Upper Klamath and Lost Subbasins Temperature TMDL and Water Quality Management Plan

Response to Comment
September 2019

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DEQ is a leader in restoring, maintaining and enhancing the quality of Oregon's air, land and water.

State of Oregon
Department of Environmental Quality

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1. Introduction

This Response to Public Comments document addresses comments and questions received regarding the Draft Upper Klamath and Lost Subbasins Temperatue Total Maximum Daily Load (TMDL) and Water Quality Management Plan (WQMP) dated May, 2019. The individuals and organizations shown in Table 1 provided comments on the Draft Upper Klamath and Lost Subbasins Temperature TMDL/WQMP during the Public Comment Period which was held from May 15 through July 15, 2019. On June 26, 2019 a public hearing was held in Klamath Falls, OR. All comments received during the public comment period have been reviewed by DEQ and addressed in this document. Comments which required modifications to the TMDL or WQMP are noted. In total there were 405 unique comments from 14 entities. DEQ made modifications to the TMDL and WQMP based on 225 of the comments.

Table 1: Commenters on the May 2019 Draft Upper Klamath and Lost Subbasins Temperature TMDL and WQMP.

Commenter #	Commenter	Acronym
1	United States Department of the Interior, Bureau of Reclamation	BOR
2	City of Klamath Falls	CKF
3	United States Environmental Protection Agency	USEPA
4	Karuk Tribe	KT
5	Klamath County Economic Development Association	KCEDA
6	Klamath Drainage District	KDD
7	Klamath Water Users Association	KWUA
8	Langell Valley Irrigation District and Horsefly Irrigation District	LVID-HID
9	Oregon Department of Agriculture	ODA
10	Oregon Farm Bureau	OFB
11	Oregon Stream Protection Coalition	OSPC
12	PacifiCorp	PC
13	Quartz Valley Indian Reservation	QVIR
14	Yurok Tribe	YT

2. Comments from: United States Department of the Interior, Bureau of Reclamation

BOR#1: Suggested Change ID #23

Description: FERC relicensing - Edits

Comment: Page 5, 1.1.3 FERC Relicensing

Section 1.1.3 does not present the most current status of the FERC relicensing process. This section needs to be updated.

Section 1.1.3 of the Draft TMDL discusses only the 2010 Klamath Hydroelectric Settlement Agreement (KHSA). This section needs to be updated to reflect material developments with regard to the KHSA since this text was originally drafted. For example, updates need to include the outcome of the Secretarial Determination process, the fate of the Klamath Basin Restoration Agreement in 2015, and the revisions to the KHSA in 2016 that resulted in an Amended KHSA. PacifiCorp is currently implementing the interim measures as required in the Amended KHSA, and dam removal by the Klamath River Renewal Corporation (KRRC), subject to obtaining required approvals from the Federal Energy Regulatory Commission (FERC) and other agencies, is now targeted for 2022, not 2020.

Response: This section (1.1.3) has been updated with new language.

BOR#2: Suggested Change ID #59

Description: Editorial - Need to Reference Monitoring Locations Consistently

Comment: Throughout the document, temperature relationships are made between river conditions and input sources to the rivers. It is realized that the relationships are modeled, but based on measured data. For specific locations in the TMDL, the nearest sources of measurements should be referenced within the actual TMDL document. The fact that this is not consistently done makes evaluation of the models and data very difficult.

Response: Station names, station IDs, and data sources have been added to figures and table throughout the TMDL that present monitoring data.

BOR#3: Suggested Change ID #60

Description: Implementation - Forces inconsistency with ESA management approach

Comment: Implementation of the Draft Upper Klamath and Lost Subbasins Temperature TMDL and Water Quality Management Plan (Plan) may result in requiring Reclamation to take actions that are inconsistent with its current water management approach for operation of the Klamath Project that was analyzed in the U.S. Fish and Wildlife Service's Endangered Species Act (ESA) 2019 Biological Opinion on the Effects of Proposed Klamath Project Operations from April 1, 2019, through March 31, 2024, on

the Lost River Sucker and the Shortnose Sucker (2019 BiOp) and the Environmental Assessment and corresponding Finding of No Significant Impact on Implementing of Klamath Project Operating Procedures 2019-2024 (2019-EA-007/ 2019-FONSI-007) prepared under the National Environmental Policy Act (NEPA).

Generally, the Plan's requirement for Reclamation to make additional water releases from facilities such as Malone Dam and Anderson-Rose Dam could result in hydrologic conditions that conflict with operating conditions prescribed in the 2019 BiOp. For example, in years of low hydrologic inflows and beginning reservoir elevations, additional release from Malone Dam could create conditions in Clear Lake Reservoir where Reclamation may exceed the 2019 BiOp incidental take statement (ITS) for Lost River and shortnose suckers. Exceedance of the ITS would trigger reinitiation of consultation under Section 7(a) 2 of the ESA as well as require additional analysis under NEPA. Further, the proposed additional water releases could impact Reclamation's ability to uphold its contractual obligations for water delivery to Klamath Project contractors. Implementation of the Plan's requirements and associated impacts to both ESA-listed species and Klamath Project contractors are likely to be further exacerbated by below-average hydrologic and drought conditions. Reclamation's required actions, as a Designated Management Agency under the Plan and associated compliance with the Clean Water Act (CWA), should not limit our ability to comply with the ESA or unnecessarily reduce our ability to meet contractual obligations to Klamath Project contractors. Therefore, Reclamation requests continued coordination with ODEQ.

Response: DEQ understands the complexity around water availability and continuing operations to meet both the needs of ESA listed species and contractual obligations. DEQ also has an obligation under the Clean Water Act to ensure listed water bodies are meeting standards to protect beneficial uses. To that end, DEQ would suggest that the USBOR continue to meet the obligations to the listed Lost River and Shortnose Sucker under the current operational requirements in the 2019 Biological Opinion. DEQ would also suggest that an evaluation of water use, loss, and conservation strategies be conducted to ensure water that is contractually assigned is being used in the most efficient way possible and return water is either drastically reduced or eliminated.

BOR#4: Suggested Change ID #61

Description: Calibration - Need Statistics for Lost Model Results

Comment: After review of the document and appendices, it appears that there is very little new work on calibration of the models used and/or improvement of model inputs. There appears to be no information related to goodness-of-fit statistics for the Lost River Model either in the original TMDL documents from 2005 or new documents provided with this TMDL. It appears that error statistics were provided for some of the tributaries (Appendix A), but not the Lost River. As provided in prior reviews of the models by the USGS, this information can be important to know just how well or not so well the models predict temperatures and may indicate problems in the data used. For this reason, we would like to see a statistical analysis using goodness-of -fit statistics provided for the Lost River Models.

Response: The Lost River Model documentation was previously referenced but now has been added to the TMDL as Appendix F (Lost River Model for TMDL development) in order to make it easier for readers to find. This documentation was updated to include goodness-of-fit statistics. The Mean Error, Mean Absolute Error, and Root Mean Square Error for daily water surface elevation and flow are included. The goodness-of-fit statistics are located in Appendix F in sections titled Appendix A_1999 and Appendix A_2004. Sections titled Appendix B_1999 and Appendix B_2004 includes water temperature calibration of the grab sample data. Error statistics are provided for the calibration and validation year i.e. 1999 and 2004 respectively. In addition, diel temperature data (2004 data) comparison plots are also included in Appendix B for six locations along the Lost River.

The calibration in the Lost River was mainly guided through visual analysis, due to data gaps associated with configuring the modeling framework (the boundary conditions only comprised of a few data points in the year at several locations and for example in 2004 when no data was available, boundary data from 1999 were used to fill in the gaps). Hence, it is unrealistic to assume that the model will be able to precisely predict each data point and every condition, making visual assessment the best way to evaluate the model performance.

BOR#5: Suggested Change ID #62

Description: Model Period

Comment: Is it realistic to assume that 1999 and 2000 data represent current conditions? Is it prudent to model only one year instead of multiple years that may have more information and data. Particularly for the Lost River effort, 1999 data is sparse and model simulations are contradictory to measurements that are available from other years. Many changes have occurred overtime in the basin since 1999 and 2000 including: increases in Klamath River flows to assist salmon down river, reductions in irrigation allocations, various piping of canals in the Lost River system, recirculation projects, other water quality improvement efforts within the basin, and water calls by the Klamath Tribes on input tributaries to Upper Klamath Lake. It would seem more appropriate to select a defined, more recent period that represents current conditions. It appears that this TMDL has been rushed to meet DEQ court order requirements with minimal, updated technical work and/or improvements since the initial previous modeling effort.

Response: Model setup is based on boundary conditions including upstream and tributary inflow, withdrawals, and atmospheric conditions. These boundary conditions represent the model's "starting point". The model was then calibrated using temperature data from 2000 and validated , or further corroborated, with observed temperature data from 2002. The model was generally able to reproduce observed water quality in the Klamath River. The model's capabilities are constrained by the limited availability and quality of monitoring data, particularly for boundary conditions to the model. The year 2000 was selected for calibration because relatively good boundary condition data and in-stream data were available. The two model years (2000 and 2002) appear to capture a variety of flows that are commonly observed in the Klamath River (see Figure 2-15 in the TMDL report). Model Configuration and Results - Klamath River Model for TMDL Development (Tetra Tech 2009) has been included as Appendix B in the TMDL and includes more details regarding the setup and calibration of the models.

Application and configuration of TMDL models were guided by an EPA-approved Quality Assurance Project Plan (QAPP). Modeling QAPPs and associated technical memoranda or addendums identify quality expectations for steps in the modeling process such as data acquisition, model selection, domain configuration, training or calibration, scenario prediction, and reporting. Such quality expectations serve multiple objectives, including requirements under 40 CFR 130.7(c)(1) that TMDLs shall account for critical conditions. We have added a new section into Chapter 2 (Section 2.3 - Water Quality Modeling Overview) which provides an overview of the modeling and the flow conditions during the model period.

More information regarding the model has also been added to Section 2.3 of the TMDL (Water Quality Modeling Overview) describing the peer review process for the model. The model went through multiple rounds of peer review. Staff with modeling expertise from DEQ, NCRWQCB, and EPA worked as a team with Tetra Tech reviewing and advising on model development and application. In 2005, the calibrated model was also reviewed by Merlynn Bender of U.S. Bureau of Reclamation (BOR), Dr. Scott Wells of Portland State University, and Brown and Caldwell under contract with the City of Klamath Falls. The NCRWQCB also had their TMDL go through an external scientific peer review in 2009 (NCRWQCB 2010). Lastly, BOR contracted the USGS to review the Keno Reservoir portion of the model. DEQ, along with EPA and NCRWQCB, considered all peer review comments and made changes to the model and documentation when appropriate.

DEQ evaluated the impact of allocations from source warming in the Klamath River using flow and temperature data collected from 2013-2018. The analysis has been added to the TMDL as Appendix I.

BOR#6: Suggested Change ID #63

Description: Editorial - add source citations to captions

Comment: Recommend citing source of data in captions, even if it's just reference to an appendix. Some tables and figures have this info in the captions already, so this comment applies to those that don't (Figure 3-26 being one example)

Response: A footnote was added to the allocation tables 3-20 through 3-29 and 4-27 through 4-40 saying "Allocations were calculated using equation 3-3/4-3, with the representative flow estimate (from StreamStat Analysis – Appendix B/from analysis of 199 modeled flows at the state line - Appendix F in DEQ 2018), and the allowable temperature increase".

BOR#7: Suggested Change ID #64

Description: Editorial - Define Upper Klamath Subbasin

Comment: Not sure I see "Upper Klamath Subbasin" clearly defined anywhere in this document. I assume it's from the head of Link River to just downstream of Keno Dam, based on the subbasin delineations in Figure 2-2, but this isn't made clear anywhere in the text. I recommend adding a definition in the text for clarity.

Response: The Upper Klamath Subbasin is defined in Chapter 3, Table 3-1, Figure 3-2, and in Section 3.2 and Sections 3.2.1. It corresponds to HUC 18010206 and generally includes all the tributaries that flow to the Klamath River downstream of Keno Dam. Additional text was added into 3.2.1 to improve the description and general location of the subbasin.

BOR#8: Suggested Change ID #65

Description: Editorial

Comment: "See black arrow at top of page", I believe this is actually referring to the purple arrow in Figure 1-2.

Response: "black" was changed to "purple'.

BOR#9: Suggested Change ID #66

Description: FERC Relicensing Discussion

Comment: Seems that this section needs to be updated.

Response: The FERC relicensing section has been updated.

BOR#10: Suggested Change ID #67

Description: Figure 1-4 - Revise Conceptual Representation

Comment: I am struggling with the processes outlined in this figure. For instance, how does floodplain roughness directly affect stream temp differently than riparian vege? Roughness can include many features other than just riparian vege (e.g., boulders, LWD, etc.). Similarly, how does shear velocity, rather than just velocity, directly affect stream temp? Unless it's getting at an indirect relationship such as a lower shear velocity increases suspended particles at a wider range of discharge, which likewise increases absorption of solar radiation in the water column, thereby increasing water temp… If this is the case, it seems that there are more obvious indirect relationships to water temp that should be, but aren't, included here. And if we're going for indirect relationships, why not add beaver, for example? Recommend a review of the mechanisms/processes and subsequent revision

Response: Floodplain roughness is directly related to vegetation. The items listed under "Near Stream Vegetation" are examples of the different ways that near stream vegetation can influence stream temperature. Floodplain roughness is one of them. Many land use activities that disturb riparian vegetation and associated flood plain areas affect the connectivity between river and groundwater sources. During high flows floodplain roughness serves to slow water down and distribute it over the floodplain so it can be captured in off-channel areas and temporary pools. The captured can be slowly released during dry periods, increasing base flow. Reduced summertime saturated riparian soils reduce the overall watershed ability to capture and slowly release stored water. There can also some thermal benefits gained from connecting the cooler, spring-fed pools and off-channel areas to the main channel.

For purposes of this graphic velocity can be used in place of shear velocity. Shear velocity was used because it relates directly to dispersion of heat.

BOR#11: Suggested Change ID #68

Description: Editorial - Revise Statement (conjecture)

Comment: "In an extremely warm year it may be possible that temperatures on the single warmest day exceed a level that is lethal to suckers (=32oC) over a short exposure time (=1 hour)." (page 16) This statement seems to be conjecture, but not fact based. It does not seem appropriate to put statements such as these in a TMDL document. Temperature measurement data does not support this statement. This statement should be removed

Response: The text in paragraph 3 below Table 2-3 has been edited to say "Temperatures that exceed 32oC over a short exposure time (=1 hour) can be lethal to suckers".

BOR#12: Suggested Change ID #69

Description: Editorial - Clarify location and temperature data

Comment: "In other locations, such as the Lost River, modeling demonstrates temperatures may actually exceed 32 C as a daily maximum." (P. 16)

This statement should be clarified. At what locations(s) does this statement refer to? Gift Road? As commented on prior and later in this review, it appears that the modeled temperatures at Gift Road as well as below Anderson-Rose look to be skewed high. Actual measured temperatures at Gift Road show a high of 28.5 degrees Celsius, while the modeling shows temperatures as high as 39 degrees Celsius (102 degrees Fahrenheit). Corresponding 1999 air temperature show air temperatures to be several degrees lower than water temperatures. Bias towards high temperatures in the model are clearly demonstrated below Anderson-Rose Dam, where several years of continuous data show all temperture levels below the 28 degree Celsius criteria, let alone the modeled temperatures that are well above 30 degrees Celsius. The reviewer is not aware of any temperatures being measured that even closely approaches 39 degrees Celsius or exceeding 30 degrees Celsius.

Response: The statement was referring to model results on the Lost River at Gift Road. We have revised this statement.

Long term observed air temperature data from KFLO-Klamath Falls and WRDO Worden were downloaded from USBR's AgriMet Co-operative Weather Network. The data at KFLO showed that the maximum air temperatures for July during the time period from 1999 to current ranged from 99.6 to 90.5 deg F (37.6 to 32.5 deg C) and during August the maximum temperatures ranged from 100.3 to 87.9 deg F (37.9 to 31.1 deg C). Similarly, the maximum air temperatures recorded at WRDO during July (2000 to current) ranged from 99.4 to 88.7 deg F (37.4 to 31.5 deg C) and during August over the years ranged from 97.9 and 88.8 deg F (36.6 to 31.6 deg C).

The simulated temperatures in the Lost River are calculated based on Heat Flux routines built into the W2 model which take into account all available sources of heat into the model. The model uses observed air temperature from the Klamath Falls Airport in the model. The air temperatures in the model for the year 1999 indicates maximum air temperatures of 37.2 and 35 deg C in July and August (98.96 and 95 deg F) respectively. The diurnal range (max minus min) of the air temperature noted from the KFLO station for example ranged from 25.6 to 15 deg C in the month of July (1999) and 23.9 to 9.5 deg C during August. During the summer irrigation period the flows below Malone Dam and Anderson Rose Dam can be very low (close to zero) making the river very shallow (with no other input into the system) and the resulting predicted water temperatures and diurnal variations during this period are essentially an artifact of the observed air temperatures specified as meteorological forcing in the model. The Anderson Rose Spill was calibrated in the model using observed flows coming out of the dam and had a reasonable calibration with RMSE of 0.62 cms and AME of 0.45 cms (the calibration plot can be found in Appendix F under Figure A_1999-4 Anderson Rose Spill (1999).

BOR#13: Suggested Change ID #70

Description: Editorial - Figure 2-1 poor quality

Comment: Figure 2-1 is not of sufficient resolution to be read in the pdf document and is therefore of limited use in this document. Recommend replacing with a higher resolution version

Response: Figure 2-1 was copied directly from the fish use designation map provided in OAR 340-041-0180 Figure 180A, therefore it cannot be improved. However, there is a footnote on the bottom of the page that includes a link to the original document so that it can be viewed with a higher resolution.

BOR#14: Suggested Change ID #71

Description: Stormwater Discharges - Provide demonstration of discharge magnitudes

Comment: Page 22, first paragraph: It would be helpful to include a brief summary of the magnitude and timing of discharges (maybe a table) so that the reader can quickly verify that the magnitude of these storm water discharges are indeed a small fraction of Klamath River flow. There are times, particularly during the summer, when Klamath River flows are relatively low and a large thunderstorm could produce substantial storm water runoff; as such, I am not confident that the statement "The flow rate in the Klamath River is large enough that storm water discharges will have not potential to increase temperature" is completely accurate, particularly during the critical period for cool water species.

Response: The narrative in this section is primarily in reference to industrial and construction stormwater discharges that are covered under an NPDES permit. As stated in the first paragraph on the same page data were not available for most of these sources so it is not possible to include a table characterizing their discharges. We based our findings that these sources are not significant from a review of literature included on that page.

BOR#15: Suggested Change ID #72

Description: Figure 2-4 - Revise text interpreting figure

Comment: Page 23 During the discharge period in the model year (year 2000) the Lost River diversion Channel warmed the Klamath River at the point of discharge by 5.5 C (Figure 2-4).

This statement is not accurate. In general based on the ODEQ TMDL graphs, these are maximum simulated increases at a specific point in time during the year 2000. In general for many months of the year, the increases indicated hover near zero based on the graphs.

Regarding the 5.5 degrees Celsius increase that corresponds to day 252 -Sept 9 of the model, the model has LRDC flows of 22.2 cms (784 cfs) and Link River flows of 4.7 cms (166 cfs). This is a quite an unusual and a non-typical flow situation. LRDC temperature data is only from grab samples, with 20 data points in year 2000. There were measurements on day 244 and 277, but the day 252 temperatures are interpolated between those two, so there definitely is uncertainty on what LRDC temperatures really were on day 252.

Response: The statement is in reference to the maximum increase calculated for 2000. The statement has been modified to clarify.

We agree there is uncertainty in the calculated increases stemming from the limited amount of temperature data in the LRDC in year 2000. DEQ calculated the temperature increases from warming in LRDC in years 2013-2018 using observed LRDC temperature collected at the USBOR Gage LRVO - Lost River Diversion Channel at Tingley and USGS gage 11507500 Link River at Klamath Falls. The maximum calculated increase was about 1.0 deg-C. This analysis was added to the TMDL as Appendix I.

BOR#16: Suggested Change ID #73

Description: Model Period - single year is inadequate representation of overall conditions

Comment: Last paragraph, Figure 2-4 It seems very problematic to utilize a single year to assess the effects of LRDC on the Klamath River water temperature. Specifically, we see the greatest change in temperature at the point of discharge in September, based on Figure 2-4. The first week or so of September 2000 was extremely wet (>1000% of avg at one point based on SNOTEL reports), meaning there was probably much less irrigation demand at that point (and hence, the LRDC began flowing back

to the Klamath River and less Lost River water would've been diverted from the LRDC, meaning if a higher proportion of warm LRDC water was then flowing into the Klamath River). The specific mechanism/process is speculative of course, but the point is that what we see in Figure 2-4 could be a consequence of this unique weather pattern and subsequent effect to Project demand and watershed hydrology rather than an "average" condition we could expect to see each year, or even a condition that leads to a verifiably more protective guideline/standard than an "average" operation. As such, I strongly recommend adding additional years to the analysis to avoid the situation in which year-specific trends drive regulatory determinations/decisions.

Response: We have added a new section into Chapter 2 (Section 2.3 - Water Quality Modeling Overview) which provides an overview of the modeling and the flow conditions during the model period. We have provided information in this section to illustrate the situation in September of 2000 that will help explain the temperature warming and the Klamath River and LRDC flow conditions at that time. DEQ has also calculated the temperature increases from LRDC and other sources warming the Klamath River in years 2013-2018 using observed temperature data collected at the USBOR Gage LRVO - Lost River Diversion Channel at Tingley and USGS gage 11507500 Link River at Klamath Falls. The maximum calculated increase during this period was 1.0 deg-C. This analysis was added to the TMDL as Appendix I.

While the Klamath River and LRDC flows may have been unusual in September of 2000 DEQ must develop a TMDL that will achieve the temperature criteria even during critical conditions, such as those that occurred in September of 2000.

BOR#17: Suggested Change ID #74

Description: Calibration - Limited calibration data and likely inaccurate predictions

Comment: Figure 2-4: Temperature increases for LRDC depicted in the graphs appear to be based on a calibrated model for the Klamath River at LRDC using one data point from September through December 2002 as shown in Appendix E, page E-19, Model Configuration and Results - Klamath River Model for TMDL Development" (Tetra Tech, Inc., 2009). This combined with the lack of goodness-of-fit statistics for the model at this location and data create serious questions as to the accuracy of temperature exceedances derived at that location.

Response: The temperature increases in Figure 2-4 were calculated using a mixing equation that utilized measured discharge flow and temperature of the Lost River Diversion Channel. The temperatures of the Klamath River were based on model outputs. The Klamath River model calibration for the Lake Ewanua - Keno Dam reach relies on both grab and continuous data collected over the the entire year. The model calibration error statistics are presented in Appendix B - Klamath River Model for TMDL Development, in Table E-1. Table E-2 show the error statistics for the validation year (2002). DEQ is satisfied with the performance of the model based on these results.

BOR#18: Suggested Change ID #75

Description: Calibration - questionable accuracy of predicted exceedences bc of limited data

Comment: Figure 2-5: Temperature increases for KSD depicted in the graphs appear to be based on a model for the Klamath River at KSD that has never been calibrated at that location. Appendix E, Model Configuration and Results - Klamath River Model for TMDL Development" (Tetra Tech, Inc., 2009). This creates questions as to the accuracy of exceedances derived for KSD.

Response: The temperature increases in Figure 2-5 were calculated using a mixing equation that utilized measured discharge flow and temperature in KSD. The temperatures of the Klamath River were based on model outputs. The Klamath River model calibration for the Lake Ewanua - Keno Dam reach relies on both grab and continuous data collected over the the entire year. The model calibration statistics are presented in Appendix B (Model Configuration and Results, Klamath River Model for TMDL Development), in Table E-1. Table E-2 shows the error statistics for the validation year (2002). DEQ is satisfied with the performance of the model based on these results.

BOR#19: Suggested Change ID #76

Description: Editorial - clarify canal ownership status

Comment: Section 2.3.2.1: USBR's Klamath Project supplies water to approximately 240,000 acres of cropland (38% of it in California and 62% of it in Oregon) (USBR 2009). Water is supplied from Upper Klamath Lake and Klamath River along with reservoirs and tributaries within the Lost River system. Included in the project are reclaimed lands of Tule Lake and Lower Klamath Lake and facilities related to flood control. In terms of its relationship with the Klamath River, the Klamath Project withdraws water from Upper Klamath Lake via A-canal and from Keno impoundment via Ady Canal and North Canal. The LRDC can transfer water to or from the Klamath River, and pump stations at the western end of KSD transfer water to the Klamath River. Except during high water, there was no surface water connection between the Klamath River and the ancestral Lost River drainage prior to construction of the Klamath Project (USBR 2005). This paragraph implies that Ady and North Canals are Reclamation owned. This is not correct. Ady and North Canals are private canals owned by the Klamath Drainage District.

Response: Language has been added to the last paragraph of Section 2.3.2.1 indicating that Ady and North canals are owned by the Klamath Drainage District.

BOR#20: Suggested Change ID #77

Description: Model Period - too short to reflect overall conditions

Comment: Figure 2-5 Same comment as above for LRDC- unusual weather in September 2000 may have prompted a lot of pumping of relatively warm water from fields or passing through of flows. Mechanism is similarly speculative, but the point is that these thermal loads may be reflective of unique weather patterns in a specific year. I strongly recommend adding additional years to the analysis to avoid the situation in which year-specific trends drive regulatory determinations/decisions.

Response: DEQ has calculated temperature increases from warming in LRDC and from other sources in years 2013-2018 using observed temperature and flow data. This analysis was added to the TMDL as Appendix I.

BOR#21: Suggested Change ID #78

Description: Riparian Vegetation - multiple effects on instream temperature

Comment: Page 24 Last sentence: "(1) the width of the river decreases the likelihood that riparian shading has much of an influence on temperature…" Riparian vegetation does more than just shade a channel. It can also maintain a higher water table elevation and thereby increase hyporheic flow, which in

turn can decrease temperature or at least provide colder-water refugia for cold- and cool water species. Riparian vegetation can also prevent bank erosion and can capture suspended sediment; bank erosion leading to additional suspended sediment can increase water temperature via the process described in my comment above for Figure 1-4. Based on Figure 1-4 there are additional mechanisms to consider here beyond physical shading of the channel. Just want to make sure these other mechanisms are also considered, particularly in light of what ODEQ acknowledges in Figure 1-4.

Response: We agree that riparian vegetation can do more than just shade a channel. We have revised Section 2.4 (Existing Pollution Sources), to include the other potential sources of warming from vegetation removal you mention, further explain our thinking and findings on vegetation for the Klamath River, and incorporate results of shade modeling conducted by Sullivan et al 2013.

Section 2.4.2.2 is revised to say:

"Vegetation removal on the Klamath River does result in some warming in the Klamath River but based on DEQ's review of available data and information does not appear to be a major source of stream warming for the following reasons: (1) Following DEQ's review of aerial imagery and LiDAR upstream of Keno Dam we conclude there appear to be areas with opportunity for vegetation restoration but the effectiveness of riparian shading on maintaining cooler stream temperatures is decreased because of the width and volume of the river. Sullivan et al 2013 conducted shading scenarios on the reaches upstream of Keno Dam and found that the daily average decrease in temperature from the current condition baseline was nearly zero near the Link River to 0.6 degrees Celsius at Keno Dam. The shading scenario assumed a continuous block of 20 meter (65.6 ft) tree heights on both banks with transmission of solar radiation through the canopy assumed to be zero (100 percent solar blockage). DEQ does not consider these assumptions to be realistic estimates of restored vegetation and it's extent upstream of Keno so the true reduction in temperature will likely be smaller; (2) the riverine portions from Keno Dam to the state line does not appear to be significantly degraded by human activity based on our review of aerial imagery and LiDAR data, and (3) since the river is constrained by steep canyon walls downstream of Keno Dam, the potential for restoring extensive riparian vegetation is limited.

Because warming from vegetation removal is not a significant source, DEQ has provided a human use allowance to land management DMAs of zero (Table 2-15). This means there can be no excess loading from land management activities such as vegetation removal."

Citation:

Sullivan, A.B., Sogutlugil, I.E., Rounds, S.A., and Deas, M.L., 2013, Modeling the water-quality effects of changes to the Klamath River upstream of Keno Dam, Oregon: U.S. Geological Survey Scientific Investigations Report 2013–5135, 60 p., http://pubs.usgs.gov/sir/2013/5135.

BOR#22: Suggested Change ID #79

Description: Editorial - suggested text revision

Comment: page 25 First bullet point May just be semantics here, but a dewatered stream channel has no water, and therefore no water temperature. Suggest revising to "Diversion dams affect stream temperature by reducing discharge in the downstream reach of the river."

Response: The first bullet point in Section 2.3.2.3 has been edited as recommended and now reads: "Diversion dams affect stream temperature by reducing discharge in the downstream reach of the river."

BOR#23: Suggested Change ID #80

Description: Editorial - Figure 2-6 Legend

Comment: Figure 2-6 Legend is duplicated (some legend entries appear twice and cover a portion of the map) and does not correspond to the correct colors (for instance, there are four IDs that the legend indicates are denoted in white, but there aren't any white colored polygons on the map). Recommend revising.

Response: This appears to be an issue that was created during the conversion to Adobe. Word version is correct and will be flagged for future reference.

BOR#24: Suggested Change ID #81

Description: Editorial - Link Dam owner/operator status

Comment: Page 27: First sentence Link Dam is owned by USBR, but operated by PacifiCorp. Please revise accordingly.

Response: Language has been added to correctly reference the Link River Dam. The information now explains that the dam is owned by USBR, but operated by PacifiCorp.

BOR#25: Suggested Change ID #84

Description: Editorial - Add detail to No Keno Dam simulation description

Comment: Table 2-19, Figures 2-10 and 2-11, and text referring to such.

It is not at all clear how ODEQ considered the effect of Keno Dam on water temp. In looking through Appendix C and the 2009 Tetra Tech memo describing the "no Keno Dam" model, there is no indication that the "no Keno Dam" model run considered that hydraulic residence time in this reach is likely to change very little, therefore largely remaining the same even in the absence of the dam, meaning that there would likely be very little change in water temperature as a direct result of removing the dam. Without a proper description of the "no Keno Dam" model, I cannot verify that this was considered in the analysis. I recommend clearly documenting the assumptions of this model run and if the underlying channel morphology/geometry of the Keno reach wasn't considered in the "no Keno Dam" model, it must be. Finally, it seems most appropriate for ease of reading if these tables are located closer to (as in adjacent to) the text that references them.

Response: Additional details about the implementation of the natural condition "no dam" scenario which includes the Keno Reef have been added to the T1BSR2 scenario section in Appendix C. The T1BSR2

model was configured based on BOR's specification that the dam was built to essentially perform the same function as the reef to maintain the elevation in this reach.

We have also completed a new model scenario (T4BSRN3) that was used to evaluate the temperature impact from Keno Dam only. For this scenario run the T4BSRN2 flow and temperature output from the Lake Ewuana to Keno CE-QUAL-W2 model was used as the input into the no dams RMA model from Keno Dam to Iron Gate Dam. The combination of these models represents the new T4BSRN3. The impacts from Keno dam only is defined as the change in 7DADM temperature within Oregon and the monthly average temperature change at stateline between two model scenarios: TOD2RN3 where dams are excluded (except Link) and a modified version of T4BSRN2 (referenced here as T4BSRN3) where only Keno dam is included. Demonstrating attainment of the HUA by Keno dam is accomplished by evaluating the change in 7DADM temperatures and monthly average temperature at stateline and requiring the appropriate reduction. The documentation of this model scenario and results were added to Appendix C.

Table 2-19 is located on the same page as the text that references this table. Table 2-20, Figures 2-10 and 2-11 follow Table 2-19 and are located on the next couple pages because there is simply not enough room on the same page where the text is located that references these tables and figures.

BOR#26: Suggested Change ID #85

Description: Editorial - Check for consistent use of 'percentile'

Comment: Page 31 "…the 'dry' condition loading capacity is calculated using the 95th percentile flow." And Table 2-8. The 95th percentile would mean 95% of flows from the relevant period of record are lower (only 5% are higher). The 95th percentile is an example of a high flow scenario. Alternatively, at the 95% exceedance flow, 95% of flows in the period of record are higher, which does represent a dry condition. As such, I think there was just a mix up in terminology here and I recommend revising wherever "percentile" is incorrectly used.

Response: The flow conditions defined in Table 2-8 and the paragraph before Table 2-8 in Section 2.4 of the TMDL report are based on flow duration intervals described in USEPA 2007 (An Approach for Using Load Duration Curves in the Development of TMDLs). A flow duration curve relates flow values to the percent of time those values have been met or exceeded. Section 1c on page 7 of USEPA 2007 identifies the flow zones as percentiles: "This particular approach places the midpoints of the moist, mid-range, and dry zones at the 25th, 50th, and 75th percentiles respectively (i.e., the quartiles). The high zone is centered at the 5th percentile, while the low zone is centered at the 95th percentile" (USEPA 2007). To clarify the meaning of the percentiles, we have edited the document narrative to use the term "flow duration percentile" instead of "flow percentile". In Table 2-8, Table 3-9, and Table 4-11 we have renamed the column that said "Applicable Flow Range" to "Applicable Flow Duration Range".

BOR#27: Suggested Change ID #87

Description: Figure 2-8 - Fix Caption

Comment: Section 2.5 Excess Load Page 34 Figure 2-8. Box plot of all available daily maximum stream temperatures for various locations upstream of Keno Dam. The red line represents the maximum cool water species target of 28 C. The figure caption does not reflect all of the boxplots contained in the figure.

The last plot refers to downstream of Keno Dam and the cold water criteria of 20 degrees Celsius. This needs corrected.

Response: The caption for Figure 2-8 has been edited to indicate that the box plots are for the Klamath River upstream and downstream of Keno Dam and the red lines represent the cool water target (28 deg C) and the cold water target (20 deg C), respectively.

BOR#28: Suggested Change ID #89

Description: Model Period - Need to Use More Recent Period

Comment: Section 2.5 Excess Load 34 Figure 2-8. Box plot of all available daily maximum stream temperatures for various locations upstream of Keno Dam. The red line represents the maximum cool water species target of 28 C.

Also, the plot states that all available temperature data were used. Is it realistic to assume that all data represent current conditions. Many changes have occurred overtime including: increases in flows to assist salmon down river, reductions in irrigation allocations, water quality improvement projects, and water calls by the Klamath Tribes on tributaries to Upper Klamath Lake. It would seem more appropriate to select a defined, more recent period that more closely represents current conditions.

Response: TMDLs typically look at water quality for the entire period of record to characterize the pollutant impairment in a waterbody. While many changes have occurred in the subbasin over the years, the monitoring station below Keno Dam shows consistent exceedances of the 20°C 7DADM for the entire period of record from 2005 to present day without much variation in water temperature during the summer critical period. Additional information has been added to this section of the report providing the period of record at each monitoring station.

BOR#29: Suggested Change ID #102

Description: Editorial - Clarify Language

Comment: General Stormwater Discharges on the Klamath River Page 43 Last paragraph

Maybe I'm missing something here, but this paragraph seems to indicate that ODEQ arrived at the temp effect of stormwater runoff in general by looking at Collins Products' point source discharge? If this is the case, I would argue that that is not an appropriate assumption for the volume (and temperature for that matter) of stormwater entering the Klamath River. Similarly, if ODEQ is assuming that just the volume of storm water from Collins Products is an appropriate assumption, I also disagreed. It almost certainly underestimates total stormwater runoff from the city, state highways, nonpoint sources related to the Project, etc. If I am misinterpreting this sentence, I recommend revising for clarity.

Response: The narrative in this section is under the Waste Load Allocation section and is in reference to industrial and construction stormwater discharges that are covered under an NPDES permit. To make it clear we changed the name of this section to "Point Source Stormwater Discharges on the Klamath River".

BOR#30: Suggested Change ID #103

Description: Flow Estimation - alternative estimation method for LRDC suggested

Comment: Discrete Nonpoint Sources Page 46 Table 2-17. Load Allocations for discrete nonpoint sources on the Klamath River.

The Tingley gage has a large cross section, low water velocities (generally), and variable backwater. This makes for noisy flow data, especially if it's windy. Reclamation calculates LRDC flow into the Klamath River using net flow derived from measurements at Wilson Dam, minus diversions at Station 48 and Miller Hill. This is likely a better estimate.

Response: The flow duration curves used for calculation of loading capacity (Appendix H) were updated to reflect the flow using your recommended method. We also added a footnote to the calculation of 7Q10 based on your comments and clarified that flows from LRDC can be calculated using your recommended method. We want to provide both options because flow measurements at Station 48 are not readily accessible to the public or DEQ unless a public records request is made to the BOR. For that reason the primary method will still rely on the Tingley gage.

BOR#31: Suggested Change ID #104

Description: Editorial - Fix flow for KSD

Comment: Discrete Nonpoint Sources Page 46 Table 2-17. Load Allocations for discrete nonpoint sources on the Klamath River. The flow calculations for KSD and LRDC within the table appear to be either wrong or switched. The maximum capacity for KSD is 600 cfs and 3000 for LRDC. Q in the table indicates a daily flow rate of 1066 cfs for KSD, which is not possible. This needs corrected.

Response: The values were switched. Table 2-17 has been updated to reflect the correct flows.

BOR#32: Suggested Change ID #106

Description: Model Assumptions - Reconsider Representation of Impacts from Keno Dam

Comment: Dams and Reservoirs pp. 47, 48 References to change in temp as a result of Keno Dam As mentioned previously, I have concerns regarding the assumptions used to arrive at the difference in temp as a result of Keno Dam ops. Recommend making assumptions more clear and reanalyzing with the consideration that this reach would have similar hydraulic residence time (and therefore water temp) w/o Keno Dam.

Response: There were many updates to the TMDL and Appendices to improve the narrative and document modeling assumptions.

BOR#33: Suggested Change ID #107

Description: Keno Dam - Consider USGS CEQUALW2 model results

Comment: Dams and Reservoirs Pages 47- 52

Entire Section in General The information presented in this section is questionable. The reductions required for Keno Dam and depicted exceedances are not realistic. Under natural conditions with natural reef restored, the character of this section of the river will change very little. Preliminary, unpublished scenario modeling by USGS in their current and updated CE-QUAL-W2 model indicates little or no temperature changes associated with reduced water elevations. ODEQ and Tetra Tech should have considered this in the modeling work used to develop the TMDL for this section of the river and reductions surmised in this TMDL.

Response: Comment noted. Note that the downstream boundary condition in the natural conditions model was configured to represent the Keno Reef based on the rating curve information provided by the U.S. Bureau of Reclamation – Klamath Basin Area Office (USBR). Details of this have been incorporated into Appendix C - Klamath Temperature Scenarios.

BOR#34: Suggested Change ID #108

Description: Keno Dam - detail assumptions and reanalyze

Comment: Allocation Attainment 53 Figures 2-13 and 2-14 As mentioned previously, I have concerns regarding the assumptions used to arrive at the difference in temp as a result of Keno Dam operations. Recommend making assumptions more clear and reanalyzing with the consideration that this reach would have similar hydraulic residence time (and therefore water temp) without Keno Dam.

Response: The temperature of Keno Dam was determined as difference between model scenarios T4BSRN2 and TOD2RN3 (see Appendix C for details.) TOD2RN3 includes the historic natural basalt reef and therefore incorporates the influence it had on temperature compared to Keno Dam. The warming and temperature reductions at Stateline presented in the Draft TMDL did not separate the portion attributed to just J.C Boyle or just Keno Dam. They were included together at Stateline. DEQ ran an additional scenario that was used to determine the temperature impact at Stateline from Keno Dam only. The results from this scenario are now included in the TMDL in sections 2.4.2.3, 2.7.3, and Appendix C. This will clarify the impact of Keno Dam and the required reductions at Stateline independent from other sources. DEQ does not expect Keno Dam to reduce warming caused by other sources.

BOR#35: Suggested Change ID #109

Description: Implementation - Future Model Updates

Comment: Dams and Reservoirs Page 48 Second to last paragraph

Not sure what to make of the assertion that ODEQ plans to refine and update models to guide TMDL implementation. What is the timeline and process for this? How will these updated models be applied if this document is meant to provide the official guidance? More details would be helpful.

Response: This statement was in reference to DMAs or other responsible persons taking initiative to build, update, or run alternative scenarios for future years in order to assist with implementation of the TMDL. An example might be using the model to evaluate different implementation options and how those options perform under different conditions. The statement was not meant to indicate that DEQ is planning to update the models. DEQ on occasion may utilize the models to to determine the effectiveness of the implementation or proposed implementation.

BOR#36: Suggested Change ID #110

Description: Allocations - Unrealistic

Comment: Allocation Attainment, pp. 52-54 Entire Section in General

The information presented in this section is questionable based on review as indicated in prior comments. The allocations presented in this section are unrealistic. As an example, the exceedances of Lost River Diversion Channel seem to be based on an outlier year with unique flow conditions. Simulations are not supported by measured data. Keno Dam and other sources in this section of the river likely do not create the level of exceedances shown at the Keno Dam outlet. The slow moving character of the river due to the Keno Reef prior to Keno Dam construction, river width in this stretch, exposure to the sun creating the natural conditions for considerable warming, temperature of water coming from UKL, and artificial boundary from 28 degrees Celsius to 20 degrees Celsius at Keno Dam all combine to make reductions at Keno Dam unrealistic. This is supported by unpublished, preliminary water quality modeling by USGS shows little or no temperature changes with water surface elevation drawdowns of two and four feet.

Response: OAR 340-041-0028(9)(a) is the site specific criteria associated with requirements for points sources in the reach designated for cool water species upstream of Keno Dam. In this section of the river, allocations are based on a specific increase in temperature above the outflow temperatures from Upper Klamath Lake. DEQ recognizes there is annual variability in hydrologic and climatic conditions and that this will influence the temperature. We have reviewed and presented temperature data and it's distribution over multiple years (e.g. see boxplots in Excess Load section). However explicitly quantifying the difference in these changes from year to year is not a necessary precondition to establishing the TMDL allocations. The TMDL allocations for sources upstream of Keno Dam (as well as those downstream) are based on an allowed amount of warming. We have provided a set of equations in the TMDL for how allocations and compliance with allocations are calculated. Calculation of the allocation does not require the use of absolute river temperature because the allocation is expressed as an excess load equal to the product of the allocated change in temperature, river flow, and conversion factor. To evaluate compliance with the allocation, the TMDL specifies that the upstream temperature and flow be used, or the temperatures at USGS 11507500- Link River at Klamath Falls for this calculation. For DMAs managing KSD and LRDC, DEQ added this information and the equation into the TMDL since it was not included in the draft. Using this approach accounts for temperature differences from year to year.

BOR#37: Suggested Change ID #114

Description: Editorial - Revise bullet or analysis as appropriate

Comment: Margin of Safety Page 55 Second bullet point

I assume this is referring to flows in the Klamath River and not those from the Project (i.e., KSD and LRDC). When I look at the USGS gages below Iron Gate Dam and at Keno Dam, I do not think this is an accurate statement, particularly when considering the critical period for cool- and coldwater fish (i.e., June - Sept). In fact, it looks like flows in July and August 2000 are above current minimums at IGD, which means flows under the current BiOp could be lower during this period in certain years, this year being one of those years. A brief look at a time series for both gages since 2000 indicates that discharge during the baseflow period has been lower than what was observed in 2000 numerous times, particularly recently. Aside from that and as stated above, I am concerned about using a single year for development of TMDL guidelines, particularly when applied to Project operations. Regardless, I recommend including information to support this statement, if it exists. If it does not, the approach (and this statement, at a minimum) should be reconsidered and revised

Response: This statement was referring to the very low flows observed in September of 2000 which we believe are lower then Bi-Op targets. Allocations were developed to attain criteria even under these very low flow critical conditions.

We have updated the bullet to say:

Allocations were developed to meet all flow conditions. During September of the model year (year 2000) the flows was very low approaching 7Q10 conditions. These flows are less than more recent flow requirements (i.e. BOR Klamath Project Operations and PacifiCorp Klamath Hydro Project Biological Opinion flows).

BOR#38: Suggested Change ID #115

Description: Editorial - Figure 3-1

Comment: Human Use Allowance Page 66 Figure 3-1

Figure 3-1 is not of sufficient resolution to be read in the pdf document and is therefore of limited use in this document. Recommend replacing with a higher resolution version.

Response: Figure 3-1 was copied directly from the fish use designation map provided in OAR 340-041-0180 Figure 180A, therefore it cannot be improved. However, there is a footnote on the bottom of the page that includes a link to the original document so that it can be viewed with a higher resolution.

BOR#39: Suggested Change ID #117

Description: Editorial - Fix 'COLD'

Comment: P, 67 Third paragraph

Why is cold in all caps? Is this an acronym? I assume not and therefore recommend revision.

Response: COLD in all caps is how the California North Coast Water Quality Control Board references their designated beneficial uses in the Basin Plan (See Chapter 2). COLD refers to water designated as Cold Freshwater Habitat. It is defined as "Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates." Additional text was provided in Section 3.1.2.4 to clarify the meaning of "COLD". A reference to the basin plan was also added. This was done throughout the TMDL document where it was referenced.

Basin Plan:
https://www.waterboards.ca.gov/northcoast/water_issues/programs/basin_plan/basin_plan_documents/

BOR#40: Suggested Change ID #118

Description: Editorial - Revise for clarity

Comment: State of California Water Quality Standards P. 73 Third sentence

This sentence is confusing- the Klamath River flows through the Cascade range and partially originates (above UKL) in the Cascade range. The river is not 120 miles east of the Cascade range, though maybe some sections of the Lost River subbasin are. It may be 120 miles east of the coast at points… Recommend revising for clarity

Response: The third sentence of Section 3.2.4 (Climate) has been edited to remove the distance of approximately 120 miles.

BOR#41: Suggested Change ID #119

Description: Editorial - Figure 3-10 Add operator information

Comment: Hydrology Page 78 Figure 3-10

It would be informative to include information regarding who operates these stations and where one can access this data. It may be that many of these were temporary temperature loggers placed for the purpose of this TMDL, but that is not entirely clear. Please add this additional information in the caption. Finally, if these are not operated by a state or federal agency with vetted QA/QC procedures, information about data collection and processing is also necessary (such as in an appendix).

Response: The sources of the temperature data have been added to the captions of Figures 3-11 through Figure 3-19 as well as Table 4-7.

BOR#42: Suggested Change ID #120

Description: Editorial - Figure 3-11 add text for context/information

Comment: Hydrology Page 79 Figure 3-11

Does this include year-round 7DADM or just within a specific period? And how many years are concluded in the dataset? Also, what is the x inside each box? The average? Recommend adding additional info to the caption for clarity.

Response: Table 3-6 has been added above Figure 3-11 summarizing all available data.

Additional information has been added to the caption of Figure 3-11 describing the data summarized in the box plots.

BOR#43: Suggested Change ID #122

Description: Editorial - Figure 3-12 Revise Caption

Comment: Hydrology Page. 79 Figure 3-12

USGS Station 11510000 does not have publicly available water temperature data. This data appears to be taken from OWRD's Spencer Creek gage, OWRD gage # 11510000 (that's four zeroes). Recommend revising the caption accordingly

Response: "USGS" has been changed to "OWRD" in the caption for Figure 3-12.

BOR#44: Suggested Change ID #123

Description: Model Period - Describe Data Limitation or Use Multiple Years

Comment: Hydrology Pages. 79-83 Figures 3-12 - 3-19

It appears that only a single year of data is utilized for these figures. As mentioned in the chapter 2 comments above, this could be highly problematic. As such, these temperatures are likely not representative of what is likely to occur in most years. There may be a data limitation here, which is fine, but that should be described at the outset. If that is not a limitation, I recommend utilizing a data set that includes multiple years.

Response: Language has been added to Section 3.2.7 stating that there are limited amounts of data available for the tributaries in the Upper Klamath subbasin. The data shown in Figures 3-12 through 3-19 are used to characterize the temperature impairment in the subbasin and to support the use of May 1 through September 30 as the critical period, as the exceedances of the water quality criterion consistently occur during these months. While Figures 3-12 through 3-19 do show all available data at these locations, it should be noted that these are not the only data the TMDLs were based on for these waterbodies.

Loading capacities were calculated for each of the ungaged tributaries to the Klamath subbasin to determine the TMDLs. Loading capacities were calculated using flow estimates from StreamStats (see more details in Appendix H of the TMDL), which calculated a range of expected flows for each tributary based on the drainage area, mean annual precipitation, and other basin characteristics. The approach used to estimate flow for Spencer Creek was based on observed flow data. A load capacity curve was developed using different flow conditions for each water quality limited segment, which characterizes the allowable thermal load capacity for a range of expected flows throughout the year.

BOR#45: Suggested Change ID #125

Description: Editorial - Figure 3-19 Revise or Remove Inappropriate References

Comment: Hydrology Page. 83 Figure 3-19

Why does this figure only include data through late June? Are the x-axis labels incorrect? This figure is referenced in many statements describing temp trends beyond late June, which is inappropriate since this figure does not contain data to support such statements. Recommend correcting the x-axis labels if they are incorrect or removing this figure from statements referencing temp trends beyond late June if the labels are indeed correct

Response: Data are only available at Johnson Creek for April 30, 2001 through June 11, 2001. The references to this figure have been removed from Section 3.3.

BOR#46: Suggested Change ID #127

Description: Editorial - Correct Station #

Comment: Page 83 Sentence with Spencer Creek station ID # Station # is incorrect- needs another zero at the end

Response: Another zero was added to the Spencer Creek station ID in Section 3.3.

BOR#47: Suggested Change ID #129

Description: Editorial - do not reference Figure 3-19

Comment: Page 83 Last sentence of first paragraph

Sentence does not apply to Figure 3-19 since only data through late June is provided; recommend not referencing Figure 3-19 here or in other statements discussing temp trends beyond late June.

Response: The references to Figure 3-19 have been removed from Section 3.3.

BOR#48: Suggested Change ID #130

Description: Editorial - text revision

Comment: Page 88 Second sentence of second full paragraph

Intra-gravel flow seeps in areas of greater substrate diversity? If that is not what was meant, then I recommend removing this sentence since the following gets at streambed (i.e., channel geometry/morphology) complexity.

Response: The 3rd sentence in the 5th paragraph of Section 3.4.2.2 (Fewer hyporheic seeps) has been updated. The two original sentences were both supporting the observation of cooler temperatures in areas of higher streambed complexity. The two sentences have been edited and combined for clarity.

BOR#49: Suggested Change ID #131

Description: Editorial - Remove Figure 3-23 and fix reference

Comment: PP. 89 -90 Entire Section and Figure 3-23

This appears to be an error. The reference to Klamath Project irrigation districts and map in Figure 3-23 do not pertain to tributaries discussed in this section as they were addressed in Chapter 2. This section needs to be edited and Figure 3-23 removed.

Response: The information provided in this section are to provide the reader context on the diversions throughout the Upper Klamath River Subbasin. The districts reside in the Upper Klamath Subbasin and manage water that is not addressed in the Klamath River Chapter 2 TMDL. This information is relevant to the overall message of Section 3.4.2.3 Hydromodification: Dams and Diversions.

BOR#50: Suggested Change ID #135

Description: Editorial - "dewatering"

Comment: Page 89 First bullet pt Same comment as above for chapter 2 regarding use of the term "dewatering"

Response: DEQ has addressed the comment and "dewatering" was changed to "reducing discharge" in the 1st bullet of Section 3.4.2.3.

BOR#51: Suggested Change ID #136

Description: Editorial - Figure 3-23

Comment: Page 90 Figure 3-23 Same comment as above for chapter 2 regarding legend; also, it's difficult to even tell where the Klamath River is in this map and therefore I can't tell if this map even provides useful info for the tributaries of interest. I'd recommend a map at the scale similar to Figure 3-24 for easier orientation.

Response: The figure has been updated with a current map from the Bureau of Reclamation.

BOR#52: Suggested Change ID #137

Description: Editorial - remove reference to Figure

Comment: Page 93
Second sentence This figure does not support the statement in this sentence; recommend removing reference.

Response: The reference to Figure 3-17 and table 3-9 has been removed from the second sentence in Section 3.4.2.4.

BOR#53: Suggested Change ID #140

Description: Editorial - Check Figure Captions

Comment: Pages 147, 148 Figures 4-4 and 4-5

These figures appear to cover the same geographic area, but one is labeled as the Lost subbasin and the other as the Klamath River watershed. I think the former is more appropriate and recommend revising figure captions in chapter 4 accordingly

Response: Subbasin name in Figure 4-5 has been changed to "Lost subbasin".

BOR#54: Suggested Change ID #142

Description: Diversion Information - Check information for A Canal

Comment: Page 154

Typical water diversions through the A Canal over extended periods of time are on the order of 1,000 cubic feet per second. This statement is inaccurate. Diversions into the A Canal very rarely exceed 1,000 cfs. For example, during the years used in this TMDL analysis (1999 for Lost River and 2000 for Klamath River) the A Canal only exceeded 1,000 cfs in 1999 and never exceeded 1,000 cfs in 2000. Maximum diversion into the A Canal can exceed 1,000 cfs on rare occasions, with an average diversion during the 1999 irrigation season (3/1/1999-10/15/1999) of 621 cfs and an average diversion during the 2000 irrigation season (3/1/2000-10/15/2000) of 600 cfs. Typical water diversions through the A Canal over extended periods of time are on the order of 600 to 800 cfs.

Response: DEQ has modified the sentence to say: "Water diversions through the A Canal can be as high as 1,000 cubic feet per second with the average summer diversion rate ranging from 600-800 cubic feet per second".

BOR#55: Suggested Change ID #144

Description: Editorial - LRDC description

Comment: page 155 The Lost River Diversion Canal begins at the Wilson Dam and ends at the confluence with the Klamath River. The sentence should read "[t]he Lost River Diversion Channel begins at the Lost River Diversion Dam and ends at the confluence with the Klamath River". The Lost River Diversion Channel is not an irrigation canal, it is a flood control water conveyance facility, or a diversion channel. In addition, the proper name for the dam that creates "Wilson Reservoir" is the Lost River Diversion Dam, as there is no facility named "Wilson Dam". The Lost River Diversion Dam is also commonly known as "Horseshoe Dam".

Response: The first sentence of paragraph 5 in Section 4.2.6.1 has been changed to read "The Lost River Diversion Channel begins at the Lost River Diversion Dam and ends at the confluence with the Klamath River".

BOR#56: Suggested Change ID #145

Description: Editorial - LRDC description correction

Comment: Page 155 The canal is capable of moving 3,000 cubic feet per second either from the Klamath River during irrigation season, or from the Lost River during periods of high flow in the Lost River drainage.

This statement is inaccurate. The Lost River Diversion Channel is not capable of moving 3,000 cfs from the Klamath River during irrigation season. The maximum capacity of facilities diverting and pumping water from the Lost River Diversion Channel is less than 700 cfs. Therefore the Lost River Diversion Channel is not capable of moving 3,000 cfs from the Klamath River. The Lost River Diversion Channel is only capable of moving 3,000 cfs from the Lost River to the Klamath River during flood control operations.

Response: The reference to 3,000 cfs in paragraph 5 of Section 4.2.6.1 has been removed and reference to the operation of the LRDC has been added.

BOR#57: Suggested Change ID #147

Description: Editorial - Diversion information correction

Comment: Page 155 During irrigation season, water is delivered from the Klamath River using the Miller Hill Pumping Plant near the Station 48 Drop into the Lost River.

This statement is incorrect. Station 48 is a gated diversion approximately 3 miles to the east of Miller Hill Pumping Plant diversion. The majority of the water diverted from LRDC is at Station 48 and lesser amounts are diverted at Miller Hill Pumping Plant.

Response: Language has been updated in Section 4.2.6.1 to indicate that "During irrigation season, water is delivered from the Klamath River using the Miller Hill Pumping Plant and via the Station 48 Drop into the Lost River.

BOR#58: Suggested Change ID #148

Description: Editorial - Global Replace Lost River Diversion Channel not Canal

Comment: Page 155 First sentence Revise universally to Lost River Diversion Channel, not “Canal”

Response: “Lost River Diversion Canal” has been changed to ’Lost River Diversion Channel" throughout the TMDL document and its appendices.

BOR#59: Suggested Change ID #149

Description: Editorial - Ady Canal not Ady Canals

Comment: Page 155 First sentence Revise “Ady Canals” to “Ady Canal”

Response: Change was made to the document.

BOR#60: Suggested Change ID #160

Description: Data - additional data available

Comment: Temperature Data Page 157 “Table 4-7 and Figure 4-14 show the maximum temperature at each monitoring station compared to the applicable criterion. Exceedances of the criteria ranged from to 0 to 100 percent. Continuous temperature data was not available on the Lost River and the maximum temperatures reflect grab data. There were no exceedances of the 28°C criterion on the Lost River with the available grab data.”

This statement is inaccurate. There is extensive continuous water temperature data available for the Lost River, including extensive data collected by ODEQ. With the exception of the full year of data collected by Reclmation in 2000 below Anderson Rose, this continuous data is within the ODEQ database. The data shows no exceedances above 28 degree Celsius. In addition to the data ODEQ already possesses, the Bureau of Reclamation has collected extensive continuous water temperature data at many locations throughout the Lost River watershed since the early 1990’s as well as 2003, 2004, 2005, and 2006.

Response: Table 4-7, Figure 4-14 and Figure 4-15 have been updated to include available temperature data from the Bureau of Reclamation.

BOR#61: Suggested Change ID #161

Description: Editorial - Table 4-7

Comment: Page 157 Table 4-7 This table should include period of record for each site

Response: The period of record was added for each monitoring site in Table 4-7.

BOR#62: Suggested Change ID #162

Description: Editorial - Figure 4-14 add details to caption

Comment: Temperature Data Page 159 Figure 4-14 Recommend defining "BBNC + HUA" in caption. I also recommend adding to the caption the period of record for this data; in the narrative below, it sounds like it's perhaps it's just for the month of August within a single year. Typically, it is best practice to write figure and table captions such that the tables and figures can stand alone without the narrative of the chapter

Response: The definitions of BBNC and HUA have been added to the caption of Figure 4-14. The period of record for each station varies and, therefore, cannot be included in the caption. However, the period of record for each station has been included in Table 4-7 above Figure 4-14.

BOR#63: Suggested Change ID #163

Description: Data - additional data available (2)

Comment: Seasonal Variation and Critical Period Page 159 "Continuous daily data were not available in the Lost River for comparison to the applicable criterion therefore, simulated temperatures for the existing conditions on the Lost River at the Oregon California state line were evaluated and compared to the cool water species target to support the selection of the critical period. The daily maximum values were calculated based on the 1999 continuous model hourly temperature output."

See prior comments. Continuous records are available from 2000 through 2006. Records indicate that continuous data from 2001 through 2003 data are within the ODEQ database. Why was this data not used?

Response: All available continuous data known to DEQ have been included in updates to Table 4-7 and Figure 4-14. U.S. Bureau of Reclamation data on the Lost River at Gift Road show an exceedance of the 28 degrees Celsius target in July 1998.

BOR#64: Suggested Change ID #164

Description: Model Results - appear to be overestimating

Comment: Seasonal Variation and Critical Period Page 160 Figure 4-15. Lost River temperature at the Oregon-California state line (1999).

It appears that the model simulations are overstimating water temperatures (biased high). Available temperature measurement records, including continuous measurements mentioned in prior comments, indicate no exceedances of the 28 degree Celsius threshold.

Response: Additional temperature data (collected by BOR) have been added to Table 4-7 that show an exceedance of the 28 degree Celsius TMDL target at the Lost River at Gift Road in July 1998.

BOR#65: Suggested Change ID #165

Description: Chapter 4 - Seasonal Variation and Critical Period

Comment: Seasonal Variation and Critical Period P. 160 "The critical condition is determined as the period when the available data show the daily maximum temperatures exceed the applicable criterion. The critical period also defines the time period when the TMDL allocations, reserve capacity, and margin of safety apply. Based on these data, the critical condition is defined as May 1 through September 30 in order to account for year to year variability when seven day average daily maximum stream temperature may exceed the applicable criteria past August. Allocations, reserve capacity, and margin of safety developed for waterbodies addressed in this chapter shall apply during the May 1 – September 30 critical period. However, supplementary surrogate implementation measures include shade targets provided by restored vegetation apply year-round."

As mentioned in prior comments, available measured data do not show exceedances. Even if ODEQ relies on this simulated data, which appears flawed and biased towards high temperatures, exceedances at Lost River Stateline only occur June through August, not May through September.

Response: We have defined the critical period as May 1 – September 30 in order to account for periods of warming where warm air temperatures may occur earlier or later than is typical. This is considered an implicit margin of safety. We have clarified this in the Margin of Safety section (section 4.9).

BOR#66: Suggested Change ID #166

Description: Figure 4-15 - add detail to caption and additional explanation

Comment: Seasonal Variation and Critical Period P. 160, Figure 4-15

These are simulated? If so, recommend updating the figure caption with this info. Also, why is it that this simulated temp for the month of August is so much higher than the max observed during August (as presented in Table 4-7 and Figure 4-14)? Also, why do hourly temps drop so low in the summer? I highly doubt daily min temps are actually approaching and dropping below 14 degrees C as indicated. That is a pretty dramatic diel fluctuation that I have a hard time believing. Additionally, Appendix D does not indicate how the model is calibrated, which is a concern. Without additional documentation, it is not possible to assess the validity of the data underlying this portion of the TMDL.

Response: The caption for Figure 4-15 has been updated. Appendix D of the Draft TMDL included a reference to the calibration report which is included as part of the Upper Klamath and Lost River Subbasins Nutrient TMDL (DEQ 2019). We recognize it would be more convenient to find and therefore easier for readers to understand how the Lost River model was constructed and calibrated if was also

included in the Temperature TMDL also. We have included this document in the final temperature TMDL as Appendix F.

The data in Table 4-7 and Figure 4-14 are based on continuous data available at the several monitoring stations identified for years other than the calibration year which was 1999. During 1999 only grab sample data were available during calibration and did not allow for calculation of a 7DADM.

The simulated temperatures are calculated based on Heat Flux routines built into the model which take into account all available sources of heat into the model. The model uses observed air temperature from the Klamath Falls Airport in the model. The observed minimum temperatures at KFLO can go quite low during the month of August. In 1999 the air temperatures ranged from 3.52 deg C to 14.15 deg C. Also the diurnal range (max minus min) of the air temperature noted from the KFLO station ranged from 23.5 to 9.5 deg C in the month of August (1999). During the summer irrigation period the flows below Anderson Rose Dam can be very low (close to zero) making the river very shallow (with no other input into the system) and the resulting predicted water temperatures and diurnal variations during this period are essentially an artifact of the observed air temperatures specified as meteorological forcing in the model. The Anderson Rose Spill was calibrated in the model using observed flows coming out of the dam and had a reasonable calibration with RMSE of 0.62 cms and AME of 0.45 cms (the calibration plot can be found in the appendix of the modeling report under Figure A_1999-4 Anderson Rose Spill (1999).

BOR#67: Suggested Change ID #170

Description: Editorial - "dewatering" 2

Comment: Hydromodification: Dams, Diversions, and Water Management Districts Page 166

First bullet pt Same comment as for previous chapters regarding use of term "dewatering"

Response: DEQ has addressed the comment and "dewatering" has been changed to "reducing discharge" in the 1st bullet of Section 4.4.2.3.

BOR#68: Suggested Change ID #171

Description: Editorial - percentile vs exceedence

Comment: Loading capacity P. 172 Last paragraph and Table 4-11

Same comment as for previous chapters regarding use of percentile vs. exceedance

Response: The flow conditions defined in Table 4-11 and the paragraph before Table 4-11 in Section 4.5 of the TMDL document are based on flow intervals described in USEPA 2007 (An Approach for Using Load Duration Curves in the Development of TMDLs). Section 1c on page 7 of USEPA 2007 identifies the flow zones as percentiles: "This particular approach places the midpoints of the moist, mid-range, and dry zones at the 25th, 50th, and 75th percentiles respectively (i.e., the quartiles). The high zone is centered at the 5th percentile, while the low zone is centered at the 95th percentile" (USEPA 2007). No changes have been made to the TMDL to be consistent with EPA guidance on the use of load duration curves in TMDL development.

BOR#69: Suggested Change ID #172

Description: Appendix B - add StreamStats estimates for KSD

Comment: Loading Capacity P. 176 Table 4-18. Thermal loading capacity by flow condition for Klamath Straits Drain ….Estimated from StreamStats

The estimates from StreamStats analysis (Appendix B) for Klamath Straits Drain do not appear anywhere in Appendix B. They should be added.

Response: The flow estimates used to calculate the Klamath Straits Drain loading capacity were added to Appendix B.

BOR#70: Suggested Change ID #173

Description: Appendix B - Add Streamstats estimates for Miller Creek

Comment: Loading Capacity P. 179 Table 4-23. Thermal loading capacity by flow condition for Miller Creek…..Estimated from StreamStats analysis (Appendix B).

The estimates from StreamStats analysis (Appendix B) for Miller Creek do not appear anywhere in Appendix B. They should be added.

Response: The flow estimates used to calculate the Miller Creek loading capacity were added to Appendix B.

BOR#71: Suggested Change ID #174

Description: Data - consider additional data from Reclamation and USGS

Comment: Excess Load P. 181

Table 4-26. Lost River excess thermal load summary at locations not meeting criteria.

This table shows an “observed DM Exceeding Criteria” value of 37.61 degrees centigrade for the Lost River at Stateline Road location. Continuous monitoring data collected below Anderson-Rose Dam from 2000 through 2003 (collected by Reclamation and ODEQ and within the ODEQ water quality database) indicate a maximum value of 27.72<U+2103> on August 01, 2000. The full year of 2000 continuous temperature data collected by Reclamation downstream of Anderson-Rose Dam appears not to be in DEQ’s database. We can provide upon request. Lower temperatures below Anderson-Rose Dam as compared to TMDL simulated temperatures also are supported by U. S. Geological Survey continuous temperature measurements in 2002, which show a maximum temperature value of ~ 26 degrees Celsius at Hatfield, California (downstream of Stateline) (USGS, 2005). Based on these examples from measured temperature data, exceedances of the 28<U+2103> criteria have never been observed. Extensive actual observed water temperature data exists for the Lost River and should be used rather than using inaccurate simulated/modeled water temperature data.

Reference Cited U.S. Geological Survey, 2005. Water-Quality Data from 2002 to 2003 and Analysis of Data Gaps for Development of Total Maximum Daily Loads in the Lower Klamath River Basin, California. Scientific Investigations Report 2004-5255, U.S. Geological Survey, Reston, Virginia.

Response: Models results were used to characterize the excess temperatures at Gift Road and Stateline because continuous data is sparse at these locations and this is where the model predicts the maximum warming occurs. We acknowledge your concerns about the model results and that you believe the modeling results to be wrong. We have modified the TMDL language to clarify that implementation of the TMDL load allocations, surrogate measure (e.g. the flow targets), or other management strategies are only necessary when temperatures of the Lost River at these locations exceed 27.9 degrees Celsius as measured using temperature monitoring probes placed in the Lost River. In order for DEQ to properly evaluate compliance with this monitoring based approach we have added monitoring and data reporting requirements into the water quality management plan.

BOR#72: Suggested Change ID #175

Description: Malone Dam - flow target

Comment: In-Stream Flow Target P. 204

"Between May 1 and September 30, The Malone Diversion Dam shall maintain a minimum of 25 cfs of instream flow in the Lost River in order minimize warming in the Lost River above 27.9 C caused by water diversions at Malone Dam. Figure 4-26 illustrates the flow target compared to the flows in the model year (1999)." This in-stream flow target will almost certainly conflict with the 2019 BiOp (Biological Opinion on the Effects of Proposed Klamath Project Operations from April 1, 2019, through March 31, 2024, on the Lost River Sucker and the Shortnose Sucker) in years in which Clear Lake Reservoir surface elevation is at or near BiOp minimums for the protection of suckers. Therefore, releases are not made from Clear Lake Reservoir. Water level elevation requirements at Clear Lake Reservoir are established as a protective measure to ensure the continued persistence of a well established and healthy sucker population in the lake. Even if Malone Dam does not divert water entering the Lost River from the East Fork Lost River and other tributaries between Clear Lake and Malone, the total Lost River channel discharge is unlikely to be 25 cfs from May 1 to Sept 30. In other words, it is necessary to release water from Clear Lake Reservoir to meet this in stream flow target, but releases from Clear Lake Reservoir in certain years will be in conflict with the 2019 BiOp. The USFWS and Reclamation is aware of the presence of suckers in the Lost River below Malone Dam, but scientific information suggests that they don't actively spawn in the Lost River below the dam. The USFWS considers the Clear Lake sucker population the priority.

Response: DEQ understands the complexity around water availability and continuing operations to meet both the needs of ESA listed species and contractual obligations. DEQ also has an obligation under the Clean Water Act to ensure listed water bodies are meeting standards to protect beneficial uses. To that end, DEQ would suggest that the USBOR continue to meet the obligations to the listed Lost River and Shortnose Sucker under the current operational requirements in the 2019 Biological Opinion. DEQ would also suggest that an evaluation of water use, loss, and conservation strategies be conducted to ensure the efficient use and management of water that is contractually assigned that could help with meeting multiple needs, including TMDL allocations.

BOR#73: Suggested Change ID #176

Description: Data - Consider additional data from Reclamation and USGS re: Anderson Rose Dam

Comment: In-Stream Flow Target P. 204 "Between May 1st and September 30th, the Anderson Rose Diversion Dam shall maintain a minimum of 11 cfs of instream flow in the Lost River in order minimize

warming in the Lost River above 27.9 C. Figure 4-27 illustrates the flow target compared to the flows n the model year (1999)."

Continuous monitoring data collected below Anderson-Rose Dam from 2000 through 2003 (collected by Reclamation and ODEQ and within the ODEQ water quality database) indicate a maximum value of 27.72<U+2103> on August 1, 2000. The full year of 2000 continuous temperature data collected by Reclamation downstream of Anderson-Rose Dam appears not to be in DEQ's database. We can provide upon request. Lower temperatures below Anderson-Rose Dam as compared to TMDL simulated temperatures also are supported by U. S. Geological Survey continuous temperature measurements in 2002, which show a maximum temperature value of ~ 26 degrees Celsius at Hatfield, California (Stateline) (USGS, 2005). Based on these examples from measured temperature data, exceedances of the 28<U+2103> criteria have never been observed. Extensive actual observed water temperature data exists for the Lost River and should be used rather than using inaccurate simulated/modeled water temperature data.

Reference Cited U.S. Geological Survey, 2005. Water-Quality Data from 2002 to 2003 and Analysis of Data Gaps for Development of Total Maximum Daily Loads in the Lower Klamath River Basin, California. Scientific Investigations Report 2004-5255, U.S. Geological Survey, Reston, Virginia.

Response: All available continuous data known to DEQ have been included in updates to Table 4-7 and Figure 4-14. U.S. Bureau of Reclamation data on the Lost River at Gift Road show an exceedance of the 28 degrees Celsius target in July 1998.

BOR#74: Suggested Change ID #177

Description: Editorial - revise statement

Comment: Site Specific Effective Shade Simulations P. 206 "Large woody debris provides shelter and supports food sources that are crucial for the survival of salmon in the Lost subbasin."

This statement is inaccurate, as no salmon are present within the Lost River subbasin.

Response: The last sentence before Figure 4-28 has been edited to state "Large woody debris provides shelter and supports food sources that are crucial for the survival of fish in the Lost subbasin".

BOR#75: Suggested Change ID #178

Description: Editorial - Revise

Comment: Federal Irrigation Project P. 225

"Upon completion of dam removal on the Klamath River, the BOR will assume ownership of the Link River Dam and the Keno Dam."

Reclamation already owns Link River Dam. Should dam removal occur Reclamation would take over operation and maintenance of Link River Dam.

Response: The first sentence of Section 5.2.1.4 has been changed to "The BOR currently owns the Link River Dam and upon completion of dam removal on the Klamath River, will assume ownership of the Keno Dam. Should dam removal occur, BOR would take over operation and maintenance of Link River

and Keno dams and incorporate the management of these two facilities in their source specific implementation plans".

BOR#76: Suggested Change ID #179

Description: Editorial - Revise (2)

Comment: Federal Irrigation Project - US Bureau of Reclamation P. 248

"The BOR upon completion of dam removal on the Klamath River will assume ownership of the Link River Dam and the Keno Dam."

Reclamation already owns Link River Dam. Should dam removal occur Reclamation would take over operation and maintenance of Link River Dam.

Response: The 2nd paragraph of Section 6.3.7.2.4 has been edited to read "The BOR currently owns the Link River Dam and upon completion of dam removal on the Klamath River, will assume ownership of the Keno Dam. Should dam removal occur, BOR would take over operation and maintenance of Link River and Keno dams and incorporate the management of these two facilities in their source specific implementation plans".

BOR#77: Suggested Change ID #180

Description: Model Results - Lost River biased high based on observed data

Comment: D.2 Lost River Model-Existing Conditions

P. D-5 Figure D-2. Lost River temperature at Stateline

TMDL model simulations of 1999 temperature conditions for the Lost River system appear to be biased towards high, unrealistic temperatures. Continuous monitoring data collected below Anderson-Rose Dam from 2000 through 2003 (collected by Reclamation and ODEQ) indicate a maximum value of 27.22<U+2103> on August 01, 2000. The full year of 2000 continuous temperature data collected by Reclamation downstream of Anderson-Rose Dam appears not to be in DEQ's database. We can provide upon request. Lower temperatures below Anderson Rose Dam as compared to TMDL simulated temperatures also are supported by U.S. Geological Survey continuous temperature measurements in 2002, which show a maximum temperature value of ~ 26 degrees Celsius at Hatfield, California (Stateline) (USGS, 2005). Based on these examples from measured temperature data, exceedances of the 28<U+2103> criteria have never been observed. Extensive actual observed water temperature data exists for the Lost River and should be used rather than using inaccurate simulated/modeled water temperature data.

Reference Cited U.S. Geological Survey, 2005. Water-Quality Data from 2002 to 2003 and Analysis of Data Gaps for Development of Total Maximum Daily Loads in the Lower Klamath River Basin, California. Scientific Investigations Report 2004-5255, U.S. Geological Survey, Reston, Virginia.

Response: The simulated temperatures in the model are calculated based on heat flux routines built into the W2 model which take into account all available sources of heat into the model and reflect the conditions using best available data at the time of model development for the year 1999. The maximum increases during June through August occur at Stateline and Gift Road, not at locations of monitoring data

directly downstream of Anderson Rose and Malone. The temperatures below Malone Dam and Anderson Rose Dam reflect the conditions and heat fluxes being specified. During the summer irrigation period the flows below the dams can be very low (close to zero for several days in 1999 during summer) making the river very shallow (with no other input into the system) and the resulting predicted water temperatures and diurnal variations during this period are essentially an artifact of the observed air temperatures specified as meteorological forcing in the model i.e. it is reflecting the conditions using the best available data. Additionally, the Lost River model was developed based on conditions that reflect the year 1999 and cannot be compared to conditions during different years.

The TMDL allocations are set at a level necessary to achieve the temperature criteria. In turn the establishment of the allocations to attain the criteria is less reliant on the year to year variability. TMDL analysis does focus on identifying the critical conditions and establishing allocations such that the criteria will be achieved even under critical conditions. The flows observed in the Lost River in 1999 were near zero during the warmest time of the year, therefore the model evaluates the allocations during a critical period. Finally, the load allocations for the Lost River were set based on a criteria of 28 deg C and any temperatures above 28 deg C must be reduced.

BOR#78: Suggested Change ID #181

Description: Model Results - Malone dam simulated data for 1999 too high

Comment: D.5 Existing Condition Plots P. D-16 Figure D-5 Lost River at Gift Road

TMDL simulated data for 1999 below Malone Dam commonly exceed 34<U+2103> with a maximum temperature value of ~ 39 deg-C (102 Fahrenheit) with exceedances above 28<U+2103> all through the months of May through September 1999. Available discrete measurement data collected below Malone Dam in 1993-1998 and prior analysis by Reclamation in the Lost River Habitat Assessment (2009) indicate a one-time, maximum high temperature of 28.8 degrees Celsius (<U+2103>) below Malone Dam in mid-July, 1998. Temperatures above 30<U+2103> below Malone Dam have never been observed.

Reference Cited U.S. Bureau of Reclamation, 2009. Lost River Water Quality and Fisheries Habitat Assessment. Mid-Pacific Region, Klamath Basin Area Office, Klamath Falls, Oregon.

Response: The simulated temperatures in the model are calculated based on heat flux routines built into the W2 model which take into account all available sources of heat into the model and reflect the conditions using best available data at the time of model development for the year 1999. The maximum increases during June through August occur at Stateline and Gift Road, not at locations of monitoring data directly downstream of Anderson Rose and Malone. The temperatures below Malone Dam and Anderson Rose Dam reflect the conditions and heat fluxes being specified. During the summer irrigation period the flows below the dams can be very low (close to zero for several days in 1999 during summer) making the river very shallow (with no other input into the system) and the resulting predicted water temperatures and diurnal variations during this period are essentially an artifact of the observed air temperatures specified as meteorological forcing in the model i.e. it is reflecting the conditions using the best available data. Additionally, the Lost River model was developed based on conditions that reflect the year 1999 and cannot be compared to conditions during different years.

The TMDL allocations are set at a level necessary to achieve the temperature criteria. In turn the establishment of the allocations to attain the criteria is less reliant on the year to year variability. TMDL analysis does focus on identifying the critical conditions and establishing allocations such that the criteria will be achieved even under critical conditions. The flows observed in the Lost River in 1999 were near zero during the warmest time of the year, therefore the model evaluates the allocations during a critical

period. Finally, the load allocations for the Lost River were set based on a criteria of 28 deg C and any temperatures above 28 deg C must be reduced.

BOR#79: Suggested Change ID #207

Description: TMDL Deadline - prohibits addressing technical comments

Comment: Reclamation is aware of the rapidly approaching court-ordered deadline for completion of this temperature TMDL. However, we are concerned that the deadline creates an imposed time constraint that is inadequate to address the inherently complex nature of water temperature in the Upper Klamath River and Lost River systems. Reclamation is concerned that significant flaws in development of the TMDL that are detailed in our review will not be properly analyzed and corrected due to the court ordered deadline.

Response: DEQ, EPA and TetraTech have worked diligently given the time constraint to provide a document based on the best available information. DEQ has responded to BOR's comments and made revisions as needed. DEQ also reviewed data submitted by BOR which resulted in a number of changes to the TMDL. Section 1.1.5 of the TMDL states that "DEQ will also consider reopening the TMDL, subject to available resources, should new information become available indicating that the TMDL or its associated water quality targets need to be modified".

BOR#80: Suggested Change ID #208

Description: TMDL requirements negatively impact Klamath Project operation and management

Comment: Reclamation believes that the draft temperature TMDL has significant development flaws, which result in requirements that negatively affect operation and management of the Klamath Project.

Response: DEQ, EPA, and TetraTech have worked diligently to develop a TMDL based on the best available information. DEQ has responded to specific BOR comments about various aspects of the TMDL. In some cases DEQ has considered data and information provided by BOR and made changes to the TMDL.

BOR#81: Suggested Change ID #209

Description: Keno Dam - required reductions not achievable

Comment: The required reductions at Keno Dam outlet do not appear credible or achievable. Historically, the upper reach of the Klamath River was impounded by a natural basalt reef approximately one mile upstream of the current Keno Dam location. The basalt reef created similar physical conditions (e.g., water depth, gradient) in the Klamath River upstream of Keno Dam as are present today. Unpublished, preliminary water quality modeling by USGS shows little or no temperature changes with water surface elevation drawdowns of two and four feet. The expectation of going from a 28 degrees Celsius (°C) upstream boundary condition to a downstream 20°C boundary condition at the same spatial location does not appear reasonable given that the allocations set for inputs to the Klamath River are based on modeling of non-typical flow conditions (e.g., 5.5°C increase at point of discharge for Lost River Diversion Channel in September 2000).

Response: The temperature impact of Keno Dam was determined as difference between model scenarios T4BSRN2 and TOD2RN3 (see Appendix C for details.) TOD2RN3 includes the historic natural basalt reef and therefore incorporates the influence it had on temperature compared to Keno Dam. The warming and temperature reductions at Stateline presented in the Draft TMDL did not separate the portion attributed to just J.C Boyle or just Keno Dam. They were included together at Stateline. DEQ ran an additional scenario that was used to determine the temperature impact at Stateline from Keno Dam only. The results from this scenario are now included in the TMDL in sections 2.4.2.3, 2.7.3, and Appendix C. This will clarify the impact of Keno Dam and the required reductions at Stateline independent from other sources. DEQ does not expect Keno Dam to reduce warming caused by other sources.

DEQ has not had the opportunity to review the referenced unpublished, preliminary water quality modeling by USGS so we cannot comment on it.

BOR#82: Suggested Change ID #210

Description: Model Results - appear to be overestimating (3)

Comment: TMDL model simulations of 1999 temperature conditions for the Lost River system appear to be biased towards high, unrealistic temperatures. This is readily observed in the following examples: a. TMDL simulated data for 1999 below Anderson-Rose Dam commonly shows exceedances of 28°C between June through August with a maximum simulated concentration of greater than 37°C (99°Farenheit). However, continuous monitoring data collected below Anderson-Rose Dam from 2000 through 2003 (collected by Reclamation and ODEQ) indicate a maximum value of 27.22°C at 5:50 pm on August 1, 2000. Lower temperatures below Anderson-Rose Dam as compared to TMDL simulated temperatures also are supported by U. S. Geological Survey continuous temperature measurements in 2002 (USGS, 2005). Based on these examples from measured temperature data, exceedances of the 28°C criteria have never been observed. b. TMDL simulated data for 1999 below Malone Dam commonly exceed 34°C with a maximum temperature value of approximately 39°C (102°Farenheit) with exceedances above 28°C all through the months of May through September 1999. Available discrete measurement data collected below Malone Dam in 1993-1997, and prior analysis by Reclamation in the Lost River Habitat Assessment (2009), indicate a one-time, maximum high temperature of 28.8°C below Malone Dam in mid-July 1998. Temperatures above 30°C below Malone Dam have never been observed.

Response: Like any dynamic water quality model, the Lost River TMDL models were developed based on assumptions, and therefore have inherent limitations and uncertainty. Application and configuration of the models were guided by an EPA-approved Quality Assurance Project Plan (QAPP). Modeling QAPPs and associated technical memoranda or addendums identify quality expectations for steps in the modeling process such as data acquisition, model selection, domain configuration, training or calibration, scenario prediction, and reporting. Such quality expectations serve multiple objectives, including requirements under 40 CFR 130.7(c)(1) that TMDLs shall account for critical conditions. In addition the models went through multiple rounds of peer review. Staff with modeling expertise from DEQ, NCRWQCB, and EPA worked as a team with Tetra Tech reviewing and advising on model development and application for calibration and validation. The Lost River models were also reviewed by Dr. Scott Wells of Portland State University following which the model was further improved.

Trends in the observed data and cause-effect relationships between various parameters were replicated with the model, although precise values at each and every point in time may not because the precise timing of all physical, chemical, and biological phenomenon are likely not perfect in a model. The simulated temperatures in the model are calculated based on heat flux routines built into the W2 model which take into account all available sources of heat into the model and reflect the conditions using best available data at the time of model development for the year 1999 (and 2004). The maximum increases during June through August occur at Stateline and Gift Road, not at locations of monitoring data directly

downstream of Anderson Rose and Malone. The temperatures below Malone Dam and Anderson Rose Dam reflect the conditions and heat fluxes being specified. During the summer irrigation period the flows below the dams can be very low (close to zero for several days in 1999 during summer) making the river very shallow (with no other input into the system) and the resulting predicted water temperatures and diurnal variations during this period are essentially an artifact of the observed air temperatures specified as meteorological forcing in the model i.e. it is reflecting the conditions using the best available data. Additionally, the Lost River model was developed based on conditions that reflect the year 1999 (and 2004) and cannot be compared to conditions during different years.

The calibrated model is able to represent cause-effect relationships used for scenarios analysis and estimation of heat load reduction due to the various scenarios e.g. site potential vegetation and flow augmentation. The TMDL allocations are set at a level necessary to achieve the temperature criteria. In turn the establishment of the allocations to attain the criteria is less reliant on the year to year variability. Finally, the load allocations for the Lost River were set based on a criteria of 28 deg C and any temperatures above 28 deg C must be reduced.

BOR#83: Suggested Change ID #211

Description: Malone Dam - TMDL requirements in conflict with USFWS Biological Opinion

Comment: The requirement to release 25 cubic feet per second (cfs) from Malone Dam during May 1 through September 30 has the potential to be in direct conflict with the U.S. Fish and Wildlife Service's 2019 Biological Opinion on the Effects of Proposed Klamath Project Operations from April 1, 2019, through March 31, 2024, on the Lost River Sucker and the Shortnose Sucker (2019 BiOp). Depending on water year conditions, 25 cfs releases from Malone Dam could result in Reclamation failing to meet the minimum end of September elevation in Clear Lake Reservoir identified as required in the 2019 BiOp. In turn, these releases could cause Reclamation to exceed the bounds of the 2019 BiOp incidental take statement for Clear Lake Reservoir Lost River and shortnose suckers thereby triggering Section 7(a) 2 of the Endangered Species Act and analysis under the National Environmental Policy Act.

Response: DEQ understands the complexity around water availability and continuing operations to meet both the needs of ESA listed species and contractual obligations. DEQ also has an obligation under the Clean Water Act to ensure listed water bodies are meeting standards to protect beneficial uses. To that end, DEQ would suggest that the USBOR continue to meet the obligations to the listed Lost River and Shortnose Sucker under the current operational requirements in the 2019 Biological Opinion. DEQ would also suggest that an evaluation of water use, loss, and conservation strategies be conducted to ensure water that is contractually assigned is being used in the most efficient way possible and return water is either drastically reduced or eliminated.

BOR#84: Suggested Change ID #212

Description: TMDL negatively impacts Klamath Project operations and management

Comment: The questionable modeling results and associated TMDL temperature requirements at Malone and Anderson-Rose dams will potentially 1) cause Reclamation to be out of compliance with the 2019 BiOp, 2) adversely affect Clear Lake Reservoir endangered sucker populations by creating conditions outside those that were analyzed or expected to occur within the 2019 BiOp, and 3) unnecessarily reduce or curtail available water supplies to Klamath Project irrigators.

Response: Much like the BOR is obligated through the Federal Endangered Species Act, DEQ has an obligation to the Federal Clean Water Act. DEQ would not suggest non-compliance with the 2019 Biological Opinion nor would DEQ suggest negatively impacting beneficial uses, in this case, endangered Lost River and Shortnosed Sucker. As a Designated Management Agency and as a responsible person as stated in the Water Quality Management Plan the BOR and Water Management Districts also have a requirement to develop a TMDL Implementation Plan that identifies the management strategies to be implemented through adaptive management. The implementation plan will provide the DMA and the responsible person the opportunity to develop management strategies that would benefit water quality and fulfill other federal requirements.

BOR#85: Suggested Change ID #213

Description: Model results questionable and since TMDL will probably trigger reinitiation of ESA consultation, should be more defensible technically and realistically

Comment: In general, Reclamation maintains it is imperative to develop TMDL requirements that are as accurate, realistic, and defensible as possible. The simulated water temperature outcomes for both the Lost River and Klamath River sub-basins do not appear grounded in factual data, nor reasonably certain to occur, based on the empirical data collected or used in the modeling. This is of particular concern to Reclamation because finalization of the TMDL would likely require reinitiation of consultation under Section 7(a)(2) of the Endangered Species Act as well as additional analyses under the National Environmental Policy Act

Response: DEQ agrees that TMDLs should be developed to be accurate, realistic, and defensible as possible. Application and configuration of TMDL models were guided by an EPA-approved Quality Assurance Project Plan (QAPP). Modeling QAPPs and associated technical memoranda or addendums identify quality expectations for steps in the modeling process such as data acquisition, model selection, domain configuration, training or calibration, scenario prediction, and reporting. Such quality expectations serve multiple objectives, including requirements under 40 CFR 130.7(c)(1) that TMDLs shall account for critical conditions. We have added a new section into Chapter 2 (Section 2.3 - Water Quality Modeling Overview) which provides an overview of the modeling and the flow conditions during the model period. This section of the TMDL provides a summary of the calibration and validation of the models for use in the Upper Klamath and Lost subbasin TMDLs. This section also summarized the assumptions and limitations of the models. Appendices B and F have also been added to the TMDL report. Appendices B and F provide more details on the setup of the Klamath River and Lost River models, respectively.

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3. Comments from: City of Klamath Falls

CKF#1: Suggested Change ID #3

Description: WLA - Impact on City of Klamath Falls

Comment: The City of Klamath Falls (City) hired HDR to support its review and comment response to the draft temperature total maximum daily load (TMDL). After the initial draft TMDL posted for public comment, HDR calculated the expected impact the proposed thermal wasteload allocations (WLAs) have on the City of Klamath Falls Spring Street Sewage Treatment Plant (SSSTP) by comparing allocations to historical data. Oregon Department of Environmental Quality's (DEQ's) TMDL staff reviewed the calculations (specifically "river temperature increase after mixing with effluent" and "max allowable effluent temperature") and resulting temperature impacts and determined they aligned with DEQ internal calculations. On July 1, 2019, DEQ provided the City with a report titled "Comparison of Draft 2019 Klamath River Temperature TMDL Allocations to 2013 — 2018 Source Discharge Data." The report indicated the City would have exceeded the 0.015 degree Celsius warming criteria approximately 40 percent of the time for the period from 2013 through 2018 (Figure 1; DEQ 2019a). This information aligns with HDR's independent evaluation.'

Reference: DEQ 2019. Comparison of Draft 2019 Klamath River Temperature TMDL Allocations to 2013-2018 Source Discharge Data. June 2019.

Response: DEQ has updated this report using the revised TMDL allocations. The report is included in the TMDL as Appendix I.

CKF#2: Suggested Change ID #4

Description: WLA - City of Klamath Falls Compliance Options

Comment: Page 3, paragraph 2. As depicted in Figure 1, the SSSTP (also referred to as the KF WWTP [Klamath Falls Wastewater Treatment Plant]) would struggle to meet proposed thermal WLAs during the winter months. Historically, the SSSTP would have exceeded their allocation limit (0.015 degrees Celsius) nearly 100 percent of the time during December through February. During that period, river temperatures often drop below 5 degrees Celsius while the SSSTP effluent temperatures usually range between 12 and 17 degrees Celsius (Figure 2), To reduce effluent temperatures enough to meet the WLAs during the winter months, sometimes as low as 2 degree Celsius, the City is investigating various compliance options. The only potential option identified to date for achieving compliance 100 percent of the time is a mechanical cooling and chilling system on the plant's effluent discharge. A cooling and chilling system of the scale needed to meet the proposed thermal WLAs would require a high energy demand posing significant impacts to greenhouse gas emissions and create other potential environmental consequences.

Response: DEQ has considered your suggestions and evaluated various allocation scenarios. DEQ has revised the TMDL and allocations in the following ways to respond to your comments:

The allocations were revised to be seasonal corresponding to the critical period for Oregon's criteria (June 1 - Sept 30) and the period where allocations are only established to achieve the targets established by the North Coast Water Quality Control Board (Oct 1 - May 31). Based on our modeling this allows some

additional capacity to be utilized in each season and sets up a framework to modify the allocation should the North Coast Water Quality Control Board Targets ever be revised. From June 1 - Sept 30 the portion of warming allocated to Klamath Falls WWTP is 0.05 deg-C. From Oct 1 - May 31 the portion of warming allocated is 0.03 deg-C. South Suburban and water management districts that warm KSD and LRDC have the same allocations. DEQ reduced the allocations for Keno Dam, Collins Products, and Columbia Forest Products.

The compliance metric at the point of discharge in the Klamath River is now based on the daily mean river temperature instead of the daily maximum. The targets at Stateline are based on mean river temperatures. Since the Stateline targets are the primary driver for the allocations DEQ found allocations based on that metric are appropriate as long as they also demonstrate compliance with the Cool Water species criteria, 7DADM HUA downstream of Keno and Stateline targets. DEQ confirmed compliance with the multiple criteria using the model. Using the daily mean may also provide an alternative compliance option for sources that wish to use lagoon or wetland treatment systems. Wetland and lagoon treatment system may offer more effective treatment options for reducing daily mean temperature compared to daily maximums. Temperature trading is another option available for compliance. Based on DEQ's analysis of how the revised allocations compare to City of Klamath Falls WWTP discharge data from 2013-2018, the rates of exceedance have come down in the winter and there are no exceedances in the summer. This analysis is included in the TMDL as Appendix I.

CKF#3: Suggested Change ID #5

Description: Tables - 2-13 and C-2

Comment: Table 2-13 in the Temp TMDL doesn't match Table C-2 of Appendix C. Use the same river temperature criteria for the two tables so that their excess temperatures and excess loads align.

Response: Table C-2 has been updated to match Table 2-13 and reflect the excess 7DADM and excess load based on temperature excess from 20.3 deg C.

CKF#4: Suggested Change ID #6

Description: Tables - C-7

Comment: In Appendix C Table C-07 the minimum excess temperature and load for September are greater than the median. Provide corrected minimum and/or median values for the month of September.

Response: Table C-07 has been updated. In addition the table also now correctly reflects the excess temperatures and excess loads based on the criteria of 20.3 degrees Celsius.

CKF#5: Suggested Change ID #8

Description: Tables - 2-14 and C-3 excess loads

Comment: Table 2-14 in the draft Temperature TMDL (which matches Table C-3 in Appendix C) shows June through August having excess 7-DADM temperatures and excess loads for the minimum, median, maximum conditions but no excess above CA mean monthly targets. Please confirm whether the excess temperatures and loads are based on the criteria set by the fourth paragraph of section C.1 in Appendix C.

If not, please provide additional details for the temperature criteria used to calculate the excess temperatures and loads in each of the first six columns of Table 2-14. Additionally, for the far right column titled "Excess above CA Mean Monthly Target" please provide whether those values shown in Table 2-14 are minimum, median, maximum, or average values, and the period covered by each data point used as an input to those calculations (i.e., maximum daily excess, weekly average excess). Also, if the excess 7-DADM temperature and excess loads are evaluated against a 20 degree Celsius plus human use allowance criterion (as described in C.1 of Appendix C) and the monthly mean stateline criterion is set by natural conditions, which is consistently below 20 degrees Celsius, how can river temperatures exceed the cold water species criteria yet not exceed the stateline's lower natural conditions criteria, as is shown in Table 2-14 during June through August?

Response: Yes, the excess temperatures and loads are based on the criteria identified in the fourth paragraph of section C.1 in Appendix C. The Table has been checked and updated to reflect the min, max, and median 7DADM and excess load to be based on temperature excess from 20.3 deg C as per Oregon Criteria. At Stateline the temperatures were evaluated based on a monthly mean temperature target established at the Stateline using the natural condition scenario.

The monthly mean Stateline target is set by the natural conditions scenario. Mean monthly temperatures were calculated using hourly temperatures (for the year 2000) for Existing and Natural Conditions. The Appendix has been updated to reflect how it was calculated. The difference between the calculated mean monthly existing temperature and the mean monthly natural condition scenario temperature was called the "Excess above CA Mean Monthly Target".

Since CA and OR both uses different metrics to evaluate the temperatures i.e. 7DADM compared to BBNC+HUA and mean natural conditions temperatures respectively, it is not possible to compare the two.

CKF#6: Suggested Change ID #9

Description: Winter Exceedances - critical period Klamath River

Comment: Section 2.2 of the draft temperature TMDL states that the TMDL must identify the critical period which is "the period when the available data show temperatures exceed the applicable criterion" and that the identified critical period is the "time period when the TMDL allocations, reserve capacity, and margin of safety apply." Table 2-14 of the draft TMDL shows that under existing conditions, temperatures do not exceed criteria at the stateline during the winter months (December through March). However, section 2.2 states that based on data shown in Table 2-12 through 2-14, temperature criteria are exceeded year round at the stateline and therefore the critical period is "year-round for California's targets". This does not appear to be supported by the data shown in this TMDL as the existing condition scenario (Table 2-14) shows that excess temperatures at the stateline based on California criteria only occurred during 5 months out of the year.

If the year-round extension of the California criteria's critical period comes from additional margins of safety, it does not appear to be explicitly stated within the document. The temperature modeling to support the Thermal Waste Load Allocations (WLAs) was carried out using data from year 2000. The draft TMDL (DEQ 2019b) already states that conservative assumptions were used to provide an implicit margin of safety. These assumptions include calculating thermal loading capacities using the minimum flow estimates and calibrating the model with year 2000 data where the river flows were lower than flows in some more recent years. While the CA stateline monthly mean baseline temperatures as well as the waste load allocations they derive come from modeling of a single year, the conservative assumptions built into the modeling seem to provide DEQ with sufficient confidence such that the single year of data can set the state border criteria and thermal waste load allocations.

The City requests DEQ reconsider whether requiring allocations for the December through March period are necessary with no supporting data showing exceedances of Oregon or California criteria during that period under the existing conditions scenario. If unknown year-to-year variability led to the conservative year-round allocation, the City requests additional model simulations for additional years to determine whether year-to-year variability spans a temperature range showing exceedances during the December through March period.

Response: In setting allocations year round, DEQ is ensuring that human sources are not warming temperatures at the Oregon/California border as required in the NCRWQCB basin plan and 2010 Klamath River temperature TMDL. For much of the year the instream temperature of the Klamath River is warmer than the natural temperature (evaluated based on monthly means during the model year 2000). Even though the monthly temperatures are not exceeded during the months Jan, Feb, Mar, and Dec the timing of those periods when exceedances occurs changes from year to year and is difficult to predict. Therefore, this TMDL takes a conservative approach, allocating no temperature increases year round.

CKF#7: Suggested Change ID #11

Description: WLA - Active dischargers

Comment: At the public hearing for this draft TMDL held in Klamath Falls on June 261h, the City learned that Columbia Forest Products and Collins Products do not currently discharge into the Klamath River. However, they are allocated the same temperature impact (0.015 degrees Celsius after mixing with 100% of the river flow) as the two large treatment plants. If they were to discharge at the maximum flow rates shown in table 2-16, which do not appear to align with their current discharge activity, and the most restrictive river temperature and flow conditions (i.e. 1 degree Celsius river temperature and 190 cfs river flow based on USGS historical data at station 11507500) are assumed, Columbia Forest Products would have to discharge at 284 degrees Celsius to fully utilize their allocation and Collins would have to discharge at 29 degrees Celsius. That would represent the most stringent conditions dating back to the beginning of 2013 and are far from the average conditions. During the period from 2013 through 2018, the average river temperature of 13 degrees Celsius and average river flow of 1020 cfs would allow Columbia Forest Products discharging up to 1,550 degrees Celsius and Collins Products discharging at 170 degrees Celsius to utilize their full 0.015 degree warming allocation, which are well above the maximum end of pipe temperatures of 32 degrees Celsius.

The City requests DEQ consider reallocating the point source (PS) thermal allocations to only active PS dischargers. If not, DEQ should consider reallocating the PS thermal allocations based on relative effluent flows (i.e., a PS with a maximum effluent discharge of 1 million gallons per day [MGD] would be allocated 10 times the thermal allocation as a PS with a maximum effluent discharge of 0.1 MGD) using more recent data. Reallocation is recommended among PS only because discrete nonpoint sources (NPSs) are a different type of entity that does not fall under NPDES permitting and has flows that are orders of magnitude greater than those of the PSs.

Response: DEQ has revised the portion of warming allocated to Collins Products and Columbia Forest Products to 0.005 deg-C to reflect that these sources currently do not discharge. DEQ did not want to reduce the allocation to zero because these sources still retain an NPDES permit and may discharge in the future. DEQ is also not clear at this time if Collin’s lagoon is lined. If not there may be a potential subsurface discharge into the Klamath River. We wanted to make sure that potential source of heat was accounted for in the allocation.

CKF#8: Suggested Change ID #13

Description: Critical Period - Point Sources/Additional model runs

Comment: The City proposes that DEQ consider whether the December through March period requires thermal allocations and thus needs to be considered part of CA's critical period since the modeling results do not show any exceedances at the stateline during that period. Section 2.2 of the draft Temperature TMDL defines the critical condition as "the period when the available data show temperatures exceed the applicable criterion" and state that that period is "when the TMDL allocations, reserve capacity, and margin of safety apply". For Oregon's criteria that period is defined as June 1- September 30 and at the CA stateline that proposed period is year-round.

In addition, a seasonally bifurcated TMDL with seasonal thermal load allocations (i.e. the Oregon critical period of June-September and the Oregon non-critical period of October-November and April-May) could provide an alternative strategy that still meets seasonally-applicable temperature requirements. The year 2000 modeling results do not show excess thermal loads at the Keno Outfall outside the June-September window for neither the existing conditions (S1) nor the TMDL condition (T4BSRN2). The S1 model's point source (PS) thermal loads assumptions do not appear to be included in Appendix C, so it has been assumed that PS thermal loads were based on actual thermal load data for year 2000 as mentioned in section 2.3.3.2 of Appendix B. It is also assumed that T4BSRN2's PS allocation is what is stated in the draft TMDL under the allocations section.

When comparing excess temperatures between the two scenarios (S1 and T4BSRN2) during periods when excess loads were present (see tables C-2, C-3, C-9, C-10), the TMDL scenario (T4BSRN2) always had higher maximum excess 7DADM temperatures than the existing conditions scenario (S1) at the Keno Outlet yet usually had lower maximum excess temperatures at the Stateline. This supports a hypothesis that the dissipation of thermal loads downstream of point source discharges led to those sources having minimal effects at the border and that it was actually a decrease in the thermal contributions downstream of the four point sources that brought the T4BSRN2 scenario into CA stateline compliance and not the upstream point source limitations.

The proposed modeling scenario below looks at (1) whether PS allocations can be set higher than what they are set at in T4BSRN2 during the winter months and still meet the stateline requirements, thus allowing for less restrictive, more achievable non-summer thermal WLAs and (2) whether TMDL criteria is necessary and applicable during part of the non-summer period when no exceedances of applicable criteria have been shown in the modeling results.

The City proposes an additional modeling scenario be run to provide a bifurcated seasonal thermal load allocation with a sensitivity analysis carried out to determine the PS' temperature effects at the stateline. This model scenario would look at the impacts of higher thermal WLAs in the non-summer months during Oregon's non-critical period to see whether (1) bifurcated seasonal thermal load allocations would meet temperature requirements at the points of compliance (Keno Outfall and California stateline in the summer and just the California stateline otherwise) and (2) the entire non-summer period (October-May) presents critical conditions that require California criteria to apply. Oregon TMDL criteria for downstream of Keno Dam incorporate the human use allowance (HUA) of 0.3 degrees Celsius cumulative warming for PS and NPS (with 0.06 degrees Celsius allocated to the four PSs). Because Oregon's critical condition period occurs exclusively during the summer period, only the year-round California stateline requirement drives the temperature TMDL allocations during the non-summer period. Please confirm that no Oregon-based temperature criteria apply during the September to May period.

During the Oregon non-critical period (i.e., October-May), this proposed scenario would increase the temperature allocation to the SSSTP to 0.03 degrees Celsius, or higher as modeling indicates appropriate, in the TOD2RN3 and T4BSRN2 scenarios to determine if it negatively impacts the California excess temperature (i.e., where it increases the river temperature above the California criteria at the stateline). If it does, repeat the model stepping down the temperature allocation until the conditions are satisfied. This sensitivity analysis can also provide assurances that existing or near existing thermal loads do not pose a

significant risk of exceeding California stateline criteria in specific winter months (i.e., December-March) and thus those months can be excluded from the California stateline critical condition period.

With this temperature limit based on a single model year, allocations are assumed conservative (as noted in comment #4), but the City asks this be verified with other model year data to show it is not sensitive to year-to-year variations. If year-to-year sensitivity is shown, then winter limits should be set using a more conservative year than 2000, but should still incorporate a bifurcated limit that is more achievable than the current single year round temperature allocation, which is a significant challenge to meet in the winter without mechanical cooling and/or chilling. The additional model validation with other model year data also can provide supporting evidence that the year-to-year variability consistently shows peak winter months (December — March) not exceeding any of the temperature criteria that would require those months fall under the critical period at the stateline; allowing those months to be excluded from California-based allocations.

Response: DEQ has considered your suggestions and evaluated various allocation scenarios. DEQ has revised the TMDL and allocations in the following ways to respond to your comments:

The allocations were revised to be seasonal corresponding to the critical period for Oregon's criteria (June 1 - Sept 30) and the period where allocations are only established to achieve the targets established by the North Coast Water Quality Control Board (Oct 1 - May 31). Based on our modeling this allows some additional capacity to be utilized in each season and sets up a framework to modify the allocation should the North Coast Water Quality Control Board Targets ever be revised. From June 1 - Sept 30 the portion of warming allocated to Klamath Falls WWTP is 0.05 deg-C. From Oct 1 - May 31 the portion of warming allocated is 0.03 deg-C. South Suburban and water management districts that warm KSD and LRDC have the same allocations. DEQ reduced the allocations for Keno Dam, Collins Products, and Columbia Forest Products.

The compliance metric at the point of discharge in the Klamath River is now based on the daily mean river temperature instead of the daily maximum. The targets at Stateline are based on mean river temperatures. Since the Stateline targets are the primary driver for the allocations DEQ found allocations based on that metric are appropriate as long as they also demonstrate compliance with the Cool Water species criteria, 7DADM HUA downstream of Keno and Stateline targets. DEQ confirmed compliance with the multiple criteria using the model. Using the daily mean may also provide an alternative compliance option for sources that wish to use lagoon or wetland treatment systems. In another comment you indicated to DEQ that the only compliance option available besides getting out the river is mechanical cooling. Wetland and lagoon treatment system may offer more effective treatment options for reducing daily mean temperature compared to daily maximums. Based on DEQ's analysis of how the revised allocations compare to City of Klamath Falls WWTP discharge data from 2013-2018, the rates of exceedaance have come down in the winter and there are no exceedances in the summer. This analysis is included in the TMDL as Appendix I.

CKF#9: Suggested Change ID #14

Description: Stateline temperature - model sensitivity

Comment: One of the key criteria in setting the WLAs for point sources is the stateline criteria of no detectable increase in river temperature above natural conditions at the CA border. This is defined as 0.04 degrees Celsius of warming as that is described as the maximum temperature not considered measureable with field instrumentation. The CE-QUAL-W2 and RMA-2/RMA-11 models were used to model various segments of the river between Lake Ewauna and the OR/CA stateline.

Appendix B's section 3.0 states that modeling calibration was primarily guided by visual comparison between simulated and observed data and that "trends in the observed data and cause-effect relationships between various parameters can be replicated with a model, although precise values at each and every point in time may not be".

With a required temperature impact of less than 0.04 degrees Celsius at the stateline, how does that threshold compare to the differences between the actual and modelled results at the stateline in the calibration and validation modelling simulations? If those differences or errors are larger than the 0.04 degrees Celsius criteria, how can the model's sensitivity to thermal inputs 40 or more miles upstream of the stateline be verified? Has DEQ quantified the sensitivity of the model's stateline river temperatures to the PSs more than 40 miles upstream of the California stateline and compared that to the magnitude of the model's error (i.e., difference between model validation temperature results and actual temperatures)? Given the small allowable temperature change at the stateline and the ubiquitous uncertainty inherent to the river temperature models' ability to predict temperatures to the level of accuracy required, the City requests a more explicit adaptive management plan be presented that addresses the magnitude of the allowable temperature impact on the river at the stateline as well as other actions taking place in the watershed (i.e., dam removals) that can impact the stateline river temperature.

Response: The model was calibrated by attempting to find the best fit between computed and observed data by adjusting model parameters, while keeping the parameters within the range of literature values. The model was validated using 'replicative model validation' which tests goodness-of-fit during and after model calibration through graphical and statistical comparison of model results and field measurements. The model was generally able to reproduce observed water quality in the Klamath River. The goodness-of-fit was evaluated using Mean Error (ME) and Absolute Mean Error (AME) at several locations which were characterized by a relative abundance of monitoring data and are presented in Appendix B. Like any dynamic water quality model, the Klamath River TMDL models were developed based on assumptions, and therefore have inherent limitations and uncertainty.

Development and application of the Klamath River TMDL model have focused on key best practices identified in EPA's March 2009 "Guidance on the Development, Evaluation, and Application of Environmental Models," including peer review of models; QA project planning, including data quality assessment; and model corroboration (qualitative and/or quantitative evaluation of a model's accuracy and predictive capabilities). In addition to the key practices noted above, model sensitivity and uncertainty analysis have also been considered. The model sensitivity was performed as needed throughout model calibration and source assessment phases of model scenarios to better understand model predictions and limitations. Since it was not a formal process with defined output and metrics, it is not presented in the modeling document. Discussion of uncertainty as it relates to the TMDL is discussed in the Margin of Safety Section (Section 2.8). Section 2.3 has been added/updated to provide a detailed model overview.

Trends in the observed data and cause-effect relationships between various parameters were replicated with the model, although precise values at each and every point in time may not be as seen in the statistical results because the precise timing of all physical, chemical, and biological phenomenon are likely not perfect in a model. The calibrated model is able to represent cause-effect relationships used for scenarios analysis and estimation of warming due to point and non-point sources. The amount of warming calculated based on the difference between the existing condition calibrated model and natural condition scenario represents a relative change analysis and the delta cannot be compared with for example the model error from goodness-of-fit calculations of an AME statistic.

CKF#10: Suggested Change ID #16

Description: Beneficial Uses - CA Klamath River

Comment: In Appendix E, the North Coast Regional Water Quality Control Board (NCRWQCB) states that "the purpose of establishing temperature objectives it to ensure protection of beneficial uses" and that when model estimates of natural conditions are not available, TMDL targets should "be based on the temperatures necessary to support the most sensitive beneficial use". While model estimates are available in this case, this clarification by the NCRWQCB indicates that the overall goal is to be protective of the most sensitive beneficial uses. It also states that "water temperature increases of up to 5 degrees Fahrenheit above natural water temperature can be allowed, if a convincing demonstration of the need is made unless such increases exceed beneficial use requirements". The most restrictive beneficial use for the Klamath River downstream of the Keno Dam on the Oregon side of the border is designated fish use for Redband and Lahontan Cutthroat Trout which have biologically based numeric criterion of 20 degrees Celsius (OAR 340-041-0028 4(e)). The most restrictive beneficial use for the California sections of the Klamath River do not appear to be explicitly stated in the TMDL documents.

Can DEQ provide documentation of or reference to the most restrictive beneficial use(s) on the California sections of the Klamath River that require more stringent criteria than the Oregon biologically based numeric criteria of 20 degrees Celsius providing the requirement for maintenance of natural river conditions when river temperatures are at or below 5 degrees Celsius for three months of the year?

Response: Appendix 4 of the NCWQCB Klamath River TMDL (https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/klamath_river/100927/staff_report/16_Appendix4_WaterQualityEffectsonSalmonids.pdf) identifies TMDL temperature thresholds for the Klamath River in California. California does not have numeric temperature standards in the Water Quality Control Plan for the North Coast Region (Basin Plan), therefore, a literature review was used by California to select chronic and acute temperature thresholds for evaluation of stream temperatures in TMDLs.

Chronic temperature thresholds for salmonids in the Klamath River in California include the following: Adult migration - 20°C Adult migration plus moderate to low density salmon and trout rearing - 18°C High density rearing - 16°C Spawning, Egg Incubation, and Fry Emergence - 13°C

Acute lethal temperature thresholds for salmonids include the following: Adult migration and holding - Steelhead (24), Chinook (25), Coho (25) Juvenile growth and rearing - Steelhead (24), Chinook (25), Coho (25) Spawning, Egg Incubation, and Fry Emergence - Steelhead (20), Chinook (20), Coho (20)

Per communication with NCWQCB, Chinook salmon are present in the Klamath River from about August to when temperatures start to drop (approximately November). Coho salmon are present from December to January and sometimes February for spawning. Steelhead are present December through February, with spawning and eggs in the gravel through April. This language has been added to Section 2.1.2.4.

CKF#11: Suggested Change ID #17

Description: Appendix C - incorrect reference to model run and figure

Comment: In Appendix C, on page C-14 in the bottom paragraph labeled "Stateline," there is reference to TOD2RN2 and Figure C-4 that appear to be incorrectly referenced. Please confirm whether those should be referencing TOD2RN3 and C-7, respectively?

Response: The references were not correct. Appendix C has been updated.

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4. Comments from: United States Environmental Protection Agency

USEPA#1: Suggested Change ID #18

Description: Modeling Scenarios - Klamath River Sources

Comment: Appendix C - Modeling Scenarios - It appears that only two sources of excess loading from NPS, i.e., stream (tributary) shade deficit and dams, were fully evaluated. Please explain why the analysis was limited to these two factors.

Response: The model scenarios in Appendix C represent several scenarios conducted for the Klamath River. Removal of vegetation is often considered a source of warming but was not considered in the Klamath River modeling primarily because we do not believe vegetation removal to be a significant source of stream warming and hence decided it was not worth the resources and time to include in the model. DEQ provided our rationale in Section 2.3.2.2 but we have expanded our discussion to further explain our thinking and incorporate results of shade modeling conducted by Sullivan et al 2013.

This section is revised to say:

"Vegetation removal on the Klamath River does result in some warming in the Klamath River but based on DEQ's review of available data and information does not appear to be a major source of stream warming for the following reasons: (1) Following DEQ's review of aerial imagery and LiDAR upstream of Keno Dam we conclude there appear to be areas with opportunity for vegetation restoration but the effectiveness of riparian shading on maintaining cooler stream temperatures is decreased because of the width and volume of the river. Sullivan et al 2013 conducted shading scenarios on the reaches upstream of Keno Dam and found that the daily average decrease in temperature from the current condition baseline was nearly zero near the Link River to 0.6 degrees Celsius at Keno Dam. The shading scenario assumed a continuous block of 20 meter (65.6 ft) tree heights on both banks with transmission of solar radiation through the canopy assumed to be zero (100 percent solar blockage). DEQ does not consider these assumptions to be realistic estimates of restored vegetation and it's extent upstream of Keno so the true reduction in temperature will likely be smaller; (2) the riverine portions from Keno Dam to the state line does not appear to be significantly degraded by human activity based on our review of aerial imagery and LiDAR data, and (3) since the river is constrained by steep canyon walls downstream of Keno Dam, the potential for restoring extensive riparian vegetation is limited.

Because warming from vegetation removal is not a significant source, DEQ has provided a human use allowance to land management DMAs of zero (Table 2-15). This means there can be no excess loading from land management activities such as vegetation removal."

Several other factors were accounted for in the scenario simulations of the Klamath River. For the Klamath River the scenario were conducted by first doing an evaluation of existing condition temperatures, which was followed by a restored conditions scenario that removed the effect of any dams, point sources, and accretion/depletion flows. Finally, a series of scenarios designed to assess the impacts of point sources, non-point sources (NPS), and dams in compliance with the applicable human use allowance was conducted. Appendix C documents all the adjustments that were made to the model.

Citation:

Sullivan, A.B., Sogutlugil, I.E., Rounds, S.A., and Deas, M.L., 2013, Modeling the water-quality effects of changes to the Klamath River upstream of Keno Dam, Oregon: U.S. Geological Survey Scientific Investigations Report 2013–5135, 60 p., http://pubs.usgs.gov/sir/2013/5135.

USEPA#2: Suggested Change ID #19

Description: Background Sources - channel morph, streambank elev, groundwater

Comment: p. 44 -45 Section 2.6.3.1 Background Sources - This section states that the background includes "… an undifferentiated mixture of natural thermal processes. Examples of loading from background sources include, but are not limited to, direct and diffuse solar and longwave radiation received by the stream under natural or restored streamside vegetation, channel morphology, and streambank elevations conditions; mass transfer of thermal load as a result of advection, dispersion, and exchange from mixing with groundwater, hyporheic flows, or tributary surface flows which also have natural or restored streamside vegetation, channel morphology, and streambank elevations; heat exchange between the water column and a natural or restored substrate through conduction; and between the water column and the atmosphere through evaporation and convection. Background sources may also include some anthropogenic warming that the Department or another Oregon state agency does not have authority to regulate, such as pollutants emanating from another state, tribal…" Please explain why other loading sources, particularly sources such as channel morphology, streambank elevation conditions and groundwater/hyporheic flow, were not included as restored in the reductions achievable modeling scenarios or otherwise accounted for in the TMDL. Please explain why these potential loading sources are being considered as part of background.

Response: A stream receives heat loading based on various aspects of its landscape condition. Those conditions include the channel morphology, streambank elevations, and the groundwater/hyporheic flow rate. When these features exist in a condition that DEQ determines to be natural, reference, or restored, DEQ considers the loading received on the stream to be background loading as defined under OAR 340-042-0030(1). When these features are not in a natural, reference, or restored condition due to current or legacy human practices; and the loading results in stream temperature warming above and beyond that of background loading, then DEQ considers these activities to be anthropogenic sources of warming. The TMDL narrative quoted in your comment includes the statement "Examples of loading from background sources include, but are not limited to […list of processes…] under natural or restored […list of landscape conditions…]". We did not include the term "under natural or restored" before every example of landscape condition listed in the sentence but its absence did not imply those conditions are background regardless of human practices. We have modified the text in the hope it will provide clarity.

The revised text now reads:

"Background sources account for non-anthropogenic sources of warming. The amount of background loading a stream receives is influenced by a number of landscape and meteorological characteristics. Those characteristics include but are not limited to substrate and channel morphology conditions, streambank and channel elevations, near stream vegetation, groundwater, hyporheic, or tributary surface flows, and climate related factors including precipitation, cloudiness, air temperature, relative humidity, and others. When these characteristics exist in a condition DEQ determines to be natural, reference, or restored the loading received on the stream is background loading as defined under OAR 340-042-0030(1). When stream conditions are in a natural, reference, or restored condition, examples of loading from background sources include, but are not limited to, direct and diffuse solar and longwave radiation; mass transfer of thermal load as a result of advection, dispersion, and exchange from mixing with the groundwater, hyporheic flows, or tributary surface flows; heat exchange between the water column and the substrate through conduction; and between the water column and the atmosphere through evaporation and convection.

When landscape conditions are not in a natural, reference, or restored condition due to current or legacy human practices; AND the loading from processes identified in the paragraph above result in stream temperature warming above and beyond that of background loading, DEQ considers the excess loading to be anthropogenic loading. Only in cases where DEQ or another Oregon state agency does not have the authority to regulate the loading (as defined in OAR 340-042-0030(1)) does DEQ consider it background loading."

USEPA#3: Suggested Change ID #20

Description: In-stream flow targets

Comment: Page 204, Section 4.7.4.1.1. In-Stream Flow Target - EPA supports the State's action to set in-stream flow targets as proposed in this section and at these locations. As DEQ explains in the draft TMDL, increased flows during the critical period are needed to attain designated uses.

Response: Comment acknowledged.

USEPA#4: Suggested Change ID #21

Description: Tables - 3-20 to 3-28

Comment: Page 109- 117, Tables 3-20 – 3-28, Load Allocations (NPS) - We believe the Load Allocation tables 3-20 through 3-28 have typographical errors for the NPS Load Allocations and should indicate DEQ's decision to assign 0.04°C allocations to Jenny Creek and each of its tributaries.

Response: DEQ has evaluated the tables and corrected various allocation assignment and computation errors. DEQ updated the allocations to be consistent with the downstream requirements in California. The revised allocations are based on 0.3 deg-C for Reserve Capacity in order to ensure that there is no cumulative warming from Jenny Creek tributaries into California. This is consistent with the approach taken on interstate streams in the Lost Subbasin.

USEPA#5: Suggested Change ID #22

Description: Jenny Creek - Cumulative Effects - Tables 3-9 to 3-18

Comment: Page 98-105, Table 3.5 and Tables 3-9 - 3-18, Loading Capacity - Sec. 3.7 states: "Because stream temperature warming and the HUA allocations in Sec. 3.7.1 are cumulative, some loading capacity and allocations may be limited when upstream cumulative warming is considered. In the sections that follow, the allocations for individual sources are provided in greater detail." Tables 3-9 through 3-18 present the loading capacities for each individual waterbody using a loading capacity equation presented in Appendix B of the TMDL. In calculating the loading capacities, the BBNC of 20°C and the HUA of 0.3°C were used. Assuming the Load Allocations for Jenny Creek and each of its tributaries is 0.04°C (see previous comment), no calculations were presented to show the mathematical relationship between the Load Capacities and the Load Allocations for the waterbodies, to ensure the downstream state (CA) target can be achieved. DEQ appears to have chosen to not complete a cumulative effects analysis, but instead used conservative assumptions to select the 0.04°C load allocations. Please describe the assumptions made to select 0.04°C as the Load Allocations for Jenny Creek and each of its tributaries.

Response: DEQ identified a number of copy/paste errors in the allocation and HUA tables so the numbers were not shown correctly in the draft TMDL. These have been revised. We also considered and evaluated cumulative warming in Jenny Creek but given there is no model and limited data available to evaluate cumulative warming from upstream tributaries, DEQ has revised the TMDL and placed the entire 0.3 deg-C HUA in Reserve Capacity for Jenny Creek and upstream tributaries. This means there can be no warming from anthropogenic sources and therefore no cumulative warming. This will ensure that targets are achieved at the Oregon/California border. This allocation approach is consistent with the approach taken on interstate streams in the Lost subbasin.

USEPA#6: Suggested Change ID #23

Description: FERC relicensing - Edits

Comment: Page 5, 1.1.3 FERC Relicensing

Section 1.1.3 does not present the most current status of the FERC relicensing process. This section needs to be updated.

Section 1.1.3 of the Draft TMDL discusses only the 2010 Klamath Hydroelectric Settlement Agreement (KHSA). This section needs to be updated to reflect material developments with regard to the KHSA since this text was originally drafted. For example, updates need to include the outcome of the Secretarial Determination process, the fate of the Klamath Basin Restoration Agreement in 2015, and the revisions to the KHSA in 2016 that resulted in an Amended KHSA. PacifiCorp is currently implementing the interim measures as required in the Amended KHSA, and dam removal by the Klamath River Renewal Corporation (KRRC), subject to obtaining required approvals from the Federal Energy Regulatory Commission (FERC) and other agencies, is now targeted for 2022, not 2020.

Response: This section (1.1.3) has been updated with new language.

USEPA#7: Suggested Change ID #24

Description: Downstream WQS - MOU

Comment: TMDL p. 11, Table 2-1 (& Table 4-11), TMDL Elements Table - While the need to meet the downstream State's water quality standards is not a federally required element of a TMDL, it would be good to footnote the importance of doing so as reflected in the MOU signed by EPA, DEQ and CA to implement the Klamath Basin TMDLs.

Response: The following language was added to Tables 2-1, 3-1, and 4-1 "The Oregon TMDLs must also achieve the water quality standards and numeric targets established in California as agreed upon through the Memorandum of Agreement (MOA) with Regions 9 and 10 of the EPA, the Oregon Department of Environmental Quality, and California's North Coast Regional Water Quality Control Board. The MOA was signed in November 2003 to address TMDL development and implementation for interstate waters in the Upper Klamath and Lost subbasins".

USEPA#8: Suggested Change ID #25

Description: Figure 2-8 - narrative description

Comment: Page 34, Section 2.5, Excess Load - There doesn't appear to be any narrative description for Figure 2-8; that narrative should be included for Figure 2-8 or else delete the figure.

Response: The following language has been added to Section 2.6 Excess Load (previously Section 2.5) "Temperature data from various monitoring stations in the Klamath River were plotted and compared to the applicable temperature criteria (Figure 2 8 and Table 2 11). All of the available data were obtained from the U.S. Geological Survey (USGS). These data included observed daily stream temperatures for six stations in the Klamath River".

USEPA#9: Suggested Change ID #26

Description: Table 3-3 -Upper Klamath 303(d) listings

Comment: Page 67-68, Section 3.1.3, Impaired Waterbodies and 303(d) Listings - The last sentence on p. 67 indicates that the impaired tributaries to the Klamath River and the 303(d) listed Klamath River are included in Table 3-3 on page 68. However, the Klamath River listings are not included in Table 3-3. We recommend that the 303(d) listings for the Klamath River be added to this table.

Response: The segments in Table 3-3 include only the 303(d) listed tributaries in the Upper Klamath subbasin. The mainstem Klamath River is addressed in Section 2 of the TMDL report. The title of Table 3-3 and language in the last paragraph of Section 3.1.3 have been updated to clarify this.

USEPA#10: Suggested Change ID #27

Description: MS4 - more detail

Comment: Page 84, Section 3.4.1, Municipal Sources - Page 84 states that "There are no communities that require a MS4 stormwater permit in the subbasin." Please explain generally why this is the case, and how close these communities are to becoming MS4 permittees.

Response: Language has been added to the end of Paragraph 1 in Section 3.4.1 and Section 4.4.1 explaining that MS4 permits are issued for municipalities meeting specific size requirements.

USEPA#11: Suggested Change ID #28

Description: Editorial - add unquantified anthropogenic sources

Comment: p. 122, Section 3.7.3.1, Background Sources - The description of background sources doesn't include unquantified anthropogenic sources. Unquantified anthropogenic sources should be added to this narrative.

Response: We have provided a reference to Section 3.4.3 where background sources are defined and include a narrative that unquantified anthropogenic sources may be included in estimates of background loading.

USEPA#12: Suggested Change ID #29

Description: Streamside Vegetation Mngt - Buffers

Comment: Page 123, Section 3.7.3.3., Streamside Vegetation Management - It is assumed that all DMAs (including Ag and Forestry) must strive to meet the site-potential shade requirements for areas where the riparian shade is inadequate or non-existent. For a typical area where the riparian shade doesn't exist, what is the minimum size of buffer that results when the site-potential shade requirements are met? How do those buffer sizes correlate to the those established in studies such as the RipStream Analysis? How will this be implemented?

Response: Buffer size needed to achieve shade targets depend primarily on these factors: buffer width, buffer density, buffer height, stream aspect, width of the sky gap over the stream (closely related to stream width), and the amount of topographic features that provide shade in addition to vegetation.

DEQ worked closely with ODF on their RipStream Analyisis and the follow-up rulemaking process. A summary of our findings of that analysis and how it relates to buffer size needed to achieve TMDL targets and the temperature criteria in those areas were summarized in DEQ's 2017 Nonpoint Source Annual Report.

In that report we say:

"In 2002, ODF initiated the "RipStream" riparian study to evaluate if the Forest Practices Act rules were effectively meeting water quality standards for temperature. RipStream showed that riparian protections on small and medium fish-bearing streams do not ensure achievement of the protecting cold water criterion of the temperature standard west of the crest of the Cascades and excluding the Siskiyou region.

The resulting rule analysis began in January 2012, and the Oregon Board of Forestry directed ODF to begin rulemaking for new rules to increase protections on salmon, steelhead, and bull trout (SSBT) streams to insure achievement of the protecting cold water criterion of Oregon's temperature standard. DEQ and other agency staff participated in this rulemaking process.

The public comment period on the revised rules ended March 1, 2017. The Board of Forestry adopted final rules on April 26, 2017 and took effect on July 1, 2017. DEQ participated on the Rule Advisory committee, which developed the final language based on Board of Forestry policy direction. The final revised rules have three prescription options for salmon, steelhead and bull trout (SSBT) streams within the Coast Range, South Coast, Interior, and Western Cascades ODF geographic regions including:

1. Retaining all trees within 60 feet and 80 feet of the high water level on small and medium SSBT streams respectively (Prescription 1 Oregon Administrative Rules 629-642 0105(10);
2. Basal area targets and live conifer tree requirements shown in Table 19. (Prescription 2 Oregon Administrative Rules 629-642-0105(10);
3. Retaining all trees within 40 feet of the high water level on the north side of SSBT streams where the stream valley direction is between 60 and 120 degrees east and 240 and 300 degrees west on a compass bearing of 0 and 360 degrees as north (Prescription 3 Oregon Administrative Rules 629-642-0105(12);

ODF developed a model to predict potential temperature change associated with changes to shade due to riparian stand management. A key limitation of this model, among others, is that the modeled temperature increases are informed by hard-edged clear cuts, not thins. Predictions for variable retention or thins were provided but were based on an equivalent no-cut buffer width. The model is based on a Bayesian technique that makes predictions about the chance that a true mean temperature change lies above or below a certain value. The analysis of various rule options was summarized in an ODF staff report to the Board of Forestry for agenda item two at the Board meeting on July 23rd, 2015. Rule concepts evaluated

in the staff report that DEQ staff believe were likely to achieve the protecting cold water criterion after the first harvest entry almost or more than 50% of the time included:

• 90 foot and 100 foot no-cut buffers, • variable retention option 170/275 with a 170 foot wide Riparian Management Area (RMA) and 275 square feet of basal area target retained per 1,000 foot of stream, and • the current State Forest Management Plan (FMP).

Based on ODF modeling, the true mean temperature for these options were at or below the 0.3 deg-C increase allowed under the protecting cold water criterion. The 90 and 100 foot no cut buffers had a true mean predicted temperature increase of 0.29 deg-C (credibility interval of 0.07-0.52 deg-C) and 0.18 deg-C (credibility interval of -0.03-0.41 deg-C) respectively. The variable retention option 170/275 had a true mean predicted temperature increase of 0.33oC (credibility interval of 0.13-0.56oC). The state Forest Management Plan (FMP) had a true mean predicted temperature increase of 0.2 deg-C (credibility interval of 0.13-0.56 deg-C). DEQ staff believe the other rule concepts evaluated in the ODF staff report did not appear likely to meet the protecting cold water criterion after the first harvest entry.

The adopted tree retention and basal area targets in rule prescriptions 1 and 2 (described above) have a smaller width and less total RMA basal area (tree retention) compared to the options DEQ staff identified as likely meeting the protecting cold water criterion. Therefore, the prescriptions adopted by the Board of Forestry likely have a true mean increase that exceeds the protecting cold water criteria.

USEPA#13: Suggested Change ID #30

Description: Streamside Vegetation Mngt - site-specific vs site-potential

Comment: Page 124, Section 3.7.3.3, Streamside Vegetation Management - Site-potential shade is most generally used when discussing compliance with water quality standards; however, “site-specific effective shade” is the term used in items 1 and 2 in this section. Is there a quantitative difference between “site-specific effective shade” and “site-potential shade”? If so, which results in greater shade protection?

Response: There is no difference, “site-potential shade” refers to the amount of effective shade produced by having near stream vegetation in a state that is considered natural, reference, or restored. We have been using term “restored conditions” to mean the same thing for the shade modeling. We have updated the text to use consistent terms and added text to clarify the meaning of “Site-specific effective shade”. Site-specific effective shade refers to the numeric effective shade values calculated for specific stream reaches. In the TMDL we provide mean shade values to represent the surrogate target for these reaches. For example in Chapter 3 Section 3.7.3.4, Figure 3-34 shows the effective shade for Jenny Creek. The mean restored condition effective shade value presented in Table 3-34 is 64%. This is the site specific effective shade target for Jenny Creek. On other streams, the effective shade curves are to be used to determine the appropriate amount of effective shade.

USEPA#14: Suggested Change ID #31

Description: Waterbodies addressed by this TMDL - Use LLIDs

Comment: Page 19, Chapter 2, Table 2-5, Waterbodies addressed by this TMDL - For better coordination with the State’s currently approved 303(d) list, we strongly recommend that LLID numbers be provided for the waters addressed by this TMDL.

Response: The LLIDs were added to Tables 2-5, 3-3, and 4-4.

USEPA#15: Suggested Change ID #33

Description: Waterbodies addressed by this TMDL - Inconsistent river miles

Comment: Page 68, 137, and p. 236-237, Chapter 3, Table 3-3, Chapter 4, Table 4-2, and Table 6-1, Waterbodies addressed by this TMDL - Some of the waters (and their associated mileage descriptors) listed in Tables 2-5, 3-3 and 4-2, do not align with those listed in Table 6-1 on pages 236-237 of the WQMP. For example, Antelope Creek is listed in Table 4-2 and covers a 14.1 mile segment while Table 6-1 lists Antelope Creek for river mile 2 to 3.

Another example of this difference appears in Table 4-2 which lists the Lost River Diversion Channel (LRDC) as a 7.8 mile segment while Table 6.1 lists LRDC for river miles 4.8-65. Please review the listings in the aforementioned tables and correct the inconsistencies.

Response: We have updated the various tables to correct the inconsistencies.

USEPA#16: Suggested Change ID #34

Description: Waterbodies addressed by this TMDL - Inconsistent number

Comment: Page 136, Below Table 4-1, Numbers of Waters Covered by the Lost River TMDLs - The narrative following Table 4-1 indicates that 15 water quality limited segments will be covered by the Lost River Subbasin TMDL. The Klamath River mainstem TMDL covers two segments and the Upper Klamath tributaries TMDL covers 11. Is it correct that this TMDL package addresses 28 water quality limited segments? This is not consistent with the WQMP.

Response: In total this temperature TMDL addresses 27 temperature impaired segments identified on the Final 2012 303(d) list approved by EPA in December of 2018. There are two segments on the Klamath River (Chapter 2, Table 2-5), 10 segments in the Upper Klamath Subbasin excluding the Klamath River (Chapter 3, Table 3-3), and 15 segments in the Lost Subbasin excluding the Klamath River (Chapter 4, Table 4-4). The text below Table 3-1 incorrectly stated there were 15 impaired segments addressed in the Upper Klamath Subbasin tributary chapter. The text below Table 3-1, and Table 4-1 also referenced tables that identified the names of the impaired waterbodies (not impaired segments). This may have added some confusion on the total segment count since there can be multiple impaired segments on a waterbody with the same name.

The sentence below Table 3-1 was revised to "…the TMDL analysis in this chapter covers 10 water quality limited segments and upstream waters for temperature in the Upper Klamath Subbasin (Table 3-3)". The text below Table 4-1 was revised to "…the TMDL analysis in this chapter covers 15 water quality limited segments and upstream waters for temperature in the Lost Subbasin (Table 4-4)".

Table 6-1 in the WQMP was missing the impairments on Antelope Creek (river mile 0-14.1) and East Branch Lost River (river mile 0-2.4). Table 6-1 was updated to include these listings.

USEPA#17: Suggested Change ID #35

Description: Editorial - Table 4-4

Comment: Page 138, section 4.1.2, Applicable Water Quality Standards - Table 4-4 lists the water quality limited segments and the applicable temperature criterion for each. We suggest that at the end of the paragraph in this section (4.1.2.), the following sentence be added: "See Table 4-4 for specific water quality criteria for 303(d) listed waters covered in the Lost River Subbasin TMDLs."

Response: The sentence "See sections below and Table 4-4 for specific water quality criteria for 303(d) listed waters covered in the Lost River Subbasin TMDLs" has been added to the end of Section 4.1.2.

USEPA#18: Suggested Change ID #36

Description: Stormwater Permits - # of construction permits

Comment: Page 161, Section 4.4.1, Point Sources - Page 161 states that "Registrants that have coverage under the 1200-C construction stormwater general permit are not listed in this TMDL because they are ephemeral in nature and the number and location of registrants will vary year-to-year." We agree that construction facilities are "ephemeral in nature." However, we recommend providing an annual average of permits issued in order to give a sense of the level of construction activity occurring in the watershed in a given year.

Response: The number of registrants is generally linked to the state of the economy so an annual average calculated over the past few years may not be a representative way to characterize construction activity unless it is calculated and presented in context with economic information. Calculating an annual average, while simple in concept, is actually a time intensive task as it would require manual review of permit records. As stated in the TMDL, NPDES 1200-C construction stormwater is not a source of warming so we did not feel it critical that this information be included in the TMDL.

USEPA#19: Suggested Change ID #37

Description: General Comment - stormwater dischargers

Comment: Page 161, Section 4.4.1, Point Sources - Page 161 states: "Data were not available in sufficient quantity to characterize the temperature impact from the stormwater dischargers identified in Table 4-8. Instead DEQ conducted a review of literature from studies in the mid-west and east coast of the United States on stormwater and stream temperature. This review provides evidence that, under certain conditions, runoff from impervious pavement or runoff that is retained in uncovered open ponds can produce short duration warm discharges (Herb et. al. 2008, Jones and Hunt 2009, UNH Stormwater Center 2011, Winston et. al. 2011, Hester and Bauman 2013)." We want to acknowledge that this is consistent with Region 10's Policy titled "Stormwater Sources and Temperature WLA's."

Response: Comment acknowledged.

USEPA#20: Suggested Change ID #38

Description: Editorial - background sources

Comment: p. 170, Section 4.4.3., Background Sources - The last sentence in the first paragraph refers the reader to review Section 3.4.3 for more information on "unidentified anthropogenic sources" as part of

the background. EPA recommends adding a couple of sentences here to further explain background sources as part of this chapter.

Response: We have updated the reference to correctly reference Section 4.4.3 and revised the narrative to further explain background sources.

USEPA#21: Suggested Change ID #39

Description: Tables - 4-36 and 4-37 LR and LRDC loads

Comment: Page 191, Section 4.7, Tables 4-16 and 4-37, Allocations - The Allocation tables for the Lost River (Table 4-36) and the Lost River Diversion Channel (Table 4-37) indicate that the current loads for these two waters are the same as the Maximum Excess Loads. This appears to be a typographical error since it is not likely that the total reduction would be the same as the current load.

Response: The typographical errors have been corrected.

USEPA#22: Suggested Change ID #40

Description: Editorial - Dams to be removed

Comment: Page 225, section 5.2.1.4, Federal Irrigation Project - We suggest identifying the dams to be removed or reference Section 5.2.1.7 where the dams are named.

Response: Section 5.2.1.4 and Section 5.2.1.7 have been updated to identify the four dams that will be removed on the Klamath River.

USEPA#23: Suggested Change ID #41

Description: Editorial - MOU update

Comment: Page 5 of comments: p. 225, Section 5.2.1.2, Non-Federal Forest Lands - The second paragraph in this section indicates that the MOU between DEQ and ODF was established in 1998. Hasn't this been updated since then?

Response: The information is still accurate. The MOU between DEQ and ODF was established in 1998 and has not been updated since.

USEPA#24: Suggested Change ID #42

Description: LAs - water management district owned dams

Comment: Page 226, Section 5.2.1.5, Water Management Districts - If Water Management Districts own and operate dams, it should be mentioned here because dams are identified as sources of heat and were assigned allocations.

Response: Due to the complex set of agreements with the Water Management Districts and the Bureau of Reclamation on the operations and maintenance of the facilities this section will be unchanged. Identifying the Bureau of Reclamation as a DMA and the Water Management Districts as a responsible person will provide the nexus for the implementation of the TMDL to address these sources of heat.

USEPA#25: Suggested Change ID #43

Description: WQMP - relationship to monitoring strategy

Comment: Page 231, Section 6.1, Introduction to WQMP - We recommend that the introduction to this section incorporate the "monitoring strategy" and its relationship to WQMP, and its importance as a tool for determining successful implementation of the TMDL.

Response: The text has been updated to reflect the monitoring strategy.

USEPA#26: Suggested Change ID #44

Description: Management Strategies - monitoring strategy data

Comment: Page 243, Section 6.3.5, Relationship of Management Strategies to Attainment of Water Quality Standards - We recommend that this section describe how the information/data reported under the Monitoring Strategy will be considered during the periodic reviews of the implementation plan to help determine the success of the plans and the adaptive management actions.

Response: Section 6.3.5 was updated to include this information.

USEPA#27: Suggested Change ID #45

Description: Reasonable Assurance - Monitoring Strategy

Comment: Page 250, Section 6.3.10, Monitoring and Evaluation - Monitoring and Evaluation, critical components of the WQMP and individual TMDL implementation plans, are closely linked with reasonable assurance. We recommend that this section be expanded to describe how monitoring and the overall monitoring strategy are important components of reasonable assurance.

Response: This section has been updated.

USEPA#28: Suggested Change ID #46

Description: Editorial - TMDL approach

Comment: Page 2, section 1.1, TMDL Definition and Regulatory Context, "TMDL Approach" - We suggest adding the word "meet" or "achieve" in the second sentence in the last full paragraph – "…that can be discharged to 'meet' the biologically-based…"

Response: The word 'achieve" was added in the second sentence in the last full paragraph.

USEPA#29: Suggested Change ID #47

Description: Figures - Figure 1-3

Comment: Page 4, Section 1.1, Figure 1-3 -We suggest changing the “yellow” colored narrative in the figure to a darker color.

Response: DEQ was not able to make the change.

USEPA#30: Suggested Change ID #48

Description: Editorial - comma

Comment: Page 5, Section 1.1.1, Permitting and Enforcement Tools - In the last sentence in fourth paragraph, the semi-colon should be changed to a comma.

Response: semi-colon has been changed to a comma

USEPA#31: Suggested Change ID #49

Description: Editorial - WQMP vs Implementation Plan

Comment: Page 6, Section 1.1.4, WQMP and the Implementation Plans - We recommend that this section begin with a couple of sentences describing the WQMP and Implementation Plans highlighting the differences between the two.

Response: The following language has been added: The WQMP is the section of the TMDL that provides the framework for TMDL implementation and is used to help inform the more detailed information in the TMDL Implementation Plans that will be written by the Designated Management Agencies (DMAs) and responsible persons. The WQMP sets goals and milestones to be incorporated in the TMDL Implementation Plans to achieve the allocations in the TMDL document.

USEPA#32: Suggested Change ID #50

Description: Editorial - equation format

Comment: Page 8, Section 1.2, Pollutant Identification - The equation format needs to be changed to correct the over-printing.

Response: The equation has been updated.

USEPA#33: Suggested Change ID #51

Description: Editorial - beneficial uses

Comment: Page 13, Section 2.1.1, Beneficial Uses - The sentence in the first paragraph of this section states "This TMDL identifies the beneficial uses in the TMDL geographic area and developed to protect the most sensitive beneficial uses." We suggest changing the sentence to "This TMDL identifies the beneficial uses in the TMDL geographic area and is intended to protect the most sensitive beneficial uses."

Response: The sentence has been changed to "This TMDL identifies the beneficial uses in the TMDL geographic area and is intended to protect the most sensitive beneficial uses."

USEPA#34: Suggested Change ID #82

Description: Editorial - as is

Comment: p. 20, Section 2.2, Seasonal Variation and Critical Period - The word "as" in the first sentence of the second paragraph in this section should be changed to "is".

Response: "as" has been changed to "is".

USEPA#35: Suggested Change ID #83

Description: Editorial - Background Sources Definition

Comment: Page 28, Section 2.3.3, Background Sources - The first sentence in the first paragraph states "Background sources include pollutants not originating from human activities and anthropogenic sources of a pollutant…." This seems redundant. We suggest removing "human activities" or "anthropogenic sources".

Response: The first paragraph in Sections 2.3.3 and 3.4.3 was revised to say "Background sources include all sources of pollution or pollutants not originating from human activities. Background sources may also include anthropogenic sources of a pollutant that the Department or another Oregon state agency does not have authority to regulate, such as pollutants emanating from another state, tribal lands or sources otherwise beyond the jurisdiction of the state (OAR 340-042-0030(1))."

USEPA#36: Suggested Change ID #86

Description: Editorial - bulleted items lead-in

Comment: Page 85, section 3.4.2.1, Near Stream Vegetation Disturbance/Removal - The last sentence in the first paragraph just before the bulleted items does not lead into the bulleted items. A sentence should be added to introduce the bulleted items. Also, in the second bulleted item, the word "is" should be changed to "are".

Response: A sentence has been added to introduce the bulleted items and "is" has been changed to "are" in the second bulleted item.

USEPA#37: Suggested Change ID #88

Description: Editorial - Lost River

Comment: Page 135, Title of this Chapter, Lost River Subbasin Temperature TMDLs - We suggest inserting “River” after “Lost.”

Response: The official name as identified by the USGS in the National Hydrography Dataset (NHD) and by the United States Board on Geographic Names - which is the federal body created to maintain uniform place names - is the “Lost” Subbasin without the word “River” included.

USEPA#38: Suggested Change ID #90

Description: Editorial - originate

Comment: Page 152, Section 4.2.6, Hydrology - The word “originates” should be changed to “originate” in the second sentence in the second paragraph in this section.

Response: “The Lost River drainages originates” has been changed to “The Lost River drainage originates”.

USEPA#39: Suggested Change ID #91

Description: Editorial - were was

Comment: Page 199, Section 4.7.3.1, Background - The last sentence on this page states that “On the Lost River, the warming from background sources were not quantified…” We suggest changing the word “were” to “was.”

Response: The word “were” has been changed to “was”.

USEPA#40: Suggested Change ID #92

Description: Editorial - is are

Comment: Page 201, Section 4.7.3.3, Dams and Reservoirs: Lost River - The last sentence in the first paragraph on page 201 states that “Both solar radiation reduction and increase in flow is needed.” We suggest changing the word “is” to “are.”

Response: “is” was changed to changed to “are”.

USEPA#41: Suggested Change ID #93

Description: Editorial - Table Numbering

Comment: Page 202, section 4.7.3.4, Dams and Reservoirs: Lost River - The Table numbering that appears incomplete in the second sentence in the first paragraph under this section should be Table 4-16.

Response: The sentence was updated to correctly reference Table 4-44. The sentence was revised to: "The allowed warming for this reservoir is provided in Table 4-44".

USEPA#42: Suggested Change ID #94

Description: Editorial - Underlining

Comment: Page 204, Section 4.7.4, Surrogate Measures - In the first sentence in this section "These TMDLs incorporate" is highlighted and underlined. Is there a specific reason for this? If not, the underlining and highlighting should be deleted.

Response: The highlighting and underlining was removed.

USEPA#43: Suggested Change ID #95

Description: Editorial - Responsible Persons

Comment: Page 232, section 6.1, Introduction - The first sentence in the first paragraph under Figure 6-1 states that "TMDL implementation Plans are source-specific plans developed and implemented by Designated Management Agencies (DMAs) or persons identified in the TMDL." We suggest adding "Responsible Persons" to this sentence.

Response: The section has been updated to add responsible persons as an individual responsible for developing a source specific TMDL implementation plan.

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5. Comments from: Karuk Tribe

KT#1: Suggested Change ID #1

Description: Implementation Activities - NPS pollution reductions not effective

Comment: Non-Point Source Pollution Reductions: Activity Does Not Necessarily Result in Success Reducing the impacts of agricultural activities on private lands offers perhaps the most important opportunity for the improvement of water quality in the entire Klamath Basin, and thus is a critically important issue for TMDL implementation.

The Draft TMDL and WQMP proposes that the water quality effects of agricultural activities on private lands be addressed through the development of Agricultural Water Quality Management Area Plans (AgWQMAPs) to be implemented by Local Area Advisory Committees (LACs). AgWQMAPs for the Klamath Headwaters and Lost River have been in place since 2004 and 2002, respectively. The LACs have issued status reports summarizing their activities implementing the AgWQMAPs. It is clear that positive activities such as riparian fencing and the development of conservation plans are occurring and we encourage these efforts; however, we note that evidence of activity is not evidence of success, or even measurable progress. Restoration activities must be strategically planned, then implemented with enough scope and magnitude that they actually begin to result in measurable improvements to water quality and habitat complexity.

Restoration efforts in other areas have often focused on activities that are easy to implement, but which fail to address the core stressors to aquatic habitat. For example, in the Shasta and Scott river valleys of California, much commendable effort has gone into activities such as riparian planting, riparian fencing, and screening agricultural diversions. These activities have resulted in some minor improvements; however, comparatively little effort has gone into reducing surface water diversions and groundwater pumping (pumping has actually increased). In some cases, inappropriate projects such as agricultural wells were funded with “restoration” or “water conservation” money, actually causing further impairment of instream flows. Thus, fish populations in those valleys have continued to decline as these rivers and their tributary streams have become progressively more and more de-watered.

We encourage ODEQ to do whatever it can to ensure that grant funds (and other incentives) intended to improve water quality go in fact to the highest-priority projects that will result in the most water quality and habitat benefits, rather than be spent opportunistically with a haphazard approach.

Response: DEQ will continue to participate in a coordinated effort for implementation and restoration activities. The goal of the TMDL is to ensure EPA and DEQ are meeting the standards proposed to protect beneficial uses. DEQ has a implementation strategy based on a good faith effort to get the most benefit without the regulatory nexus. However, should the need arise DEQ will use the regulatory backdrop to ensure egregious acts of impairment and environmental harm are addressed.

KT#2: Suggested Change ID #2

Description: Implementation Activities - Adaptive Management Process

Comment: 1.1 TMDL Definition and Regulatory Context 1.1.5 Adaptive Management Process Page 7 states: “The implementation of TMDLs and the associated TMDL Implementation Plans are generally enforceable by DEQ, other state agencies, and local government. However, sufficient initiative likely exists to achieve water quality goals with minimal enforcement.” This is an overly optimistic view of the chances of achieving water quality goals. Achieving water quality goals will take more than initiative, it

will take substantial resources and a combination of approaches including enforcement for those not unwilling to make good faith efforts.

Response: DEQ acknowledges the challenges for water quality restoration in the Upper Klamath and Lost Subbasins and that considerable time, effort, and resources are needed for restoring water quality.

KT#3: Suggested Change ID #7

Description: Editorial - text update requested for incomplete excerpt of OAR 340-041-0028(4)(e) in Chapter 2, 3, 4

Comment: -Chapter 2: Mainstem Klamath River Temperature TMDLs In Table 2-1 on page 11, the section regarding the Redband or Lahontan Cutthroat Trout Use is an incomplete excerpt of OAR 340-041-0028(4)(e) and is missing the important second half of the sentence. It currently reads "The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or Redband trout use". It should be revised to "The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or Redband trout use may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit)." -Chapter 3: Upper Klamath Subbasin Tributaries Temperature TMDLs In Table 3-1 on page 62, the section regarding the Redband or Lahontan Cutthroat Trout Use is an incomplete excerpt of OAR 340-041-0028(4)(e) and is missing the important second half of the sentence. It currently reads "The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or Redband trout use". It should be revised to "The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or Redband trout use may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit)." -Chapter 4: Lost Subbasin Temperature TMDLs In Table 4-1 on page 135, the section regarding the Redband or Lahontan Cutthroat Trout Use is an incomplete excerpt of OAR 340-041-0028(4)(e) and is missing the important second half of the sentence. It currently reads "The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or Redband trout use". It should be revised to "The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or Redband trout use may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit)."

Response: The language "may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit)" has been added to Tables 2-1, 3-1, and 4-1.

KT#4: Suggested Change ID #10

Description: Editorial - Additional text requested and text change Figure 2-8, Table 2-11

Comment: 2.5 Excess Load Figure 2-8 and Table 2-11 on pages 34 and 25 present temperature data summaries but do not mention the data source, years, or season in which the data were collected. Without such information it is difficult to place the data in context. We recommend adding a short paragraph with this information, similar to the text in section 4.2.7 for the Lost River subbasin.

Response: Table 2-11 has been updated to include data sources and period of record and a summary paragraph has been added to Section 2.5.

KT#5: Suggested Change ID #12

Description: Editorial - text update requested Table 2-12, 2-13, and 2-14

Comment: Section 2.5 Excess Load

It is unclear if the temperature data in Tables 2-12, 2-13, and 2-14 on pages 36 through 38 is measured or modeled. We recommend revising the captions to clarify.

Response: The caption for Tables 2-12, 2-13, and 2-14 have been updated to indicate that the temperatures are modeled.

KT#6: Suggested Change ID #15

Description: Editorial - Identify data source for Figures 3-11 through 3-19

Comment: 3.2.7 Temperature Data This section, including Figures 3-11 through 3-19 on pages 79 through 83, presents temperature data but do not mention the data source or years in which the data were collected. Without such information it is difficult to place the data in context. We recommend adding a short paragraph with this information, similar to the text in section 4.2.7 for the Lost River subbasin.

Response: The data source and period of record has been added to Figures 3-12 through 3-19, a paragraph discussing the sources of the data was added to section 3.2.7, and table 3-6 was added, which summarizes the available data.

KT#7: Suggested Change ID #32

Description: Spring Creek Diversion in Jenny Creek - Additional Description Needed

Comment: 3.4 Existing Pollution Sources 3.4.2.3 Hydromodification: Dams and Diversions and 3.4.2.4 Hydromodification: Water Rights The description of how the issue of the PacifiCorp diversion of Spring Creek (tributary to Jenny Creek) is addressed is somewhat confusing. The results in Figure 3-28 does not seem to match with Figure 3-26. Figure 3-28 shows less than 1.5 °C difference in lower Jenny Creek temperatures due to diversions while Figure 3-26 shows that the Spring Creek diversion increases lower Jenny Creek temperatures about 3 °C. We recommend revising the text to explain the reason for this discrepancy.

3.6 Excess Load It is unclear how the Spring Creek diversion is handled in Figure 3-32 (excess 7-day average daily maximum stream temperatures on Jenny Creek) on page 107. We recommend revising the text to explain.

3.7 Allocations It is unclear how the Spring Creek diversion is handled in Table 3-23 (Jenny Creek sector allocations at point of maximum impact) and Table 3-24 (Jenny Creek sector allocations at OR/CA stateline) on page 107. We recommend revising the text to explain. Can the TMDL be met with the existing Spring Creek diversion in place?

Response: We included the wrong plot. The correct plot has been added and we have updated the text. This should reconcile differences between the excess loads and other figures. The TMDL allocations for Jenny Creek watershed have been updated to reflect concerns about cumulative warming form other commenters. The final TMDL provides zero human use allowance to all anthropogenic sources including PacficCorp which diverts water from Spring Creek.

KT#8: Suggested Change ID #52

Description: Reasonable Assurance - Stewardship Agreement Plan review requested to ensure Tribal involvement

Comment: Chapter 5: Reasonable Assurance 5.2 Programs to Achieve Nonpoint Source Reductions Load 5.2.1 DMAs, Responsible persons, Management Strategies, and Implementation Actions 5.2.1.4 Federal Irrigation Project Page 226 notes that "DEQ and the NCWQCB have been working with BOR, USFWS, and the Klamath Water Users Association to draft a Stewardship Agreement Plan that will cover source specific implementation planning in Oregon and California." We are interested to know if there is a plan for public or Tribal involvement in that process, given that: 1) DEQ, NCWQCB, BOR, and USFWS are public agencies, and 2) the content of the Stewardship Agreement Plan has important implications for the future of water quality in the Klamath River upon which Tribes depend. We would appreciate an opportunity to review and provide input on the draft Stewardship Agreement Plan before it is finalized.

Response: There will be an opportunity to review the draft plan when a draft is completed. The Stewardship Agreement team has not met since February 6, 2018 and will start working on an outline and draft as soon as the Upper Klamath and Lost River Sub-basin TMDL's are completed and issued.

KT#9: Suggested Change ID #53

Description: Editorial - Suggested Text change in Chapter 6 WQMP page 242

Comment: 6.3 Water Quality Management and Implementation Plan Guidance 6.3.4 Timeline for Implementing Management Strategies

On page 242, it is stated that "DEQ recognizes that there has been and continues to be much progress towards improving water quality in the Upper Klamath and Lost River Subbasins." We are not aware of any data showing that in-river water quality conditions in the Upper Klamath or Lost River are getting better, especially for water temperature. It is true that some efforts are being made, but factors such as climate change that are detrimental to water quality are also progressing. As we noted above, activity and effort is different than progress or actual improvement. This may seem to be an issue of minor semantics, but actually it is important to distinguish between the two; thus, we suggest that "progress" in the passage above be changed to "effort"

Response: DEQ revised "progress" to "effort".

KT#10: Suggested Change ID #54

Description: Agreement - Monitoring Strategy

Comment: We (Karuk Tribe with help of Kier Associates) reviewed the Monitoring Strategy to Support Implementation of Water Temperature Total Maximum Daily Loads for the Upper Klamath and Lost Subbasins (USEPA and ODEQ 2019). We agree with the concept of developing and implementing a monitoring strategy.

Response: Thank you for reviewing the monitoring strategy.

KT#11: Suggested Change ID #55

Description: Monitoring Strategy - Add a map

Comment: Monitoring Strategy

Add a map showing the proposed monitoring locations.

Response: Two figures were added to Section 6.3.10.1 of the WQMP chapter showing the locations of proposed status monitoring stations for the Upper Klamath and Lost River subbasins.

KT#12: Suggested Change ID #56

Description: Monitoring Strategy - Inventory and Compile Existing Data

Comment: Suggestions regarding the monitoring strategy:

Inventory and compile existing data, both from previous short-term studies as well as ongoing long-term monitoring efforts. This would be beneficial because re-occupying previous stations would leverage previous data. The KBMP monitoring map (http://www.kbmp.net/maps-and-data/monitoring-locations) is a good place to start. Riverbend Sciences is currently working on a project for the Klamath Tribal Water Quality Consortium to analyze a large dataset of temperature data collected by multiple entities in the Klamath River and tributaries downstream of Keno Dam, including data from the BLM's Klamath Falls and Medford offices collected in the Jenny and Spencer creek watersheds and the mainstem Klamath River downstream of JC Boyle Dam.

Response: We agree monitoring at existing sites is beneficial and would like to coordinate with the Tribes as much as possible on implementing the monitoring strategy.

KT#13: Suggested Change ID #57

Description: Monitoring Strategy - Suggestion for Tiered approach for monitoring

Comment: The scope of the draft monitoring strategy seems overly ambitious, unless ODEQ can bring significant resources to the project. For example, the draft strategy proposes a list of 62 sites, including at least one site in each water quality limited segment (WQLS) that should be monitored for a minimum 10 years. That would no doubt generate a large quantity of useful data, but it may be more than necessary or possible. It may be more achievable to develop a tiered approach in which the 62 sites are monitored for a few years to provide information on the spatial patterns, and then the monitoring network is scaled back to a smaller subset of sites for long-term trend monitoring.

Response: The monitoring plan may seem ambitious and resource intensive but to some degree monitoring is already being conducted throughout the watershed. In addition, a stewardship agreement approach will most likely be in place incorporating the BOR, USFWS, KWUA, and Irrigation Districts to pool resources for meeting the monitoring needs. Furthermore, the monitoring strategy is a stand alone document subject to change through adaptive management. We will consider these and other comments through the adaptive management process as the strategy is scaled to available resources in relation to the goals and objectives.

KT#14: Suggested Change ID #58

Description: Overall Technical Analysis

Comment: The Draft Upper Klamath and Lost Subbasins Temperature TMDL and Water Quality Management Plan (Draft TMDL and WQMP) was issued by the Oregon Department of Environmental Quality (ODEQ) in May 2019. With the help of our consultants Kier Associates, the Karuk Tribe provides the following comments. Overall the technical analyses presented in the Draft TMDL and WQMP are sound and provide a solid diagnosis of the causes of water temperature impairment. We appreciate the diligent efforts of ODEQ and the other members (NCRWQCB, U.S. Environmental Protection Agency, and Tetra Tech) of the Klamath and Lost River TMDL development team. In our comments here, we offer some constructive suggestions for improving the document.

Response: Thank you. We appreciate the participation and effort the Karuk Tribe has made in the Temperature TMDL development and implementation process.

KT#15: Suggested Change ID #215

Description: WQMP likely to be ineffective

Comment: We strongly support the water temperature improvements proposed in the Draft TMDL and WQMP: however, we have serious concerns that the proposed water quality management plan is unlikely to be effective for that purpose. A primary reason is that Oregon's laws and regulations regarding environmental protections are relatively weak. For example, the strategy proposed to address the effects of private land forestry is to rely upon the implementation of Oregon's existing Forest Practices Act rules, which were found to be inadequate to protect coldwater fish resources by National Marine Fisheries Service (NMFS 1998) and an Independent Multidisciplinary Science Team (IMST 1999) convened by the State of Oregon.

Response: We appreciate your comment and concern on the implementation strategies outlined in the WQMP. As stated in a previous comment DEQ will work through the processes of a good faith effort for implementation and adaptive management. If inadequacies exist in any given plan we will work with that entity to ensure the water quality goals and objectives are being met.

KT#16: Suggested Change ID #217

Description: Designated Uses - Mainstem Klamath River Between Link and Keno Dams Should be Changed to Protect Salmonids

Comment: The reach of the mainstem Klamath River from Keno Dam downstream to the Oregon/California border is currently designated as Redband or Lahontan Cutthroat Trout Use, with a relatively protective water temperature standard of 20 °C seven-day average of daily maximum temperature (7DADM). The next reach of the mainstem Klamath River upstream, spanning between Keno dam up to Link Dam, is currently designated as Cool Water Species use, with a weaker water temperature standard of 28 °C daily maximum water temperature. We are concerned that the 28 °C daily maximum water temperature standard based on the Cool Water Species designation is not sufficiently protective of salmonids in the mainstem Klamath River, especially once the lower dams are removed and anadromous fish passage to the Upper Basin is restored. We do not disagree that 28 °C is protective of

suckers, or that suckers are an appropriate species upon which to set a Cool Water Species temperature standard. We also recognize that the public comment period on a draft TMDL with a court-ordered deadline for approval is not the optimal time to request major changes. However, we request that after the TMDL is approved ODEQ should change the designated use for this reach to something more appropriate such as Cold-Water Aquatic Life, Migration Corridors, or Redband or Lahontan Cutthroat Trout Use. During the portion of the year with tolerable water quality conditions, redband Trout occur in both Link River and Keno Reservoir and have been detected moving upstream through the fish ladders at Link Dam and Keno Dam (Starcevich et al. 2006). A substantial number of redband trout overwinter between Keno Dam and Link Dam and then migrate to Spencer Creek for springtime spawning (Starcevich et al. 2006). Given the presence of redband trout, we believe that this reach merits a more protective designation than Cool Water Species and that the justification for re-designation will become even stronger once anadromous fish passage has been restored to the Upper Basin. Maintaining suitable water temperatures in the spring and fall for salmon migration through Keno Reservoir will be a critically important for re¬establishing salmon populations upstream of Upper Klamath Lake.

Response: Thank you for your comment. TMDLs are not the regulatory vehicle through which water quality standards may be changed. TMDLs are used to determine appropriate pollutant load allocations for point and nonpoint sources to meet existing water quality criteria. The existing water quality standards identify cool water species as the designated fish use for the reach upstream of Keno. To change the fish use from cool to cold water species requires a revision to standards and fish use designations accomplished through a rule making process.

Even though cool water species is the designated fish use and the target is 28 deg-C upstream of Keno, it is not the only target the TMDL has established. The TMDL also provides allocations to all anthropogenic sources in the Klamath River such that their cumulative warming is limited to less than 0.3 deg-C (even upstream of Keno) with no measurable warming at the California/Oregon Stateline. These warming limits will help protect salmonid populations in addition to cool water species.

KT#17: Suggested Change ID #220

Description: Editorial - Fix caption Figure 3-6

Comment: 3.2 Subbasin Characterization 3.2.4 Climate The caption to Figure 3-6 on page 74 reads “Climate summary — Klamath Falls, Oregon (KLMO 1999-2017).” Should it be KFLO not KLMO?

Response: The climate station in the caption for Figure 3-6 has been changed from KLMO to KFLO.

KT#18: Suggested Change ID #221

Description: Editorial - Figure 4-6 caption

Comment: 4.2 Subbasin Characterization 4.2.4 Climate The caption to Figure 4-6 on page 149 reads “Climate summary — Klamath Falls, Oregon (KLMO 1999-2017).” Should it be KFLO not KLMO?

Response: The climate station in the caption for Figure 4-6 has been changed from KLMO to KFLO.

KT#19: Suggested Change ID #223

Description: Editorial - Update URL

Comment: 6.3.7 Identification of Sector-Specific Implementation Plans

On page 245, the URL listed for ODEQ's guidance for developing Implementation Plans (http://www.deq.state.or.us/wq/tmdls/docs/impl/07wq004tmdlimplplan.pdf) is no longer active.

Response: The URL was updated to: https://www.oregon.gov/deq/wq/tmdls/Pages/TMDLs-Implementation.aspx

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KT#20: Suggested Change ID #224

Description: Editorial - add explanation

Comment: A.3 Derived Data and Sampled Parameters A.3.2.2 Vegetation — Mapping, Classification and Sampling

Page A-10 notes that "Variable vegetation conditions in the Klamath River Basin require a higher resolution than currently available GIS data sources. To meet this need, DEQ has mapped vegetation for most streams using Digital Orthophoto Quads (DOQs) at a 1:5,000 map scale. On the Lost River, LiDAR data was used to characterize vegetation." LiDAR for Spencer Creek is available from the National Map (https://viewer.nationalmap.gov/advanced-viewer/). We recommend that a brief explanation be added about the pros/cons of characterizing vegetation with manual digitization versus LiDAR, and why LiDAR was used for Lost River but not Spencer Creek.

Response: We added a section into Appendix A discussing LiDAR. In addition to the Lost River, LiDAR was used to update ground elevations, topographic shade, and verify the vegetation heights for the Miller Creek model. This was not apparent in Appendix A so we added additional language to clarify.

In Jenny Creek and Spencer Creek, DEQ chose not to update the models with LiDAR.

The temperature data, TIR data, flow data, and vegetation/habitat information used in the modeling in Jenny Creek and Spencer Creek were collected in year 2001. LiDAR and aerial imagery is useful for characterizing current vegetation conditions. LiDAR is also useful for characterizing ground elevations which are inputs used in the model. DEQ considered updating the model to incorporate vegetation and ground elevation data from the more recent LiDAR but decided against it. Updating to LiDAR would have required DEQ to either 1) collect new temperature, TIR, and flow data that centered closer to the year the LiDAR was collected in order to accurately represent the vegetation conditions at that time, or 2) reconcile differences in the vegetation between the two years and modify the LiDAR DSM so it more closely represents vegetation conditions in the year 2001. In addition, updating the model with LiDAR data would require a significant reconfiguration of the model. Given the scale of work and the number of changes that needed to occur in order to incorporate LiDAR DEQ did not believe it was feasible given the time and resources devoted to the project. In the Lost River and Miller Creek we felt it was appropriate to utilize LiDAR because the vegetation conditions when LiDAR was collected do not significantly differ from the model year. There was also no prior vegetation assessment on the Lost River so starting with LiDAR made the most sense.

KT#21: Suggested Change ID #248

Description: Monitoring Strategy - Prioritize known sources for implementation

Comment: Page 4 of the draft monitoring strategy notes that "In some cases, modeling indicates that even with the removal of known, quantifiable sources, the water quality criteria will not be attained. In these cases, DEQ assigns a heat load reduction to background and unidentified anthropogenic sources in order to meet the criteria" and "additional heat budget and system response information may be needed for three waters (i.e., mainstem of the Klamath River, Jenny Creek, and Miller Creek) to effectively reduce unidentified anthropogenic sources of heat or heat related processes. System response studies will be initiated by DEQ for segments of Miller Creek or Klamath River that do not meet water temperature criteria within 10 years of EPA's approval of the KLR TMDL." We disagree with this approach. The priority for implementation should be to focus on addressing the issues known to adversely affect temperatures (i.e., shade and flow), rather than searching for additional sources that might affect temperatures. If by some miracle we collectively succeed at thoroughly addressing all the known sources (which would likely take several decades of intensive effort), then it would be appropriate to search for additional sources, but to do it before then would be a waste of effort.

Response: Thank you for your comment. DEQ agrees that implementation should focus on known causes of increased temperature. We have updated the narrative to clarify. DEQ still plans to complete system response studies which serve to identify previously unknown sources, but also to quantify progress made on reducing known sources and assist in further implementation.

KT#22: Suggested Change ID #249

Description: Monitoring Strategy - drop additional modeling

Comment: Monitoring Strategy - Section '1.5.6 - 8 System Response and Heat Source Characterization' proposes additional modeling for Klamath River, Jenny Creek, and Miller Creek. We disagree that this is necessary and suggest that this be dropped from the monitoring strategy (see previous comment [Monitoring Strategy - Prioritize known sources for implementation] for reasons).

Response: Thank you for your comment. DEQ agrees that implementation should focus on known causes of increased temperature. We have clarified in the WQMP that priority for implementation should be on addressing known sources first. DEQ still plans to complete system response studies which serve to identify previously unknown sources, but they also serve to quantify progress made on reducing known sources and assist in further implementation. System response studies will only occur for the portions of Jenny Creek, Miller Creek, and the Klamath River that are not making progress toward meeting the TMDL targets within 10 years.

KT#23: Suggested Change ID #250

Description: Monitoring Strategy - Include Photo Monitoring

Comment: The draft monitoring strategy does not mention photos. While quantitative data is useful, it is can also be expensive and time-intensive to collect and thus DMAs may be resistant. Photo-monitoring is an easy and powerful tool for documenting and tracking both habitat conditions (including riparian vegetation) and restoration projects. Therefore, we recommend photo monitoring be included as an integral component of the monitoring strategy.

Response: This is a great suggestion and DEQ will work to incorporate photo monitoring into the overall monitoring strategy document.

KT#24: Suggested Change ID #251

Description: Monitoring Strategy - DMA monitoring data should be publicly available

Comment: We agree with the draft monitoring strategy's call for the DMA's data management systems to "facilitate timely uploads to state (AWQMS) or federal (WQX) databases." In addition, we recommend that the monitoring strategy require that all data collected by the DMAs be made available to the public in electronic form in its full level of detail, not just summaries.

Response: The monitoring strategy itself is not a regulatory document. Requirements for DMAs and other responsible persons are identified in the TMDL Water Quality Management Plan (WQMP) - Chapter 6. In the WQMP, DEQ has required certain DMAs and responsible persons develop an implementation plan for DEQ's approval. The implementation plan will include a monitoring plan which should in part support aspects of the monitoring strategy. The WQMP also requires certain DMAs and responsible persons to submit an annual report to DEQ which will include the results of any monitoring.

It is DEQ's intention that any water quality monitoring data submitted to DEQ will be uploaded into DEQ's AWQMS database. Data in AWQMS is available for download by the public at https://www.oregon.gov/deq/wq/Pages/WQdata.aspx. AWQMS includes both continuous observations as well as the daily summaries. Both are available for download.

KT#25: Suggested Change ID #325

Description: Implementation Activities - Focus on the Klamath River at its Tributaries Rather than the Lost River

Comment: Pages 17 of comments: VI. TMDL Implementation Should Focus on the Klamath River at its Tributaries Rather than the Lost River

Given the level of alteration, restoring water quality and habitat in the Lost River subbasin would be a monumental task requiring conversion of thousands or tens of thousands of acres of farmland back to wetlands. This would require large amounts of money and political will which is unlikely to materialize. Therefore, we recommend that restoration efforts focus on the Klamath River and its tributaries [12]. The problems of the Lost River can be addressed through a combination of minimizing discharges into the Klamath River and by treating the effluent prior to discharge into the Klamath River.

12 Klamath Tribal Water Quality Consortium, Upper Klamath Basin Nonpoint Source Pollution Assessment and Management Program Plan, 78 (2018), available at https://klamathwaterquality.com/documents/KlamConsortium_NPS_Plan_20180918_finalweb.pdf

Response: We have noted your recommendation to prioritize TMDL implementation on the Klamath River and it's tributaries. We agree that restoration of water quality in the Lost River will be a challenging task and support the Tribes prioritization to focus on the Klamath River and it's tributaries.

In terms of the level of effort required in the Lost River. We recognize that historically the Lost River was tied to series of expansive wetlands and that these conditions supported a healthy population of Suckers. DEQ does not oppose an attempt to restore the Lost River and it's surrounding wetlands but DEQ is also

not proposing that TMDL implementation be an attempt to go back to that condition if an alternative set of actions will achieve the same water quality goal. We don't agree that the only way to achieve the temperature targets and other water quality standards in the Lost River would require converting thousands of acres of farmland back to wetlands. The temperature TMDL analysis shows that the Lost River as it generally exists today can achieve the temperature standard with improvement to shade and with implementation of strategies to address thermal loading that is a result from a lack of instream flow. We estimate that less than 100 acres along the Lost River need to be restored to increase shade. While this may not restore the Lost River to it's historical condition DEQ believes this is an achievable objective and will lead to improvements in water quality.

KT#26: Suggested Change ID #329

Description: Forest Practice Rules are Are Not Protective

Comment: Forest Practice Rules for Private Lands Are Not Protective of Water Temperature

The water quality effects of timber harvest and roads on private lands are an important issue generally in the Klamath River Basin, but play a particularly critical role in the impairment of coldwater tributaries. For example, Spencer Creek is a Klamath River tributary that currently drains into J.C. Boyle reservoir. It contains low-gradient stream habitat that is rare in tributaries of the Middle Klamath Basin. Following the likely removal of J.C. Boyle, Copco, and Iron Gate dams, a restored Spencer Creek could provide excellent habitat for coho salmon. The Draft TMDL and WQMP found that current riparian shade in Spencer Creek is barely more than half of the estimated maximum potential shade, current water temperatures at the mouth of Spencer Creek are more than 10 ºC warmer than its natural thermal potential, and that a substantial portion of this warming is due to the lack of vegetative shade. Examination of aerial photographs of the Spencer Creek watershed and the surrounding areas in 2005 shows more bare ground than trees, with the forest confined to narrow strips (Figure 1), a powerful illustration of the poor condition of private timber lands in the Oregon portion of the Klamath Basin. Since 2005, additional harvests the proceeded to target the few remaining riparian areas in Spencer Creek's middle (Figure 2) and lower reaches.

The Draft TMDL and WQMP relies on the Oregon Department of Forestry's ongoing implementation of Oregon's Forest Practices Act (FPA) to ensure that private land forestry activities do not result in water quality impairment. Unfortunately, these regulations have long been recognized as inadequate for the protection salmonid habitat and water quality. For example, the Independent Multidisciplinary Science Team [13] ("IMST") was convened by the State of Oregon to assess whether the FPA rules were sufficiently protective to restore wild salmonids in Oregon. The IMST found that the existing rules were not adequate on several bases, including water quality issues such as sedimentation resulting from landslides and roads.

We are not aware of any significant improvements to the Oregon FPA rules to address the shortcomings identified by the IMST. The National Marine Fisheries Service has also recognized the shortcomings of the FPA rules and has made recommendations to the State of Oregon [14], but these recommendations have not yet been implemented. In the Oregon Coast Range west of the Klamath Basin, Oregon did recently increase riparian protections in response to research showing that previous rules did not adequately protect water temperatures [15]; however, rules were not changed for areas outside the Coast Range. We realized that ODEQ's authority to resolve the situation is limited due to existing laws, regulation, and politics; however, we feel compelled to note the approach outline in the Draft TMDL and WQMP to address the water quality impacts of forestry on private lands is unlikely to succeed.

Figure 2. Satellite images from May 2016 and June 2019 from Planet.com showing of a 1.5 mile long reach in the middle portion of Spencer Creek which runs from northwest corner to southeast corner of the

images. The white dashed oval indicates areas where timber harvests specifically targeted trees within riparian buffers. The road crossing (labeled on some topographic maps as Spencer Creek Hook Up Road) in the upper left of the photo is located at latitude 42.224576° north, longitude -122.098926° west.

13 Independent Multidisciplinary Science Team (IMST), Recovery of Wild Salmonids in Western Oregon Forests: Oregon Forest Practices Act Rules and the Measures in the Oregon Plan for Salmon and Watersheds. Technical Report 1999-1 to the Oregon Plan for Salmon and Watersheds, Governor's Natural Resources Office, Salem, Oregon, 94 (1999).

14 National Marine Fisheries Service (NMFS), A Draft Proposal Concerning Oregon Forest Practices. Submitted by NMFS to the Oregon Board of Forestry and the Office of the Governor, 110 plus Appendices (1998).

15 Groom, J.D., L. Dent, and L.J. Madsen, Stream Temperature Change Detection for State and Private Forests in the Oregon Coast Range, Water Resources Research 47:W01501. doi: 10.1029/2009WR009061 (2011).

Response: Thank you for you comment. DEQ agrees that in certain situations, the Oregon Forest Practices Act rules minimum riparian requirements may not be sufficient to achieve the TMDL shade allocations. DEQ has communicated this concern to ODF and the Board of Forestry. DEQ and the Oregon Environmental Quality Commission are working closely with the ODF and the Board of Forestry on this issue.

KT#27: Suggested Change ID #333

Description: Monitoring Strategy

Comment: Monitoring Strategy

We reviewed the Monitoring Strategy to Support Implementation of Water Temperature Total Maximum Daily Loads for the Upper Klamath and Lost Subbasins. We agree with the concept of developing and implementing a monitoring strategy.

Response: Thank you for the feedback.

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6. Comments from: Klamath County Economic Development Association

KCEDA#1: Suggested Change ID #283

Description: general Comment - stimulate area development

Comment: Paragraph 1: Thank you for the opportunity to comment on the May 2019 Draft Upper Klamath and Lost Subbasins Temperature TMDL and Water Quality Management Plan (Draft TMDL), which addresses water temperature issues in the Klamath and Lost River Basins in Oregon. Our work at the Klamath County Economic Development Association (KCEDA) is primarily focused in business recruitment, retention/expansion, and entrepreneurship. Our efforts to stimulate area development has in recent years been significantly impacted by issues involving the region's water and TMDLs.

Response: Thank you. Your comment has been noted. TMDLs are developed to identify the pollutant sources and reductions necessary to meet existing water quality criteria. In many parts of the country, including Oregon, significant economic growth has occurred in watershed where TMDLs have been issued.

KCEDA#2: Suggested Change ID #284

Description: General Comment - development and environmental improvement

Comment: Paragraph 2: Developing TMDLs requires ODEQ to consider matters that are complex in many respects. These issues are particularly complicated in the Klamath and Lost River and Lower Klamath Basins. KCEDA appreciates the Oregon Department of Environmental Quality's (ODEQ) efforts to improve water quality in the Klamath Basin collaboratively with the United States Environmental Protection Agency (EPA) and other interested and affected parties. However, KCEDA at this time believes this Draft TMDL has not been prepared in a way that effectively addresses our region's capacity for development and environmental improvement.

Response: Thank you. Your comment has been noted.

KCEDA#3: Suggested Change ID #285

Description: General Comment - new industry

Comment: Paragraph 3: Examining our current project portfolio, we have nearly 40 active projects, in addition to roughly 10 projects, that although alive, have been placed on hold. Collectively, these projects potentially represent billions of dollars in capital investment, along with thousands of new jobs for Klamath County. This is mainly the result of large industrial based operations identifying value in Klamath's land assets. In the past few years, Klamath has been selected as a finalist location by multiple companies aiming to establish large industrial operations in the region, where despite proven track

records of these companies being environmentally friendly, the TMDLs have prohibited their ability to move forward with the investment in Klamath; in more than one case, the wastewater discharged from the prospective facility would improve the cleanliness levels of the Klamath River. The proposed Temperature TMDL would only add to the prohibitive nature of these standards, enhancing the difficulty for Klamath to strengthen its economic vitality, as well perhaps preventing opportunities for the Klamath River's quality to make better environmental progress.

Response: Thank you. Your comment has been noted. The TMDL does not change the existing water quality criteria for temperature in the Upper Klamath and Lost River subbasins. The TMDL is based on the existing water quality standards for temperature in these subbasins. Under EPA's permitting regulations, water quality-based effluent limits in NPDES permits must be "consistent with the assumptions and requirements" of wasteload allocations in EPA-approved TMDLs irrespective of economic considerations. In many areas, including Oregon, there has been large economic growth in watersheds where TMDLs have been developed. In addition, many Oregon TMDLs have set aside reserve capacity for future growth.

KCEDA#4: Suggested Change ID #286

Description: General Comment - insufficient data

Comment: Paragraph 4: The Draft TMDL was prepared without sufficient data to support the wasteload allocations and load allocations.

Response: Appropriate data were used to assess the water quality and develop the TMDLs. The allocations provide a means for the water quality standards to be met and the success of the implementation actions taken to meet the allocations will be supported by performance monitoring in the field. Section 1.1.5 of the TMDL states that "DEQ will also consider reopening the TMDL, subject to available resources, should new information become available indicating that the TMDL or its associated water quality targets need to be modified".

KCEDA#5: Suggested Change ID #287

Description: General Comment - time contraints

Comment: Paragraph 4: In addition, there are important factual and legal issues requiring correction. KCEDA understands that a court order imposes time constraints and urges ODEQ and EPA to pursue a deadline extension. If there is no extension, ODEQ should make clear that any final TMDL is in need of considerable modification.

Response: An extension has already been requested and was granted by the court to allow EPA up until September 30, 2019 to approve the TMDL. DEQ has made a number of changes to the TMDL to address comments received during the public comment period. DEQ has reviewed the TMDL and does not believe there to be any factual or legal issues requiring correction. Section 1.1.5 of the TMDL states that "DEQ will also consider reopening the TMDL, subject to available resources, should new information become available indicating that the TMDL or its associated water quality targets need to be modified".

KCEDA#6: Suggested Change ID #288

Description: General Comment - KCEDA does not support TMDL:

Comment: Paragraph 4: KCEDA does not support the current draft and believes there should be practical changes to the draft's proposed standards. If you have any questions or comments, please contact us.

Response: Thank you. Your comment has been noted. The TMDL is based on the existing water quality standards for temperature in the subbasins. A TMDL does not change the existing water quality criteria for temperature in the Upper Klamath and Lost River subbasins and is not the regulatory vehicle through which water quality standards may be changed. TMDLs are clean water act plans that implement already approved water quality standards.

7. Comments from: Klamath Drainage District

KDD#1: Suggested Change ID #96

Description: General Comment - OWRC & Farm Bureau

Comment: Page 1 - To note, there are a number of excellent and thorough responses to your request for comments on the draft Temperature TMDL. We encourage the DEQ to consider those comments in addition to the ones outlined in this submission. Specifically, as a member of the Klamath Water Users Association (KWUA), KDD joins in the comments submitted by KWUA. As a member of the Oregon Water Resources Congress (OWRC), KDD strongly supports the comments submitted jointly by OWRC and the Oregon Farm Bureau as well.

Response: Thank you we will review the comments received.

KDD#2: Suggested Change ID #97

Description: General Comment - number of issues

Comment: Page 1 - The Klamath Drainage District was formed under the laws of the State of Oregon on March 6, 1915. The District is situated in Southern Oregon on the lakebed of the historic Lower Klamath Lake and was created for the purpose of providing adequate drainage at all times as well as for providing a cost-effective water supply to its landowners. Comprised of approximately 27,000 acres, KDD is part of the United States Bureau of Reclamation's Klamath Reclamation Project (Klamath Project). Virtually all runoff and drainage from the Klamath Project is released to the Klamath River via the Klamath Straits Drain which runs through the heart of the district. As a district that relies heavily on providing adequate drainage for its landowners, we've identified a number of general issues with the draft Temperature TMDL that need to be addressed.

Response: Thank you for the comment. We understand the significance of the KSD and will work to maintain flexible operation while meeting the Clean Water Act obligations.

KDD#3: Suggested Change ID #98

Description: TMDL Conflicts with the 2019 Biological Opinion

Comment: Pages 1 & 2: TMDL Conflicts with the 2019 Biological Opinion

On April 2, 2019, the United States Bureau of Reclamation, Fish and Wildlife Service, and National Marine Fisheries Service signed a Biological Opinion that determines the allocations of water for the Klamath River based on a given hydrologic water year. The model that is used to determine Klamath River flows relies on historical accretions from the Klamath Straits Drain.

The National Marine Fisheries Service has determined that water quantity is necessary to prevent incidental take of listed Coho in the Klamath River. Water quantity provides habitat refugia for listed Coho and other salmonid species important to Klamath River Tribes downstream. As the current Draft

TMDL is written, the Klamath Straits Drain (KSD) will not be permitted to discharge to the Klamath River if temperatures in the KSD exceed 28°C or increase Klamath River temperatures by 0.015°C. This restraint may have harmful impacts on listed Coho and other salmonid species in the Klamath River due to lower flows at critical times of the year. Although the KSD is critically important to the KDD, the same temperature constraints will be required of the Lost River Diversion Channel which could have even larger effects on the flow of the Klamath River.

The TMDL clearly conflicts with the interests of the Endangered Species Act as demonstrated above with its conflict with the 2019 Biological Opinion.

Response: DEQ recognizes the requirements in the 2019 Biological Opinion and the requirements to meet water quality standards as required by the Federal Clean Water Act. To that end, DEQ would suggest conducting operations within the district to meet the standards set forth by the TMDL to protect beneficial uses and aquatic life. DEQ also suggests evaluating operations to ensure KDD meets both the needs of the TMDL and the Biological Opinion.

KDD#4: Suggested Change ID #99

Description: KSD - pollutant source

Comment: Page 2: TMDL Conflicts with Ninth Circuit Court and Clean Water Act Section 2.6.3.2 defines the Klamath Straits Drain as a Discrete Nonpoint Source, making the claim that it discharges agricultural related storm water or return flows from irrigated agricultural lands to the Klamath River, insinuating that, therefore, its discharge can be regulated based on temperature. However, this characterization of the KSD as a discreet nonpoint source, however, is inconsistent with established court precedent. In the 2015 lawsuit filed by the Oregon Natural Resource Council alleging that the Bureau of Reclamation and its commissioner violated the Clean Water Act by discharging pollutants into the Klamath River via the Klamath Strait Drain, the Ninth Circuit Court of Appeals ruled that the Klamath Straits Drain is not meaningfully distinct from the Klamath River and therefore the defendant was not in violation of the Clean Water Act. Given that the court has determined that the Klamath Straits Drain is not meaningfully distinct from the Klamath River under the Clean Water Act, and the draft Klamath and Lost River Subbasins Temperature TMDL generally derived from the Clean Water Act, the Klamath Straits Drain cannot be defined as a Discrete Nonpoint Source and cannot be regulated under the TMDL. Further, the TMDL is inconsistent regarding treatment of the KSD as both a pollutant source and a receiving water. In Chapter 4 of the Draft TMDL, the KSD is identified as an impaired body assigned loading capacities and allocations, yet as discussed above KSD has been also labeled as a pollutant source. It cannot be both.

Response: DEQ used the term “discrete nonpoint sources” to refer to the warming in the KSD from the management of KSD by the KDD and other sources with heat inputs into KSD. To clarify DEQ’s intent and to respond to this comment, DEQ has removed references to discrete nonpoint sources from the TMDL and instead revised the text to refer to sources that warm the KSD.

KDD#5: Suggested Change ID #100

Description: Water Quality Data - Year 2000

Comment: Pages 2 & 3: TMDL Violates EPA Scientific Integrity Policy and Conflicts of Interest

Understanding that Oregon DEQ is not the United States Environmental Protection Agency (EPA), the Department still has the responsibility to follow many of the laws, regulations, policies and standards set forth and regulated by the EPA.

The draft Klamath and Lost River Subbasins Temperature TMDL was based on a narrow dataset used to determine the TMDL's water quality standards. Using a single year of data (year 2000) is not a fair representation of the realistic nature of the waterways analyzed for the TMDL. This narrow view violates the EPA's Scientific Integrity Policy which fosters a culture of scientific integrity through its Principles of Scientific Integrity developed in 1999. Clearly stated in the policy, "The Principles of Scientific Integrity sets forth the Agency's commitment to conducting science objectively, presenting results fairly and accurately, and avoiding conflicts of interest." 2

Determining the TMDL on one year's data is neither objective, nor presenting results fairly and accurately.

Response:
DEQ consulted with EPA to better understand how EPA evaluates adherence to this policy. Based on their response, summarized below, DEQ does not believe the TMDL or the data and information used to develop the TMDL and allocations to be in violation of this policy.

DEQ used multiple years worth of data to evaluate stream temperatures. See TMDL section 2.6, 3.27, and 4.27. The Klamath River model was calibrated using temperature data from 2000 and validated, or further corroborated, with observed temperature data from 2002. The model was generally able to reproduce observed water quality in the Klamath River. The model's capabilities are constrained by the limited availability and quality of monitoring data, particularly for boundary conditions to the model. The year 2000 was selected for calibration because relatively good boundary condition data and in-stream data were available. The two model years (2000 and 2002) appear to capture a variety of flows that are commonly observed in the Klamath River (see Figure 2-15 in the TMDL report). Model Configuration and Results - Klamath River Model for TMDL Development (Tetra Tech 2009) has been included as Appendix B in the TMDL and includes more details regarding the setup and calibration of the models.

Application and configuration of TMDL models were guided by an EPA-approved Quality Assurance Project Plan (QAPP). Modeling QAPPs and associated technical memoranda or addendums identify quality expectations for steps in the modeling process such as data acquisition, model selection, domain configuration, training or calibration, scenario prediction, and reporting. Such quality expectations serve multiple objectives, including requirements under 40 CFR 130.7(c)(1) that TMDLs shall account for critical conditions. We have added a new section into Chapter 2 (Section 2.3 - Water Quality Modeling Overview) which provides an overview of the modeling and conditions during the model period.

More information regarding the model has also been added to Section 2.3 of the TMDL (Water Quality Modeling Overview) describing the peer review process for the model. The model went through multiple rounds of peer review. Staff with modeling expertise from DEQ, NCRWQCB, and EPA worked as a team with Tetra Tech reviewing and advising on model development and application. In 2005, the calibrated model was also reviewed by Merlynn Bender of U.S. Bureau of Reclamation (BOR), Dr. Scott Wells of Portland State University, and Brown and Caldwell under contract with the City of Klamath Falls. The NCRWQCB also had their TMDL go through an external scientific peer review in 2009 (NCRWQCB 2010). Lastly, BOR contracted the USGS to review the Keno Reservoir portion of the model. DEQ, along with EPA and NCRWQCB, considered all peer review comments and made changes to the model and documentation when appropriate.

While EPA welcomes differing views and opinions on scientific and technical matters as a legitimate and necessary part of the process to provide the best possible information to regulatory and policy decision-makers, EPA does not believe that ODEQ's use of data and the model to develop the TMDL violated EPA's Principles of Scientific Integrity. EPA's Scientific Integrity Policy ensures that scientific and

technical activities are of the highest quality and credibility by requiring that employees' work is of the highest integrity and that they represent their own work fairly and accurately, acknowledge the intellectual contributions of others, avoid financial conflicts of interest and impartiality, understand the specific programmatic statutes that guide their work and report any breach in these principles (https://www.epa.gov/sites/production/files/2014-11/documents/epa-principles-of-scientific-integrity.pdf). In fact, it is the understanding of the specific programmatic statutes that guide the TMDL work that support the selection of year 2000 for the Klamath River model was appropriate in order to protect against reasonable worst case conditions. Likewise EPA is unaware of any conflict of interest or impartiality shown by ODEQ in preparing the TMDL analysis. Should you continue to have concerns regarding the scientific integrity of the process, you may contact the acting EPA Region 10 Deputy Scientific Integrity Official, Linda Anderson-Carnahan at anderson-carnahan.linda@epa.gov or (206) 553-2601, or the Agency Scientific Integrity Official, Francesca Grifo at grifo.francesca@epa.gov or (202) 564-1687.

KDD#6: Suggested Change ID #101

Description: KSD - no legal authority

Comment: Page 3: TMDL Impacts the Klamath Drainage District First and foremost, the Klamath Drainage District does not believe that the DEQ has legal authority to implement this draft TMDL in its current form, nor to regulate the Klamath Straits Drain as a Discrete Nonpoint Source.

Response: The TMDL covers the entities that have authority over sectors and sources that affect water quality in the Upper Klamath and Lost River Subbasins. The Oregon Department of Agriculture (ODA) and the Bureau of Reclamation (BOR) have been named as Designated Management Agencies (DMA's) who are responsible for developing source specific TMDL Implementation Plans. The Agriculture Water Quality Area Plans facilitated by ODA are written for the individual landowners throughout the watershed and do not cover the Water Management Districts (WMDs). In addition, it is DEQ's understanding that through transferred works all operation and maintenance on the BOR-owned facilities are delegated to the WMDs. For this reason, DEQ has identified all WMD's as responsible persons in the Water Quality Management Plan with the requirement to develop Source Specific TMDL Implementation Plan and associated management strategies. In establishing a TMDL, OAR 340-042-0040(4)(l)(G) states that the department will include a WQMP that includes "Identification of persons, including Designated Management Agencies (DMAs), responsible for implementing the management strategies and developing and revising sector-specific or source-specific implementation plans." This rule provides that while a WQMP can designate DMAs it can also identify other persons with a role in implementation. Additionally OAR 340-042-0080(4) states that persons identified in the WQMP must prepare an implementation plan. The Environmental Quality Commission adopted these rules under the authority granted to it to take acts necessary to implement the Federal Clean Water Act under ORS 468B.035. Additionally, ORS 468B.110 grants the EQC or DEQ authority to establish and enforce TMDLs by rule or order. This TMDL was issued by DEQ as an order.

We used the term "discrete nonpoint sources" to refer to the warming in the KSD from the management of KSD by the KDD and other sources with heat inputs into KSD. To clarify what we meant, we have removed references to discrete nonpoint sources from the TMDL and instead revised the text to refer to sources that warm the KSD.

KDD#7: Suggested Change ID #105

Description: KSD Flow - draining water

Comment: Pages 3 & 4: The Klamath Straits Drain is an invaluable operational mechanism for evacuating water from Klamath Drainage District lands. It provides flood protection and lowers the water table within the district so crops can grow. The district is the largest financial contributor to the Klamath Straits Drain operation and has spent millions of dollars in just the last 10 years to operate and maintain the Drain and its infrastructure.

The Klamath Drainage District is limited in its ability to drain water beyond the Klamath Straits Drain. The district does have a small pumping station that could lift water to the Ady Canal to send to the refuge, however, that practice is not consistent with the 2019 Biological Opinion for certain times of the year and as mention previously, is not modeled nor expected and therefore could be in violation of the 2019 Biological Opinion. Moreover, the pumping station can not pump the capacity required to evacuate water to remedy a shut down of the Klamath Straits Drain. Therefore, if limitations are set upon the use of the Drain, the impacts to district landowners could be devastating potentially resulting in a total loss of crop production. In addition, rising water levels from a KSD shutdown could jeopardize the integrity of KDD and Bureau of Reclamation infrastructure and could cost tens of millions of dollars in damages.

Aside from damages, operational costs to achieve the prescribed load allocations would be devastating to a small district like KDD. Requiring compliance with the program without state funding would constitute an unfunded mandate under Article XI, section 15(3) of the Oregon Constitution. Although we haven't analyzed the impacts reaching beyond the district, we can assume that impacts will be felt at a regional level as well. Economic impacts would certainly be felt in the local economy if there was no production or harvest within the district.

Finally, we believe there would be even further impacts not yet realized if these limitations were placed upon the Klamath Straits Drain. The Klamath Drainage District is an annual stop for over a million migrating birds along the Pacific Flyway, including the largest concentration of Bald Eagles in the lower 48 states. District lands provide feed and refuge that are desperately needed for these birds to continue in their migration. These are just a few reasons related to the Klamath Drainage District and the Klamath Straits Drain as to why DEQ should reassess its authority and scientific basis for setting temperature standard limitations on the Klamath Strait Drain.

Response: This TMDL is not an unfunded mandate under Article XI, section 15 of the Oregon Constitution, the "Unfunded Mandate Act." The Unfunded Mandate Act provides that when "any state agency requires any local government to establish a new program or provide an increased level of service for an existing program," the state must allocate funds to the local government to pay for the costs of performing the required service or activity. A "program" means "a program or project imposed by enactment of the Legislative Assembly or by rule or order of a state agency under which a local government must provide administrative, financial, social, health or other specified services to persons, government agencies or to the public generally." Art. IX, section 15(2)(c) (emphasis added). The Unfunded Mandate Act went into effect in 1997 and only applies to mandates enacted after that date. This TMDL is issued pursuant to the Clean Water Act and state water quality laws that predate the Unfunded Mandate Act. Additionally the TMDL does not require local governments to establish a "program" as defined by the Unfunded Mandate Act but rather regulates the internal activities of those entities to address their pollution to waters of the state. The Oregon Court of Appeals recently clear in Linn County v. Brown, 297 Or App 330 (2019), that the Unfunded Mandates Act does not apply to these sorts of regulatory actions.

DEQ understands the complex nature of the KSD and the benefits it provides to the district and habitat. DEQ's intent is that the district review its operation plan and develop a program that would meet the needs of the districts and regulatory requirements under the Clean Water Act and state water quality laws.

8. Comments from: Klamath Water Users Association

KWUA#1: Suggested Change ID #111

Description: General Comment - complex TMDL

Comment: Thank you for the opportunity to comment on the May 2019 Draft Upper Klamath and Lost Subbasins Temperature TMDL and Water Quality Management Plan (Draft TMDL), which addresses water temperature issues in the Klamath and Lost River Basins in Oregon. The Klamath Water Users Association submits these comments on behalf of its constituent districts and irrigators of the United States Bureau of Reclamation Klamath Project (Klamath Project). In addition, Klamath Irrigation District, Klamath Drainage District, Tulelake Irrigation District, Van Brimmer Ditch Company, and Pioneer District Improvement Company are members of the Klamath Water Users Association with operations within the Klamath Project and each of them individually joins in these comments. This letter collectively refers to the Klamath Water Users Association and all the above-identified entities as "KWUA." KWUA appreciate the Oregon Department of Environmental Quality's (ODEQ) efforts to improve water quality in the Klamath Basin collaboratively with the United States Environmental Protection Agency (EPA), California North Coast Regional Water Quality Control Board (Regional Water Board), and other interested and affected parties. Developing TMDLs requires ODEQ to consider matters that are complex in many respects. One complexity involves regulatory issues associated with the interstate nature of waters. These issues are particularly complicated in the Klamath and Lost River and Lower Klamath Basins as related to the Klamath Project.

Response: Thank you for the acknowledgement.

KWUA#2: Suggested Change ID #112

Description: General Comment - modifications

Comment: Page 1 - As the comments explain, the Draft TMDL was prepared without sufficient data to support the wasteload allocations and load allocations. In addition, there are important factual and legal issues requiring correction. KWUA understand that a court order imposes time constraints and urges ODEQ and EPA to pursue a deadline extension. If there is no extension, ODEQ should make clear that any final TMDL is in need of considerable modification.

Response: DEQ respectfully disagrees that the TMDL was prepared without sufficient data to support the wasteload and load allocations. DEQ, EPA, and TetraTech have worked diligently to provide a document based on the best available information. DEQ has responded to comments by KWUA and others and made revisions as needed. Section 1.1.5 of the TMDL states that "DEQ will also consider reopening the TMDL, subject to available resources, should new information become available indicating that the TMDL or its associated water quality targets need to be modified".

KWUA#3: Suggested Change ID #113

Description: LAs - Discrete NPS

Comment: Page 2 - A. Mainstem Klamath River Draft TMDL As discussed in detail below, in the case of the mainstem Klamath River portion of the Draft TMDL, KWUA submit that: it is improper to assign load allocations to various features identified in sections 2.6.3.2; the load allocations are much more stringent than necessary, meeting the load allocations would be a misallocation of public resources; and the inflexible approach to California water quality standards is unnecessary and inappropriate.

1. Load Allocations Are Improperly Assigned to Waters that Are Not Meaningfully Distinct from the Klamath River In ONRC Action v. U. S. Bureau of Reclamation, 798 F.3d 933 (9th Cir. 2015), the United States Court of Appeals held that the feature known as Klamath Straits Drain is not meaningfully distinct from the Klamath River. The federal appellate court carefully analyzed the history of the Klamath and Lower Klamath Basins and their subsequent development. It agreed with the position articulated by the United States, concluding, under binding authority established by the United States Supreme Court in Los Angeles County Flood Control District v. Natural Resources Defense Council, 568 U.S. 78 (2013) (L.A. County) that water in the mainstem Klamath River and the Straits Drain are not meaningfully distinct. A load allocation is a specification of the limit on the addition of pollutants to a water body. 40 C.F.R. § 130.7(c); OAR 340-042-0030(15), 340-042-0040(4)(h). However, as a matter of law, "no pollutants are 'added' to a water body when water is merely transferred between different portions of that water body." L.A. County at 82. Thus, load allocations for the Straits Drain are not required, authorized, or appropriate.

The same conclusion applies to each of the other features that is characterized in the Draft TMDL (e.g., Table 2-17) as a "discrete nonpoint source." The historical circumstances and development of the Pioneer and Plevna District Improvement Companies are for all relevant purposes identical to those of the Straits Drain. There is no legally relevant difference for Lost River Diversion Channel (LRDC) which is physically connected, at all times, to the mainstem Klamath River. As the Draft TMDL recognizes, water sometimes flows westward in the LRDC into the mainstem, and sometimes flows eastward in the LRDC away from the mainstem. The historic and continuing connections and intermingling of these waters leads to the conclusion that for the purposes of the Clean Water Act (CWA) there is no meaningful distinction between the two. See, e.g., Attachment A at 46-47 (excerpt from United States Bureau of Reclamation's 2005 natural flow study describing the physical interconnectedness of the LRDC and mainstream Klamath River).

Response: The TMDL is consistent with ONRC Action v. U. S. Bureau of Reclamation, 798 F.3d 933 (9th Cir. 2015). DEQ considers KSD and LRDC to be waterbodies (i.e. waters of the state) with an associated loading capacity and beneficial uses. We treat them in the model similar to how we treat other tributaries. Load allocations are provided to both background sources and anthropogenic nonpoint sources. Given the extensive modifications that have occurred in KSD and LRDC from their historical condition it is difficult to establish what the background temperatures and loads for these waterbodies should be. Given that KSD and LRDC historically used to mix with Klamath River water, we set the background temperatures to be the same as the Klamath River. Loading into the Klamath River from source loading in the KSD and LRDC that results in warming to the Klamath River are considered nonpoint source loads with allocations developed accordingly.

DEQ used the term "discrete nonpoint sources" to refer to the warming in the KSD and LRDC from the management of KSD by water management districts and other sources with heat inputs into KSD and LRDC. To clarify DEQ's intent and to respond to this comment, DEQ has removed references to discrete nonpoint sources from the TMDL and instead revised the text to refer to sources that warm the KSD and LRDC.

KWUA#4: Suggested Change ID #116

Description: LAs - KSD & LRDC costs

Comment: Page 3 - 2. The Load Allocations Are Unreasonable and to Achieve them Would Misallocate Public Resources and have Adverse Environmental Effects

It is appropriate that ODEQ consider the costs of implementing measures, the ease of their implementation, and the environmental impacts and unintended consequences of meeting a load allocation. OAR 340-0042-0040(6). KWUA understand the importance of environmental protection. However, there is no realistic likelihood that the load allocations proposed will afford meaningful benefit to beneficial uses generally, let alone in California or in all months of all years. The costs of actual attainment would be breathtaking, and there would be considerable adverse consequences in doing so. In addition, while the specific load allocations may be calculable, their precision far exceeds the accuracy or practical realities that can be achieved in real-world conditions.

The document titled "Comparison of Draft 2019 Klamath Temperature Allocations to 2013-2018 Source Discharge Data" (Draft June 2019) provides, in Table 4, the maximum reduction in temperatures of Klamath Straits Drain and LRDC water that would be needed to achieve the Draft TMDL's load allocations assigned to these waters. For Straits Drain, this value is 6.6°C and for LRDC it is 4.9°C. The volume of discharge from these facilities can be up to 600 cubic feet per second (cfs) and 3,000 cfs, respectively. To lower the temperature of such a volume of water would require extraordinary capital facilities.1 KWUA have not had the time or resources necessary to calculate the cost required to achieve such a lowering. However, we have received an engineering analysis and findings of a California regional water quality control board concerning the cost of facilities to cool 317 million gallons per day (491 cfs) of treated wastewater effluent by 9°F (~12.8°C). That total project cost is over $700,000,000. In addition, the necessary facilities would have estimated annual operating costs of over $22,000,000. Power demand would be up to 70 megawatts, and the environmental impacts of the facility would be significant. See Attachment C (memorandum describing project cost and schedule for Regional San's thermal plan). Given that the volume of water requiring cooling in the Draft TMDL is even greater than that evaluated in the engineering analysis, the cost would likely be even greater, but undoubtedly would be extreme. Further, the environmental impacts of cooling facilities—visual and construction and other impacts—would be very significant.

Response: DEQ recognizes there will be financial costs associated with attainment of temperature criteria. DEQ establishes allocations and surrogates measures to achieve the temperature criteria although we may consider costs in establishing those allocations. DEQ has revised the allocations in the cool water species reach of the Klamath River upstream of Keno dam so that the mean river temperature is used as the compliance metric at the point of discharge, instead of the daily maximum. Allocations based on the daily mean have been established and still demonstrate compliance with the 28 deg-C cool water species target, and criteria downstream of Keno Dam including the human use allowance associated with 20 deg-C redband trout use designation and California's targets at Stateline. The rationale for this revision is that use of the daily mean more closely tracks the California targets at Stateline, which are the primary driver for the allocations, but also that it may provide an alternative and potentially cheaper compliance option for sources that wish to use lagoon or wetland treatment systems. Lagoon or wetland treatment systems may be more effective at reducing daily mean temperatures compared to reducing daily maximum temperatures. Wetland treatment has the potential to be cheaper than mechanical cooling and may also offer environmental benefits beyond temperature control.

DEQ is open to alternative management strategies in lieu of the flow surrogate measure (see revised TMDL) if those alternative management strategies will demonstrate achievement of allocations and temperature criteria. The irrigation districts may consider financial costs in selection of their preferred management strategies.

KWUA#5: Suggested Change ID #121

Description: Downstream WQS - not appropriate

Comment: Pages 3 & 4 - 3. The Draft TMDL's Application of California Water Quality Standards Is Not Required or Appropriate

As KWUA understand the Draft TMDL, a major driver of the wasteload and load allocations is the "TMDL target" or "targets" established by the Regional Water Board "at the Oregon/California border." Draft TMDL § 2.6.3.2 at 45. KWUA recognize the applicability of downstream state water quality standards to discharges in upstream states. However, we are concerned, for several reasons, about the approach taken in the Draft TMDL. First, "targets" and "water quality standards" are not the same thing. And, we are unaware of any "target" that applies specifically or uniquely at the state border, which would appear discriminatory.

Second, the Draft TMDL appears to rely on a memorandum from three members of the Regional Water Board staff that states the "findings of the [Regional Water Board] regarding requested temperature standards . . . ."2 While intending no disrespect to members of the Regional Water Board staff, ODEQ may not consider this staff memorandum to be the findings of the Regional Water Board itself, which is a California public agency governed by an appointed board and which can only take actions or make findings in a public process and at a public meeting. Cal. Wat. Code § 13201; Cal. Gov. Code § 11123. The memorandum does not bind ODEQ or control ODEQ's actions. Third, the Regional Water Board staff memorandum refers to a Regional Water Board basin plan water quality objective3 (WQO) that is applicable to "intrastate" waters. We do not understand the basis for the assumption that this WQO is relevant here. "Intrastate" means wholly within one state. Webster's Collegiate Dictionary, 11th ed. ("existing or occurring within a state"). The only WQO cited in the Regional Water Board staff memorandum is one that disallows increases of more than 5°F in temperatures having a coldwater fishery beneficial use. Based on the Regional Water Board staff memorandum, this is the only WQO properly applied to discharges in Oregon.

Fourth, the intrastate WQO that is cited in the memorandum states that the "natural receiving water temperature of such waters shall not be altered unless it can be demonstrated to the satisfaction of the [Regional Water Board] that such alteration in temperature does not adversely affect beneficial uses." By its own terms, the WQO affords parties who are subject to Regional Water Board authority to make a showing that a change in temperature would not adversely affect beneficial uses, at whatever location this inquiry may be relevant. No opportunity has been presented to parties in Oregon to make the showing contemplated by the WQO, which is procedurally unfair. Nor do we understand the process for persons outside California to make such a showing.

Fifth, and related, the Draft TMDL is premised on the notion that, 365 days per year, water temperature at the state line must not perceptibly increase as a result of discharges in Oregon. The greatest compliance challenges are in the cool-weather months, when increases in water temperature, especially those that may result from any incremental change from discharges occurring many miles away (and upstream of Keno and J.C. Boyle reservoirs) should not even be of potential concern.

Response: The California "targets" referenced in Oregon's TMDL are identified in California's North Coast Water Quality Control Board's Klamath River TMDL Chapter 5. The documents are currently available at https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/klamath_river/.

It is the policy of the Oregon DEQ to achieve water quality standards established by neighboring states in interstate waters.

We recommend parties with an interest in modifying California's TMDL, Basin Plan, or other policies associated with California's water quality program to contact the California's North Coast Water Quality Control Board.

We agree the greatest compliance challenge will be in winter months. DEQ evaluated the impact of allocations on source warming in the Klamath River using flow and temperature data collected from 2013-2018. Based on this analysis the largest reductions are in winter months. The analysis has been added to the TMDL as Appendix I.

KWUA#6: Suggested Change ID #124

Description: Water Quality Data - additional data

Comment: Page 5 - KWUA have concerns regarding the lack of scientific data to guide the implementation of this TMDL. Only incorporating data from the year 2000 into the model could lead to bias, as climatic conditions change annually. It would be best served to include all available data and collect additional data to generate a more accurate depiction of temperature cycles on an annual basis.

The USGS Oregon Water Science Center has available temperature data from the Keno Impoundment beginning in 2003 until present. KWUA feel this data needs to be incorporated into the modeling and compared to the outputs from the 2000 data. Running the model with additional data will validate the output and will determine if the data truly represents the temperatures at these locations.

Response: Model setup is based on boundary conditions including upstream and tributary inflow, withdrawals, and atmospheric conditions. These boundary conditions represent the model's "starting point". The model was then calibrated using temperature data from 2000 and validated , or further corroborated, with observed temperature data from 2002. The model was generally able to reproduce observed water quality in the Klamath River. The model's capabilities are constrained by the limited availability and quality of monitoring data, particularly for boundary conditions to the model. The year 2000 was selected for calibration because relatively good boundary condition data and in-stream data were available. The two model years (2000 and 2002) appear to capture a variety of flows that are commonly observed in the Klamath River (see Figure 2-15 in the TMDL report). Model Configuration and Results - Klamath River Model for TMDL Development (Tetra Tech 2009) has been included as Appendix B in the TMDL and includes more details regarding the setup and calibration of the models.

Application and configuration of TMDL models were guided by an EPA-approved Quality Assurance Project Plan (QAPP). Modeling QAPPs and associated technical memoranda or addendums identify quality expectations for steps in the modeling process such as data acquisition, model selection, domain configuration, training or calibration, scenario prediction, and reporting. Such quality expectations serve multiple objectives, including requirements under 40 CFR 130.7(c)(1) that TMDLs shall account for critical conditions. We have added a new section into Chapter 2 (Section 2.3 - Water Quality Modeling Overview) which provides an overview of the modeling and the flow conditions during the model period.

More information regarding the model has also been added to Section 2.3 of the TMDL (Water Quality Modeling Overview) describing the peer review process for the model. The model went through multiple rounds of peer review. Staff with modeling expertise from DEQ, NCRWQCB, and EPA worked as a team with Tetra Tech reviewing and advising on model development and application. In 2005, the calibrated model was also reviewed by Merlynn Bender of U.S. Bureau of Reclamation (BOR), Dr. Scott Wells of Portland State University, and Brown and Caldwell under contract with the City of Klamath Falls. The NCRWQCB also had their TMDL go through an external scientific peer review in 2009 (NCRWQCB 2010). Lastly, BOR contracted the USGS to review the Keno Reservoir portion of the model. DEQ, along

with EPA and NCRWQCB, considered all peer review comments and made changes to the model and documentation when appropriate.

DEQ evaluated the impact of allocations from source warming in the Klamath River using flow and temperature data collected from 2013-2018. The analysis has been added to the TMDL as Appendix I.

KWUA#7: Suggested Change ID #126

Description: Targets - 7DADM at Keno Dam

Comment: Page 5 - The daily maximum temperature threshold for the Keno Impoundment is a serious issue in that it is more restrictive than below Keno or Lost River. Both have the 7-day average daily maximum threshold in which the maximum temperature recorded is averaged with the maximum temperature recordings for a seven-day period (referred to as the "7DADM"). There should not be any reason why the Keno Impoundment is managed different than the other two locations. In 2017, the ODEQ outlined the 7DADM as a reasonable threshold for this location. Based on the LC50 (i.e., the lethal concentration that causes 50 percent mortality to the population) concentrations calculated by Saiki et al. (1999) for Lost River and shortnose suckers, the 28- degree daily threshold is well below the approximately 31-degree Celsius for 24 hour threshold that would be detrimental to these species. We believe that these species are adequately protected under the 7DADM. Until we see an impact on the fish in this location, it should be subject to the same guidelines as the other locations.

Response: Based on a review of available literature, DEQ has determined water temperatures greater than 28 deg-C result in impairment to Lost River and shortnose suckers. Therefore temperatures cannot exceed 28 where the cool water species criteria apply. We use the daily maximum instead of the 7DADM because data show (e.g. USGS station ID 420853121505500) that there can be temperatures that exceed 28 but not when averaged over a seven day rolling period. Using the daily maximum ensures river temperatures do not reach levels that would adversely affect and impair Lost River sucker and shortnose sucker. We have revised the text in this part of the TMDL to improve the description of our rationale.

KWUA#8: Suggested Change ID #128

Description: Targets - Lost River

Comment: Page 5- B. Lost Subbasin Draft Temperature TMDL The Lost Subbasin portion of the Draft TMDL includes instream flow targets in Lost River below Malone and Anderson-Rose Dams as "Surrogate Measures." To our knowledge, this is unprecedented in the State of Oregon. The targets exceed ODEQ's authority. They are not proper load allocations or surrogates. Relevant dam operators do not have water rights necessary for such purposes, and flow targets as surrogates would create chaos in Oregon's system of administration of water rights. In addition, there is no support for specific targets selected. The "effective shade" surrogate is similarly inappropriate. The surrogate does not relate to reduction in load from a source.

Response: DEQ has modified the TMDL language to clarify that the flow targets are only necessary when the temperatures of the Lost River exceed 27.9 degrees Celsius as measured using temperature monitoring probes placed in the Lost River. Note that 0.1 deg-C is placed into reserve capacity. In order for DEQ to properly evaluate compliance with a monitoring and performance based approach we have added monitoring and data reporting requirements into the water quality management plan.

DEQ has clarified in the TMDL that the flow targets are but one way the Lost River may come into compliance. DEQ did not intend that the flow targets be the only approach available for DMAs or responsible persons to achieve their allocations. DMAs or responsible persons may also propose alternative management strategies in their implementation plan. If DEQ determines that alternative strategies proposed will also achieve the allocation and temperature water quality criteria those management strategies may be used instead of the flow targets.

DEQ views the temperature increases resulting from the practice of flow diversion or vegetation removal to be a source of heat pollution. In the case of flow diversion, the source of warming is from the practice of diverting water which facilitates rapid temperature warming because of the loss in loading capacity due directly to the practice of said diversions. OAR 340-042-0030(12) defines a pollutant "Source" to mean "any process, practice, activity or resulting condition that causes or may cause pollution or the introduction of pollutants to a waterbody". The diversion of water is a practice that causes the existing heat loading to be heat pollution, that results in a condition where that heat pollution contributes to the exceedance of the temperature criteria. In the case of vegetation removal, the removal causes additional heat loading pollution to enter the stream.

KWUA#9: Suggested Change ID #132

Description: Targets - surrogate flow target Anderson Rose/Malone Dams

Comment: Pages 5, 6, and 7 - 1. The Flow Targets Are Not Lawful Load Allocations or Surrogates

The Draft TMDL states that the instream flow targets "translate load allocations" for Malone and Anderson-Rose Dams. KWUA disagree. It is our understanding that the purpose of the flow objectives is to decrease the consequence of atmospheric warming downstream of the dams. In other words, the reason the dam operator would release water up to the flow targets is to mitigate a condition that will occur under some lesser flow, or to "dilute" atmospheric heat effects. This is not a load allocation. Further, each of the dams is a diversion dam, whose function is to raise water elevations for gravity diversion. Under optimal operation, there would be zero flow released below the dam. In those circumstances, there would not be water downstream of the dams at all. Yet the Draft TMDL's flow surrogates would seemingly lead to release of some water just so that an additional increment of water would be released to ensure that the total volume does not exceed a desired temperature due to atmospheric warming. This is illogical.

The flow targets implicate issues of water supply and water rights, matters that are outside the scope of TMDLs or ODEQ's authority. Section 101(g) of the CWA expresses the policy that state authority to allocate water will not be superseded by the CWA and the CWA will not be construed to abrogate rights to water which have been established by states. 33 U.S.C. § 1251(g). ODEQ is not the state authority for water allocation, and the flow targets impair and conflict with state water rights. If water is bypassed in order to meet flow targets, the right to use of that water for irrigation is foregone. In addition, in the case of Anderson-Rose Dam (for example), if Tulelake Irrigation District (TID) (the operator) must ensure realization of the target flow, it may be required to divert water at Station 48 (on LRDC) and into Lost River, specifically so that flow can be bypassed below Anderson-Rose Dam. But, the only water rights that exist for diversion via Station 48 are for the use of water for irrigation. Thus, the target flows call for action inconsistent with state water rights. ODEQ, and the Oregon Water Resources Department for that matter, should consider the chaotic consequences for water rights administration generally that would result from use of flow "surrogates" in this manner. For example, assume a system of a river and tributaries with multiple diversions under multiple water right priorities. Assume the stream, or a tributary, or both, exceed water quality standards for temperature at one or more locations, and ODEQ establishes flow surrogates at each such location. It is inevitable that the measures to actually attain the targets would be inconsistent with priority-based administration of water, and it is certainly unclear who could ensure achievement of the targets and how.

The CWA and Oregon law do not support the flow targets, in any event, because they are not limitations on loading from a source. Section 303(d)(1)(D) of the CWA refers to allocations of thermal "load" and "heat input." 33 U.S.C. § 1313(d)(1)(D). ODEQ's regulations are clear that a load allocation represents a quantity pollutant loading from a source. See OAR 340-042-0040(4)(d), (e), (f), (h). The flow targets are not limitations on the loading of heat from a source of heat.

In addition, KWUA do not concur that the flow targets are a "surrogate" contemplated by the regulations. OAR 340-042-0040(5) states: To determine load allocations for sources identified in the TMDL, the Department: . . . . (b) may use surrogate measures to estimate allocations for pollutants addressed in the TMDL. The Department may use one or more surrogate measures for a pollutant that is difficult to measure or highly variable. A surrogate measure will be closely related to the pollutant, and may be easier to monitor and track.

The regulation's characterization of surrogates is unrelated to the flow targets.4 The flow targets are not an estimation of allocation of heat loading. Temperatures of water can vary but not randomly or in a manner that is difficult to track, and heat is easily measured. The flow targets, which are amounts of flow that will not warm up too much due to atmospheric heating, are not closely related to heat pollution from a source. KWUA are concerned that the Draft TMDL appears to reflect a philosophy that the purpose of a TMDL is to correct problems. But, the TMDL and load allocations are defined and confined by legal rules and authorities. The flow target "surrogates" should be removed from the TMDL.

Response: DEQ does not view the temperature increases resulting from the practice of flow diversion in the Lost River to be caused only by atmospheric warming. The source of warming is from the practice of diverting nearly all the water out of the Lost River which facilitates rapid temperature warming because of the loss in loading capacity due directly to the practice of said diversions. OAR 340-042-0030(12) defines a pollutant "Source" to mean "any process, practice, activity or resulting condition that causes or may cause pollution or the introduction of pollutants to a waterbody". The diversion of water is a practice that causes the existing heat loading to be heat pollution, that results in a condition where that heat pollution contributes to the exceedance of the temperature criteria.

There seems to be some confusion in the meaning of the flow surrogate measure and its relationship to the load allocation. A surrogate measure is another appropriate measure for implementing a load allocation and is acceptable for use in a TMDL as defined in 40 CFR 130.2(i) which says "TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure." OAR 340-042-0030(14) defines a surrogate measure as "substitute methods or parameters used in a TMDL to represent pollutants".

The Department may use surrogate measures, in this case flow, to estimate allocations for pollutants addressed in the TMDL, in this case heat. Surrogate measures are closely related to the pollutant, and are typically easier to monitor and track. The heat load allocation for these sources has been set as an excess thermal load equal to zero kilocalories/day when the Lost River exceeds 27.9 degrees Celsius. This means that there can be no warming when temperatures exceed 27.9 degrees Celsius and there must be a 100 percent reduction in the excess loading in order to achieve the cool water species temperature criteria.

DEQ has clarified in the TMDL that the flow targets are but one way the Lost River may come into compliance. DEQ did not intend that the flow targets be the only approach available for DMAs or responsible persons to achieve their allocations. DMAs or responsible persons may also propose alternative management strategies in their implementation plan. If DEQ determines that alternative strategies proposed will also achieve the allocation and temperature water quality criteria those management strategies may be used instead of the flow targets.

KWUA#10: Suggested Change ID #133

Description: Flow Data - Anderson Rose/Malone Dams

Comment: Page 7 - 2. The Flow Targets Are Not Supported Technically The proposed discharges of 25 cfs at Malone Dam and 11 cfs at Anderson-Rose Dam are based from one year of climatic and hydrologic data occurring in 1999. The modeled flows need to be validated with multiple years of data to capture the annual variability in hydrological and climatic conditions.

Response: DEQ recognizes there is annual variability in hydrologic and climatic conditions. We respectfully disagree that modeling climatic and hydrologic conditions over multiple years is a necessary precondition to establishing the TMDL allocations. The TMDL allocations are set at a level necessary to achieve the temperature criteria. The temperatures that attain the criteria are 28 deg-C and does not change from year to year. In turn the establishment of the allocations to attain the criteria is less reliant on the year to year variability. TMDL analysis does focus on identifying the critical conditions and establishing allocations such that the criteria will be achieved even under critical conditions. The flows observed in the Lost River in 1999 were near zero during the warmest time of the year, therefore the model evaluates the allocations during a critical period.

The Lost River went through multiple rounds of peer review. Staff with modeling expertise from DEQ, NCRWQCB, and EPA worked as a team with Tetra Tech reviewing and advising on model development and application for calibration and validation. The Lost River models were also reviewed by Dr. Scott Wells of Portland State University following which the model was further improved. The 1999 daily flow data downstream of Malone Dam from the BOR database were used to form the upstream inflow boundary condition. During the irrigation period Malone Dam discharge into the Lost River was effectively zero. The flows below Anderson Rose were calibrated in the model using observed flows coming out of the dam and had a reasonable calibration with RMSE of 0.62 cms and AME of 0.45 cms (the calibration plot can be found in Appendix F under Figure A_1999-4 Anderson Rose Spill (1999). In addition the model validated for the year 2004 and had a RMSE of 1.11 cms and AME of 0.74 cms. The calibration plot can be found in the Appendix F under Figure A_2004-3 Anderson Rose Spill (2004). DEQ finds these goodness-of-fit statistics to be acceptable for a model used for TMDL development. Flow and elevation calibration plots at all available locations (Harpold, Wilson and Anderson) during 1999 and 2004 along with their associated goodness-of-fit statistics.

KWUA#11: Suggested Change ID #134

Description: In-stream flow targets - Cost

Comment: Page 7 - In addition to the previously mentioned concerns with the flow surrogate, increase bypass at Anderson-Rose Dam would cause undue financial hardship on TID patrons. This water would flow to Tule Lake Sumps. TID would incur the entire cost of pumping D Plant to maintain the Tule Lake Sump elevations for flood control and other purpose, and this additional cost would ultimately fall on the patrons.

Response: DEQ establishes allocations and surrogates measures to achieve the temperature criteria. We recognize there may be financial costs associated with attainment of temperature criteria. DEQ is open to alternative management strategies in lieu of the flow surrogate measure (see revised TMDL) if those alternative management strategies will demonstrate achievement of allocations and temperature criteria. The irrigation districts may consider financial costs in selection of their preferred management strategies.

KWUA#12: Suggested Change ID #138

Description: Targets - effective shade

Comment: Pages 7 & 8 - 3. The Effective Shade Targets Are Not Lawful Load Allocations or Surrogates For reasons similar to those applicable to instream flow targets, the effective shade measures are not proper. The purpose of the shade is to reduce the effects of atmospheric warming, not to function as a reduction in load from a source of pollutants. Overall, it is unclear in the Draft TMDL what parties' discharge or discharges in the Klamath Project area has a proposed load allocation surrogate of effective shade, who has the responsibility for any sort of implementation plan, and who is expected to implement implementation measures. This is especially important where there are limitations on access or property ownership, or where tree roots impair channel function or other infrastructure.

Response: We respectfully disagree that the effective shade surrogate measures are not lawful or proper. The purpose of the effective shade targets are to reduce stream warming and excess solar radiation loading caused by the removal of stream side vegetation.

DEQ does not view the temperature increases resulting from vegetation removal to be caused by natural sources. The source of warming is from the reduction of near stream vegetation and shade which results in a condition where temperature warming occurs because of the increased exposure of solar radiation loading. OAR 340-042-0030(12) defines a pollutant "Source" to mean "any process, practice, activity or resulting condition that causes or may cause pollution or the introduction of pollutants to a waterbody". The lack of vegetation is a condition that causes increased heat loading that contributes to the exceedance of the temperature criteria.

DMAs or responsible persons who have land management authority or directly control the management of areas adjacent to streams and waterways are responsible for implementing the effective shade surrogate measures. DMAs or responsible persons have been identified in the TMDL and WQMP.

KWUA#13: Suggested Change ID #141

Description: LAs - KSD & LRDC NPS vs listed waters

Comment: Page 8 - Comments Applicable to Both Mainstem Klamath and Lost River Subbasins Draft TMDL

1. The Draft TMDL Is Inconsistent in Its Treatment of Sources of Pollutants and Receiving Waters In chapter 2 of the TMDL, both LRDC and Klamath Straits Drain are treated as sources of discharge of heat. However, in chapter 4, these features are treated as waters as to which there are loading capacities and allocations. KWUA submit that a water body (e.g., Klamath Straits Drain) cannot be both a nonpoint source of pollution and impaired receiving water. Therefore, the identification of Klamath Straits Drain or LRDC as a pollutant source is inappropriate if these waters are themselves receiving waters.

Response: DEQ considers KSD and LRDC to be waterbodies (i.e. waters of the state) with an associated loading capacity and beneficial uses. We treat them in the model similar to how we treat other tributaries. Load allocations are provided to both background sources and anthropogenic nonpoint sources. Given the extensive modifications that have occurred in KSD and LRDC from their historical condition it is difficult to establish what the background temperatures and loads for these waterbodies should be. Given that KSD and LRDC historically used to mix with Klamath River water, we set the background temperatures to be the same as the Klamath River. Loading into the Klamath River from source loading in the KSD and

LRDC that results in warming to the Klamath River are considered nonpoint source loads with allocations developed accordingly.

DEQ used the term "discrete nonpoint sources" to refer to the warming in the KSD and LRDC from the management of KSD by water management districts and other sources with heat inputs into KSD and LRDC. To clarify DEQ's intent and to respond to this comment, DEQ has removed references to discrete nonpoint sources from the TMDL and instead revised the text to refer to sources that warm the KSD and LRDC.

KWUA#14: Suggested Change ID #143

Description: LAs - Lost and LRDC don't exceed WQS

Comment: Page 8 - Table 4-7 on pages 158-159 shows no exceedances of water quality standards in the LRDC or Lost River. In that case, there is no need for load allocations for these waters.

Response: We agree that based on existing data, LRDC does not exceed the 28 deg-C Cool Water Species TMDL target within LRDC. However, LRDC is warmed by human activity and this warming contributes to heat pollution in the Klamath River. DEQ has established warming limits and allocations for sources that contribute and manage the LRDC in order to achieve the temperature criteria in the Klamath River.

KWUA#15: Suggested Change ID #146

Description: WQMP - DMA vs responsible persons

Comment: Pages 8 & 9 - D. Comments Regarding the Proposed WQMP

The Assignment of Implementation Responsibilities Is Not Proper The Draft TMDL inappropriately assigns certain expectations and responsibilities to water management agencies as "responsible persons" to implement the TMDL. The designation requires water management agencies to prepare TMDL implementation plans, identical to the responsibilities of a DMA. Under Oregon law, a DMA is "a federal, state, or local governmental agency that has legal authority over a sector or source contributing pollutants, and is identified as such by the Department of Environmental Quality in a TMDL." OAR 340-042-0030(2) (emphasis added). Nowhere in the Oregon Administrative Rules or in the Draft TMDL is the term "responsible persons" defined, nor is the difference between a "responsible person" and a DMA explained. Irrigation districts and other water delivery agencies in the Klamath Project lack authority (and in some cases the expertise) to enforce water quality standards or regulate the activities of constituent irrigators. Consequently, the inappropriately assigned actions are unlikely to be carried out effectively, if at all. Further, ODEQ is the entity with authority over the actual dischargers responsible for discharges to the state's surface waters. See, e.g., OAR 340-045-0005. ODEQ cannot expect or require districts to assume the role of a water quality regulator. Moreover, ODEQ cannot assign responsibility for certain discharges unless the assignee is actually responsible for the subject discharges. The TMDL Implementation Guidance issued by ODEQ recognizes this limitation: "DMAs required to submit a plan are not responsible for pollution arising from land management activities that occur outside of their jurisdictional authority." TMDL Implementation Plan Guidance, ODEQ (May 2007) at 7 (emphasis in original). Finally, it is uncertain what specific "water management districts" are called upon by the Draft TMDL to develop TMDL Implementation Plans for temperature. KWUA and its member districts lack the legal authority to ensure that the targets set forth in a temperature TMDL are met as required by OAR

340-042-0030(2). ODEQ should eliminate the ambiguous and unlawful "responsible person" designation for "water management agencies," including KWUA's member districts.

Response: The TMDL covers the entities that have authority over sectors and sources that affect water quality in the Upper Klamath and Lost River Subbasins. The Oregon Department of Agriculture (ODA) and the Bureau of Reclamation (BOR) have been named as Designated Management Agencies (DMA's) who are responsible for developing source specific TMDL Implementation Plans. The Agriculture Water Quality Area Plans facilitated by ODA are written for the individual landowners throughout the watershed and do not cover the Water Management Districts (WMDs). In addition, it is DEQ's understanding that through transferred works all operation and maintenance on the BOR-owned facilities are delegated to the WMDs. For this reason, DEQ has identified all WMD's as responsible persons in the Water Quality Management Plan with the requirement to develop Source Specific TMDL Implementation Plan and associated management strategies. In establishing a TMDL, OAR 340-042-0040(4)(l)(G) states that the department will include a WQMP that includes "Identification of persons, including Designated Management Agencies (DMAs), responsible for implementing the management strategies and developing and revising sector-specific or source-specific implementation plans." This rule provides that while a WQMP can designate DMAs it can also identify other persons with a role in implementation. Additionally OAR 340-042-0080(4) states that persons identified in the WQMP must prepare an implementation plan. The Environmental Quality Commission adopted these rules under the authority granted to it to take acts necessary to implement the Federal Clean Water Act under ORS 468B.035. Additionally, ORS 468B.110 grants the EQC or DEQ authority to establish and enforce TMDLs by rule or order. This TMDL was issued by DEQ as an order.

KWUA#16: Suggested Change ID #280

Description: WQMP - reasonable costs

Comment: Page 9 & 10 of comments: 2. ODEQ May Not Issue the TMDL Without Allocating Money to KWUA

Members and Other Local Governments to Pay the Usual and Reasonable Costs of Performing the Services and Activities of DMAs

Oregon Constitution Article XI, section 15(3) provides: (3) A local government is not required to comply with any state law or administrative rule or order enacted or adopted after January 1, 1997, that requires the expenditure of money by the local government for a new program or increased level of service for an existing program until the state appropriates and allocates to the local government reimbursement for any costs incurred to carry out the law, rule or order and unless the Legislative Assembly provides, by appropriation, reimbursement in each succeeding year for such costs. However, a local government may refuse to comply with a state law or administrative rule or order under this subsection only if the amount appropriated and allocated to the local government by the Legislative Assembly for the program in a fiscal year: (a) Is less than 95 percent of the usual and reasonable costs incurred by the local government in conducting the program at the same level of service in the preceding fiscal year; or (b) Requires the local government to spend for the program, in addition to the amount appropriated and allocated by the Legislative Assembly, an amount that exceeds one-hundredth of one percent of the annual budget adopted by the governing body of the local government for that fiscal year.

The water management districts that the Draft TMDL expects to act as "responsible persons," with identical responsibility as DMAs, are local governments. See, e.g., ORS 174.116. Any temperature TMDL will have been adopted after January 1, 1997, and establish a new program or increased level of service for an existing program, which will force local governments to incur costs exceeding the financial thresholds set forth in Article XI, section 15(3)(a)-(b). Therefore, water management districts cannot be

required to comply with the Draft TMDL unless or until they are allocated funds to carry out the usual and reasonable costs of the new program. Petitioners understand that ODEQ may contend the Klamath Basin TMDL is beyond the scope of the unfunded mandate provisions of Article XI, section 15(3) based on the exceptions to that provision set forth at Article XI, section 15(7)(d) of the Oregon Constitution. These later provisions set forth in Article XI, section 15(7)(d) state that the unfunded mandate provisions of Article XI, section 15(3) do not apply to:

A new program or an increased level of program services established pursuant to action of the Federal Government so long as the program or increased level of program services imposes costs on local governments that are no greater than the usual and reasonable costs to local government resulting from compliance with the minimum program standards required under federal law or regulations.

To the extent ODEQ may seek to rely upon Article XI, section l5(7)(d) to argue the unfunded mandate provisions of Article XI, section 15(3) are inapplicable to the Klamath Basin TMDL, KWUA respectfully submit that such reliance is misplaced. Neither federal law nor federal regulation requires that water districts serve as "responsible persons." Therefore, the Klamath Basin TMDL imposes costs on water districts that exceed the usual and reasonable costs of complying with any minimum program standard required by federal law or regulation. In the event ODEQ is unwilling to reconsider the draft management plan direction that water districts serve as DMAs, ODEQ should not issue this mandate without providing water management districts with funds to carry out this new program.

Response: This TMDL is not an unfunded mandate under Article XI, section 15 of the Oregon Constitution, the "Unfunded Mandate Act." The Unfunded Mandate Act provides that when "any state agency requires any local government to establish a new program or provide an increased level of service for an existing program," the state must allocate funds to the local government to pay for the costs of performing the required service or activity. A "program" means "a program or project imposed by enactment of the Legislative Assembly or by rule or order of a state agency under which a local government must provide administrative, financial, social, health or other specified services to persons, government agencies or to the public generally." Art. IX, section 15(2)(c) (emphasis added). The Unfunded Mandate Act went into effect in 1997 and only applies to mandates enacted after that date. This TMDL is issued pursuant to the Clean Water Act and state water quality laws that predate the Unfunded Mandate Act. Additionally the TMDL does not require local governments to establish a "program" as defined by the Unfunded Mandate Act but rather regulates the internal activities of those entities to address their pollution to waters of the state. The Oregon Court of Appeals recently clear in Linn County v. Brown, 297 Or App 330 (2019), that the Unfunded Mandates Act does not apply to these sorts of regulatory actions.

KWUA#17: Suggested Change ID #281

Description: General Comment - timeline

Comment: Page 10 of comments: KWUA are grateful for the time of ODEQ staff in assisting our understanding of the Draft TMDL. We also understand that a court deadline results in a challenging situation. The best solution would be a modification of that deadline, to afford adequate time to complete a stronger document. If that is not possible, and if ODEQ determines to adopt a TMDL at this time, it should explicitly confirm the limitations of the TMDL and need for timely modification.

Response: DEQ acknowledges the resource and time challenges for TMDL development and issuance. However, DEQ believes we have developed and will issue a legal TMDL that will lead to improvements in water quality to address the temperature impairments.

KWUA#18: Suggested Change ID #405

Description: Allocations - Pioneer District Improvement Company

Comment: Water does not flow to the Klamath River from the Pioneer District Improvement Company area at all. It flows to Keno Irrigation District. See Attachment B (map of Pioneer District Improvement Company's boundaries and points of discharge). Therefore, even if such a flow entered the Klamath River and was meaningfully distinct from the mainstem, there is no such flow, and there should be no load allocation for Pioneer District Improvement Company.

Response: DEQ has revised the TMDL and removed the Klamath River allocation assigned to the Pioneer District Improvement Company. Our intention was to assign an allocation to DMAs that have warming potential in the Klamath River. We have added Keno Irrigation District into the TMDL with a Klamath River allocation.

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9. Comments from: Langell Valley Irrigation District and Horsefly Irrigation District

LVID-HID#1: Suggested Change ID #150

Description: Modeling Scenarios - biased modeling scn. from 1999 used to describe Lost River temperature TMDL_Recent data is not being used

Comment: The draft temperature TMDL uses a biased modeling scenario from 1999 to describe Lost River water temperatures. ODEQ is choosing to disregard other available information which shows Lost River water temperatures to be in compliance of the 28 degrees Celsius standard set by the TMDL.

a. In Appendix D: Lost River Temperature Modeling Scenarios, page D-16 the 1999 model shows Lost River water temperature at Gift Road to have reached 39 degrees Celsius (102 degrees Fahrenheit), which is intutively inaccurate. In communication with ODEQ it was established ODEQ used 1999 to streamline the temperature TMDL with the nutrient TMDL. LVID and HID later learned other information on Lost River water temperatures is available from US Geological Survey (USGS), US Bureau of Reclamation (USBR), and North Coast Regional Water Quality Control Board (NCRWQCB) for 2000-2003. (See attachment LR Water Temp 2000-2003). The ODEQ is choosing to disregard this water temperature data showing Lost River to be in compliance and are instead using a biased modeling scenario that does not show substantial evidence to be reliable.

b. Other water temperature data has also been collected by Klamath Soil & Water Conservation District (KSWCD) for July through December of 2017. (See attachment KSWCD 2017 LR water temp data). This data also shows Lost River water temperature to be in compliance. In August of 2017 Lost River downstream of Harpold Dam read a water temperature of 20.08 degrees Celsius, well below the TMDL standard of 28 degrees Celsius.

c. LVID spoke with Alan Henning with the Environmental Protection Agency (EPA) and he stated it is the responsibility of ODEQ to establish the data quality assurance protocol. Nowhere in the TMDL does it mention what ODEQ's data quality assurance protocol is. After these communications the Districts do not think ODEQ has provided a rational basis to be excluding all available data and only model 1999. If the TMDL temperature model were to use real data it is evident 1999 would have been an outlying year compared to other data from 2000-2003 and 2017.

Response: Language has been added to section 4.3 of the TMDL indicating that the year 1999 was used to configure and calibrate the Lost River model because of data availability and exceedances of the water quality criteria. Appendix F Lost River Model for TMDL Development has been included in the TMDL for more details. All Lost River temperature data known to DEQ and that meet DEQ's data quality requirements have been included in Table 4-7 and shown in Figure 4-14.

The simulated temperatures in the model are calculated based on heat flux routines built into the W2 model which take into account all available sources of heat into the model and reflect the conditions using best available data at the time of model development for the year 1999. The maximum increases during June through August occur at Stateline and Gift Road, not at locations of monitoring data directly downstream of Harpold Dam. The temperatures below Malone Dam and Anderson Rose Dam reflect the conditions and heat fluxes being specified. During the summer irrigation period the flows below the dams can be very low (close to zero for several days in 1999 during summer) making the river very shallow (with no other input into the system) and the resulting predicted water temperatures and diurnal variations

during this period are essentially an artifact of the observed air temperatures specified as meteorological forcing in the model i.e. it is reflecting the conditions using the best available data. Additionally, the Lost River model was developed based on conditions that reflect the year 1999 and cannot be compared to conditions during different years.

Application and configuration of the Lost River models were guided by an EPA-approved Quality Assurance Project Plan (QAPP). Modeling QAPPs and associated technical memoranda or addendums identify quality expectations for steps in the modeling process such as data acquisition, model selection, domain configuration, training or calibration, scenario prediction, and reporting. Such quality expectations serve multiple objectives, including requirements under 40 CFR 130.7(c)(1) that TMDLs shall account for critical conditions. We have added reference to the QAPP in the TMDLs.

LVID-HID#2: Suggested Change ID #151

Description: Flow Target- 25 cfs target unnecessary in Lost River

Comment: A flow target of 25 cfs is unnecessary when data shows Lost River water temperatures to be in compliance.

a. For the same reason as above, data that ODEQ is choosin g to disregard shows Lost River water temperatures to be in compliance. With data showing Lost River to be in compliance, a flow of 25 cfs is not necessary to cool the water and should be removed from the TMDL.

Subsequently, Clear Lake should not need to release a target flow of 25 cfs to Lost River because water temperatures are already in compliance.

Response: DEQ has modified the TMDL language to clarify that the flow targets are only necessary when the temperatures of the Lost River exceed 27.9 degrees Celsius as measured using temperature monitoring probes placed in the Lost River. Note that 0.1 deg-C is placed into reserve capacity. In order for DEQ to properly evaluate compliance with a monitoring and performance based approach we have added monitoring and data reporting requirements into the water quality management plan.

DEQ has clarified in the TMDL that the flow targets are but one way the Lost River may come into compliance. DEQ did not intend that the flow targets be the only approach available for DMAs or responsible persons to achieve their allocations. DMAs or responsible persons may also propose alternative management strategies in their implementation plan. If DEQ determines that alternative strategies proposed will also achieve the allocation and temperature water quality criteria those management strategies may be used instead of the flow targets.

LVID-HID#3: Suggested Change ID #152

Description: Vegetation Restoration-a human health and safety issue during normal and flooding events in Lost River

Comment: The plan to restore vegetation along Lost River conflicts with our operation of water conveyance system.

In the TMDL on page 253 it states, “Restoration can be passive or active. Passive restoration results from removing stresses to the channel, vegetation and floodplain and allowing the river system to naturally re over.” Lost River is a severely altered river and treating it as something natural is not realistic because the 11 mile stretch from Malone Dam to Keller Bridge is channelized with steep ditch banks. To better

illustrate our point of bank angle and how trees along the channel would hinder bank maintenance we have attached a photo of Lost River facing south at Gift Road bridge (LVID 7.13.19 LR at Gift Rd facing south). The maintenance of the Lost River banks would be unworkable with trees and vegetation. In the scenario of restoring vegetation as the TMDL proposes the channel would become a human health and safety issue not only for maintenance crews but in a flood event. As has occurred in the past, debris stacks against county owned bridges and further downstream the problem becomes more prevalent. In the attached photo of Lost River you can see the repair work being done to the channel after the 1955-1956 flood (Klamath Waters Digital Library, Klamath Waters — LR Channel I p. After 1955-1956 flood). Channel repair also occurred after the Christmas day flood of 1964.

Response: DEQ is open to alternative management strategies in lieu of the vegetation effective shade surrogate measure if those alternative management strategies will demonstrate achievement of allocations and temperature criteria.

LVID-HID#4: Suggested Change ID #153

Description: General Comment - Lost River TMDL

Comment: We are thankful for your review of our comments. The Districts (Langell Valley Irrigation District and Horsefly Irrigation District) view the draft temperature TMDL to not be representative of Lost River water temperature conditions. We understand the time constraint due to your court mandate but feel modifications are needed to the TMDL to better represent the current water temperature conditions of Lost River.

Response: The technical team responsible for compiling data and modeling various scenarios in the Lost River were diligent in maintaining the best available data. DEQ and the technical team is open to additional data should additional data exist that has appropriate QA/QC and been verified for accuracy and methods used.

LVID-HID#5: Suggested Change ID #154

Description: General Comment - DA-General

Comment: On behalf of our clients, Langell Valley Irrigation District ("LVID") and Horsefly Irrigation District ("HID") (collectively, the "Districts"), we appreciate the opportunity to provide comments to the Oregon Department of Environmental Quality ("DEQ") on the May 2019 Draft Upper Klamath and Lost Subbasins Temperature TMDL and Water Quality Management Plan (the "Draft TMDL"). The Districts wish to acknowledge DEQ's efforts to promulgate the Draft TMDL to improve water quality in two subbasins that are subject to a complicated web of operational and legal constraints, and on a compressed court-ordered timeline. Irrespective of these challenges, however, DEQ must still meet the minimum legal requirements that apply to all TMDLs, and the Draft TMDL fails in multiple respects. Many of these failures have been identified in comments already submitted as of the date of this letter. In particular, the Districts support the comments offered by the U.S. Bureau of Reclamation ("USBR") and the Klamath Water Users Association. In addition, the jurisdictional problems the Districts have identified regarding the Upper Klamath and Lost River Subbasins Nutrient TMDL and Water Quality Management Plan—both in the Districts' comments submitted to DEQ regarding the July 2018 draft nutrient TMDL and also in the Districts' subsequent petition for judicial review of the January 2019 final order, filed in Marion County Circuit Court and referenced on Page 1 of the Draft TMDL—are also at issue in this Draft TMDL. Finally, the Districts' board members, in their individual capacities, are submitting additional

comments under separate cover that identify problems related to the Lost River subbasin temperature model and the surrogate measures of effective shade and instream flow.

Districts' Interests in the Draft TMDL The Districts are irrigation districts formed under ORS Chapter 545 (known as the "Irrigation District Law") for the purpose of diverting, storing, and distributing irrigation water to landowners located within the Districts' boundaries. The Districts' jurisdiction and authority are derived from and limited to the Irrigation District Law. The Districts are located on the east side of USBR's Klamath Reclamation Project, entirely within the Lost River subbasin. The Districts do not have any lands, facilities, or water sources in the Upper Klamath River subbasin. LVID delivers irrigation water to approximately 18,600 acres of land. The LVID delivery system consists of open canals and sealed pipelines. The delivery system is owned by USBR and is operated and maintained by LVID. In addition, LVID operates and maintains two USBR-owned storage reservoirs: Clear Lake Reservoir in California, and Gerber Reservoir in Oregon. LVID operates and maintains these Klamath Project facilities pursuant to operation and maintenance contracts with USBR. HID delivers irrigation water to approximately 10,000 acres of land. The HID delivery system consists of open canals and sealed pipelines. The delivery system is owned, operated, and maintained by HID. LVID and HID each divert and deliver water to their patrons under a combination of storage, live flow, and groundwater rights. A large portion of the Districts' rights were appropriated in 1905 by the United States government as part of the Klamath Reclamation Project. USBR has repayment contracts with the Districts that obligate USBR to deliver water from the Klamath Project facilities to the Districts in order to serve the lands located within the Districts.

Response: Langell Valley Irrigation District, Horsefly Irrigation District, District, Attorney, Jordan Ramis, General Comments

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LVID-HID#6: Suggested Change ID #155

Description: Data used in TMDL - DA-Existing Data on Actual Stream Temperatures - Lost River TMDL disregards actual data in favor of using simulated data

Comment: Existing Data on Actual Stream Temperatures

The Districts share specifically in the concerns raised by USBR and others that the Lost River temperature TMDL was developed inappropriately using simulated stream temperature data from 1999, leading DEQ to conclude that "the target of 28°C is typically exceeded from June to August." Draft TMDL, page 159. The Draft TMDL states that DEQ used this approach because "continuous daily data were not available in the Lost River for comparison to the applicable criterion therefore, simulated temperatures for the existing conditions on the Lost River at the Oregon-California state line were evaluated and compared to the cool water species target [of 28°C] to support the selection of the critical period." Id. This statement ignores multiple years of continuous temperature data from the Lost River subbasin in DEQ's own database—data that demonstrate that the 28°C threshold is not exceeded in the Lost River. DEQ has failed to provide a reasonable explanation for disregarding these actual data in favor of using simulated data, particularly when the modeled data far exceed the range of temperatures actually observed in the subbasin and when that purported exceedance is used to justify a cascade of new and costly regulatory requirements.

OAR 340-042-0040 sets forth the elements that must be a part of every TMDL, including the element of excess load, which "evaluates, to the extent existing data allow, the difference between the actual pollutant load in a waterbody and the loading capacity of that waterbody." OAR 340-042-0040(4)(e). The Draft TMDL fails to evaluate to any extent the "existing data" on "actual pollutant load" in the Lost River subbasin, instead relying exclusively on modeled data. DEQ's failure to accurately quantify actual temperature conditions in the Lost River subbasin has a cascade effect that renders inadequate multiple

other aspects of the Draft TMDL. Having inaccurately concluded from the modeled data that the Lost River typically exceeds the 28ºC standard from June through August by as much as 10ºC, the Draft TMDL amplifies the error by (1) assigning a 0.0ºC load allocation to all nonpoint sources, (2) determining that sufficient load reduction can only be achieved through "both solar radiation reduction and increase in flow" and identifying "surrogate measures" to reduce heat loads through increases in effective shade and maintenance of instream flow targets (Draft TMDL, Section 4.7.4, pages 204-212), and (3) mandating development of source-specific implementation plans that "will address how human activities will be managed to achieve the surrogates." (Draft TMDL, page 243)

Response: The draft TMDL presented summaries of Lost River temperature data available to DEQ in section 4.2.7. Additional temperature data (collected by BOR) have been added to Table 4-7 that show an exceedance of the 28 degree Celsius TMDL target at the Lost River at Gift Road in July 1998. The Lost River is a very long river (60.9 miles, 98 kilometers) and is highly modified with multiple diversions and returns along its route. Maximum temperatures observed at one location are not necessarily representative of the maximum temperatures at another location.

The excess load element described in OAR 340-042-0040(4)(e) says that a TMDL will include "to the extent existing data allow, the difference between the actual pollutant load in a waterbody and the loading capacity of that waterbody". DEQ has provided estimates to the the extent the existing data allow. When flow data is not available we provide excess temperature. When and where temperature data is not available, we use model data. Models results were used to characterize the excess temperatures at Gift Road and Stateline because there is no continuous temperature data available at these locations and this is where the model predicts the maximum warming occurs. TMDLs must be developed to show attainment of water quality criteria at all locations during critical periods. Lost River Gift Road and at Stateline appear to experience extremely warm temperatures and the TMDL set allocations for the Lost River with these specific locations in mind.

Application and configuration of the Lost River models were guided by an EPA-approved Quality Assurance Project Plan (QAPP). Modeling QAPPs and associated technical memoranda or addendums identify quality expectations for steps in the modeling process such as data acquisition, model selection, domain configuration, training or calibration, scenario prediction, and reporting. Such quality expectations serve multiple objectives, including requirements under 40 CFR 130.7(c)(1) that TMDLs shall account for critical conditions.

We acknowledge your concerns about the model results and that you believe the modeling results to be wrong. We have modified the TMDL language to clarify that implementation of the TMDL load allocations, surrogate measure (e.g. the flow targets), or other management strategies are only necessary when temperatures of the Lost River at these locations exceed 27.9 degrees Celsius as measured using temperature monitoring probes placed in the Lost River. In order for DEQ to properly evaluate compliance with this monitoring based approach we have added monitoring and data reporting requirements into the water quality management plan.

LVID-HID#7: Suggested Change ID #156

Description: LAs - DA -inaccurate load allocations for the Lost River nonpoint sources

Comment: Load Allocations The inaccurate Lost River subbasin temperature model resulted in inaccurate load allocations for the Lost River nonpoint sources. In Table 4-36 on page 191, the first column lists "Current" temperature as 37.88ºC. The table fails to identify that the temperature was modeled and that actual data on current temperatures in the Lost River show no exceedance of the 28.0ºC loading capacity. Compounding matters, Table 4-36 contains multiple mathematical errors in the first column that are propagated through the rest of the table. The values shown for reserve capacity (9.9ºC),

maximum excess load (37.88ºC), and the allocations derived for each associated flow condition are mathematically wrong and should be corrected in the final TMDL.

Response: The errors in Table 4-36 were caused by a copy/paste error. They have been corrected. The text clarifies the data presented are based on model results.

The draft TMDL presented summaries of Lost River temperature data available to DEQ in section 4.2.7. Additional temperature data (collected by BOR) have been added to Table 4-7 that show an exceedance of the 28 degree Celsius TMDL target at the Lost River at Gift Road in July 1998.

LVID-HID#8: Suggested Change ID #157

Description: Lost River TMDL - DA - Lack of Jurisdiction over Diversions

Comment: Lack of Jurisdiction over Diversions There are multiple sections within the TMDL that reference diversions as contributing to water quality violations of the temperature standard. See, e.g., Draft TMDL, page 162-63 (discussing nonpoint sources in the Lost River subbasin). It is unclear whether those references are an attempt to assert jurisdiction over those diversions, but to the extent they are, DEQ has no jurisdiction or authority to do so. Any attempt by DEQ to assert jurisdiction over irrigation diversions would be contrary to both state and federal law. For example, it would violate 33U.S.C. § 1251(g), which mandates that the federal Clean Water Act shall not "be construed to supersede or abrogate rights to quantities of water which have been established by any State." It would also constitute an unlawful expansion of DEQ jurisdiction into an area of law delegated by the Oregon legislature to the Oregon Water Resources Department. Therefore, this ambiguity should be corrected in the final TMDL by clearly stating that DEQ does not intend for the TMDL to regulate—directly or indirectly—the diversion of water by Klamath Project irrigators.

Response: DEQ views the temperature increases resulting from the practice of flow diversion or vegetation removal to be a source of heat pollution. In the case of flow diversion, the source of warming is from the practice of diverting water which facilitates rapid temperature warming because of the loss in loading capacity due directly to the practice of said diversions. OAR 340-042-0030(12) defines a pollutant "Source" to mean "any process, practice, activity or resulting condition that causes or may cause pollution or the introduction of pollutants to a waterbody". The diversion of water is a practice that causes the existing heat loading to be heat pollution, that results in a condition where that heat pollution contributes to the exceedance of the temperature criteria. In the case of vegetation removal, the removal causes additional heat loading pollution to enter the stream.

A surrogate measure is another appropriate measure for implementing a load allocation and is acceptable for use in a TMDL as defined in 40 CFR 130.2(i) which says "TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure." OAR 340-042-0030(14) defines a surrogate measure as "substitute methods or parameters used in a TMDL to represent pollutants".

The Department may use surrogate measures, in this case flow or effective shade, to estimate allocations for pollutants addressed in the TMDL, in this case heat. Surrogate measures are closely related to the pollutant, and are typically easier to monitor and track. The heat load allocation for these sources has been set as an excess thermal load equal to zero kilocalories/day when the Lost River exceeds 27.9 degrees Celsius. This means that there can be no warming when temperatures exceed 27.9 degrees Celsius and there must be a 100 percent reduction in the excess loading in order to achieve the cool water species temperature criteria.

In the case of the Lost River flow surrogate measures, DEQ has clarified in the TMDL that the flow targets are but one way the Lost River may come into compliance. DEQ did not intend that the flow

targets be the only approach available for DMAs or responsible persons to achieve their allocations. DMAs or responsible persons may also propose alternative management strategies in their implementation plan. If DEQ determines that alternative strategies proposed will also achieve the allocation and temperature water quality criteria those management strategies may be used instead of the flow targets.

LVID-HID#9: Suggested Change ID #158

Description: Lost River TMDL - DA - Misapplied the rule that allows the use of surrogate measures in TMDLs

Comment: Surrogate Measures In addition to setting forth a temperature standard, the Draft TMDL identifies surrogate measures for temperature that quantify streamside vegetation and instream flow. The Draft TMDL has misapplied the rule that allows the use of surrogate measures in TMDLs. Under OAR 340-042-0040(5)(b), DEQ may use one or more surrogate measures to estimate allocations for a pollutant, but only "for a pollutant that is difficult to measure or highly variable." The Draft TMDL fails to explain how the pollutant allegedly at issue in the Lost River subbasin—heat—is either "difficult to measure" (inexpensive temperature loggers measure heat on a continuous basis, and store-bought thermometers suffice for grab samples (footnote given at the end), or "highly variable" (existing stream temperature data do not support this statement). The fact that extensive stream temperature data already exist for the Lost River shows the opposite is true: compared with other types of pollutants in the Lost River subbasin, heat is quite easy to measure and not particularly variable. DEQ's failure either to collect stream temperature data itself or to consider data actually collected by other entities does not justify the Draft TMDL's requirement for implementation of surrogate measures. Furthermore, the surrogate measures authorized under OAR 340-042-0040(5) provide a means for allocating pollutant loads, not a backdoor for DEQ to dictate management actions for achievement of load reductions. Ongoing discussions with DEQ have given the Districts the impression that the agency views these surrogate measures merely as options that could be included in a TMDL implementation plan. If this is in fact the intent underlying the surrogate measures, the Draft TMDL fails entirely to convey this. Section 4.7.4.1.1 of the Draft TMDL states plainly: "Between May 1 and September 30, The Malone Diversion Dam shall maintain a minimum of 25 cfs of instream flow in the Lost River in order [to] minimize warming in the Lost River above 27.9ºC caused by water diversions at Malone Dam." Draft TMDL, page 204. Within the context of a TMDL, issued as a final agency order, there is absolutely nothing to indicate that the instream flow target surrogate measure might be conditional or permissive in any way the release of the stored water and then failed to divert it, it would constitute a breach of the Districts' statutory trust duty to their patrons under the Irrigation District Law to manage district water resources in a manner that maximizes benefit to the district and its landowners. Additionally, DEQ's proposal fails to recognize that once the augmentation flows are released from storage, the water could be diverted by any Lost River irrigator with a Lost River water right. Unless a flow augmentation release is legally protected instream with a water right, it can be diverted by any downstream irrigator as live flow. Therefore, the practical value of such releases for water quality purposes would potentially last only until the first diversion of the additional water. If the reference in the WQMP to water diversions is intended to make implementation of the instream flow surrogate measure permissive, it is misplaced. Section 6.3.2 sets forth the goals and objectives of the WQMP, and states, "The TMDL does not mandate or imply that a DMA or Responsible Person must alter water diversions in order to meet this TMDL and the water quality standard." Draft TMDL, page 237. This statement may be an attempt to show compliance with 33 U.S.C. § 1251(g), which mandates that the federal Clean Water Act shall not "be construed to supersede or abrogate rights to quantities of water which have been established by any State." However, it is entirely unclear how the mandatory language contained in the instream flow target surrogate measure—"Between May 1 and September 30, The Malone Diversion Dam shall maintain a minimum of 25 cfs of instream flow in the Lost River"—is not a directive both to USBR and to the Districts to reallocate a significant portion of their collective state-recognized irrigation water rights toward maintenance of minimum streamflows established by the Draft

TMDL. The Districts further note that such use would not be authorized by either a storage or live flow irrigation right. Therefore, even if the Districts were able to satisfy this bypass flow requirement using only live flow from Lost River (which appears hydrologically impossible), they would be unlawfully using the water for a purpose other than that for which it was appropriated in 1905—namely, irrigation of District lands. In conclusion, DEQ's inclusion of a flow augmentation measure, whether mandatory or suggested, violates multiple other aspects of state and federal law, including DEQ's own rules. All reference to such measures in the TMDL should, therefore, be removed.

Footnote: See, e.g., USGS Monitoring Stream Temperatures—A Guide for Non-Specialists, Techniques and Methods 3-A25, available at https://pubs.usgs.gov/tm/03/a25/tm3a25.pdf (HOBO data loggers for continuous measurements), and USGS National Field Manual for the Collection of Water-Quality Data, Section 6.1 Temperature, available at https://water.usgs.gov/owq/FieldManual/Chapter6/6.1_ver2.pdf (liquid-in-glass field thermometers for grab samples); see also EPA Water Monitoring & Assessment, 5.3 Temperature, available at https://archive.epa.gov/water/archive/web/html/vms53.html

Response: DEQ views the temperature increases resulting from the practice of flow diversion, vegetation removal, or channel modification to be a source of heat pollution. In the case of flow diversion, the source of warming is from the practice of diverting water which facilitates rapid temperature warming because of the loss in loading capacity due directly to the practice of said diversions. OAR 340-042-0030(12) defines a pollutant "Source" to mean "any process, practice, activity or resulting condition that causes or may cause pollution or the introduction of pollutants to a waterbody". The diversion of water is a practice that causes the existing heat loading to be heat pollution, that results in a condition where that heat pollution contributes to the exceedance of the temperature criteria. In the case of vegetation removal or channel modification, these modifications cause additional heat loading pollution to enter the stream.

A surrogate measure is another appropriate measure for implementing a load allocation and is acceptable for use in a TMDL as defined in 40 CFR 130.2(i) which says "TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure." OAR 340-042-0030(14) defines a surrogate measure as "substitute methods or parameters used in a TMDL to represent pollutants".

The Department may use surrogate measures, in this case flow or effective shade, to estimate allocations for pollutants addressed in the TMDL, in this case heat. Surrogate measures are closely related to the pollutant, and are typically easier to monitor and track. The heat load allocation for these sources has been set as an excess thermal load equal to zero kilocalories/day when the Lost River exceeds 27.9 degrees Celsius. This means that there can be no warming when temperatures exceed 27.9 degrees Celsius and there must be a 100 percent reduction in the excess loading in order to achieve the cool water species temperature criteria.

DEQ has clarified in the TMDL that the flow targets are but one way the Lost River may come into compliance. DEQ did not intend that the flow targets be the only approach available for DMAs or responsible persons to achieve their allocations. DMAs or responsible persons may also propose alternative management strategies in their implementation plan. If DEQ determines that alternative strategies proposed will also achieve the allocation and temperature water quality criteria those management strategies may be used instead of the flow targets.

LVID-HID#10: Suggested Change ID #159

Description: Lost River TMDL - DA - Management Strategies and Reasonable Assurances

Comment: Management Strategies and Reasonable Assurances The Draft TMDL fails to meet the requirements of OAR 340-042-0040(4)(l), which mandates that the WQMP section of every TMDL must include "a categorization of sources and a description of the management strategies proposed for each

source category," as well as a "description of reasonable assurance that management strategies and sector-specific or source-specific implementation plans will be carried out through regulatory or voluntary actions." The Draft TMDL fails to identify pollutant management strategies that the Districts could implement to address the alleged violation of the 28ºC temperature standard in the Lost River, as required by OAR 340-042-0040(4)(l)(C). Table 6-2 is supposedly designed to be used by "DMAs and Responsible Persons as guidance for selecting management measures to be included in their Implementation Plans." Draft TMDL, page 240. However, the table fails to give the Districts sufficient notice of what types of actions DEQ might anticipate would be included in a TMDL implementation plan. In fact, roughly half of the table of possible management strategies is evidently inapplicable to the temperature standard based on the lack of an "X" in the Temperature column, suggesting that DEQ has simply recycled a generic list rather than linking specific management strategies to achievement of the temperature standard. This is particularly confusing given that elsewhere in the Draft TMDL, the Districts are apparently required to achieve surrogate measures through specific management strategies, namely, shading the stream channel through riparian plantings and maintaining 25 cfs of streamflow below Malone Dam. This inconsistent and incomplete information does not give the Districts sufficient notice of the actions they are expected to implement and should be addressed directly in the final TMDL. Moreover, it highlights a deeper flaw in the Draft TMDL, which is DEQ's attempt to place the Districts in a role for which they have no jurisdiction or authority. The Draft TMDL also fails to describe or refer to any legal authority or other basis for which irrigation districts and/or drainage districts can be compelled to develop source-specific implementation plans such that "reasonable assurance" is provided that such plans would or could be implemented, as required pursuant to OAR 340-042-0040(4)(l)(J). Table 6-4 lists "organizations with TMDL responsibilities" and identifies "Water Management Districts" as having jurisdiction over "canals, drains, and diversions within the Klamath Reclamation Project." Draft TMDL, page 245. However, the Districts' jurisdiction over the operation of water conveyance facilities is linked to the delivery of water under the operation and maintenance contracts between the Districts and USBR or under their own water rights, both of which are further subject to a complex array of state and federal laws. The Draft TMDL's failure to even acknowledge these preexisting legal requirements, much less explain how the Districts have authority to diverge from them under the Draft TMDL, does not provide reasonable assurances that developing and implementing TMDL implementation plans will lead to achievement of the temperature standard.

Response: The goal of the Water Quality Management Plan (WQMP) is to provide general information to the Designated Management Agency (DMA) or Responsible Persons in regards to what should be included in the source specific TMDL implementation plan. DEQ is not an expert on the systems that are managed and operated by the Water Management Districts (WMD's) and would leave the specifics up to the WMD's on how to meet the load allocations. In addition, with varying conditions throughout the watershed it would be impossible for DEQ to provide a complete list of management actions that would help to meet the targets in the TMDL. It is suggested that someone with knowledge of the systems managed by the WMD's provide input to the best management practices (BMP's) that could be implemented.

LVID-HID#11: Suggested Change ID #167

Description: Lost River TMDL- DA - Districts are not Designated Management Agencies (DMAs) responsible for implementation plan

Comment: Designated Management Agencies (DMAs) The Draft TMDL appears to include both Districts as "water management districts" purportedly responsible for the development of a TMDL Implementation Plan to address applicable load allocations from agricultural nonpoint sources, though not in the traditional roles of designated management agencies. Rather, the Districts would be required to develop these plans based on the Draft TMDL labeling them "responsible persons." The term "designated management agency" is defined by rule at OAR 340-042-0030(2) as "a federal, state or local

governmental agency that has legal authority over a sector or source contributing pollutants, and is identified as such by the Department of Environmental Quality in a TMDL." However, the Draft TMDL cites to this rule in support of its statement on page 244 that "DMAs and Responsible Persons are recognized by the State of Oregon as being those entities with the legal authority to ensure that the targets set forth in the TMDL are met (OAR 340-042- 0030 (2))." Nowhere in the cited rule definition is the term "responsible persons" used, and nowhere in the Draft TMDL does DEQ explain the difference in the terms. This distinction matters, since the Draft TMDL seeks to require the Districts to develop TMDL Implementation Plans based on their purported status as "responsible persons" with purported legal authority to ensure TMDL targets are met through specific management strategies. In contrast, the Draft TMDL correctly identifies on page 224 that under the Agricultural Water Quality Management Act ("AgWQMA"), ODA "is the DMA responsible for regulating agricultural activities that affect water quality" through Agricultural Water Quality Management Area Plans. These Area Plans are developed or modified based on DEQ's load allocation to agricultural nonpoint sources in TMDLs. The Draft TMDL also correctly identifies at page 225 that USBR is the "DMA responsible for developing a source specific implementation plan to address load allocations associated with water delivery and drainage facilities that are federally owned and/or operated in the Klamath Reclamation Project." The Districts are not identified as a DMA, nor should they be, as they lack the legal authority to ensure that the targets set forth in the TMDL are met as required by OAR 340-042-0030(2). Irrigation districts have not been delegated TMDL implementation authority by the Legislature. Under the Irrigation District Law, an irrigation district's purpose is limited to activities that are necessary for the construction, maintenance, and operation of a system of works to deliver irrigation water for the benefit of its patrons, including acquiring water rights under state law and entering into contracts with USBR for the delivery and distribution of water under the federal Reclamation laws. An irrigation district is not authorized to require implementation of management activities on its patrons' private property (e.g., requiring the planting of riparian vegetation), nor is it authorized to administer water rights in a manner contrary to law (e.g., delivering a minimum of 25 cfs of instream flow downstream of Malone Diversion Dam between May 1 and September 30). As such, it is improper for the Draft TMDL to attempt to create such legal authority by labeling the Districts so-called "responsible persons," as this would be in direct conflict with the scope of the legislatively authorized purpose of irrigation districts under ORS Chapter 545.

Response: The TMDL covers the entities that have authority over sectors and sources that affect water quality in the Upper Klamath and Lost River Subbasins. The Oregon Department of Agriculture (ODA) and the Bureau of Reclamation (BOR) have been named as Designated Management Agencies (DMA's) who are responsible for developing source specific TMDL Implementation Plans. The Water Quality Management Plans facilitated by ODA are written for the individual landowners throughout the watershed and do not cover the Water Management Districts (WMDs). In addition, it is DEQ's understanding that through transferred works all operation and maintenance on the BOR-owned facilities are delegated to the WMDs. For this reason, DEQ has identified all WMD's as responsible persons in the Water Quality Management Plan with the requirement to develop Source Specific TMDL Implementation Plan and associated Best Management Practices (BMP's). In establishing a TMDL, OAR 340-042-0040(4)(l)(G) states that the department will include a WQMP that includes "Identification of persons, including Designated Management Agencies (DMAs), responsible for implementing the management strategies and developing and revising sector-specific or source-specific implementation plans." This rule provides that while a WQMP can designate DMAs it can also identify other persons with a role in implementation. Additionally OAR 340-042-0080(4) states that persons identified in the WQMP must prepare an implementation plan. The Environmental Quality Commission adopted these rules under the authority granted to it to take acts necessary to implement the Federal Clean Water Act under ORS 468B.035. Additionally, ORS 468B.110 grants the EQC or DEQ authority to establish and enforce TMDLs by rule or order. This TMDL was issued by DEQ as an order.

LVID-HID#12: Suggested Change ID #168

Description: Lost River TMDL - DA - remove the designation of the Districts as "water management districts"

Comment: Water Management Districts The Draft TMDL states on page 6 without citing to any authority that "water management districts" are required to develop TMDL implementation plans: Designated Management Agencies and Responsible Persons [that] are responsible for preparation of TMDL implementation plans include Water Management Districts, Dam Removal Entity (DRE) and PacifiCorp. These entities must develop individual TMDL Implementation Plans or participate in development of a unified implementation plan to address load allocations identified in the TMDLs.

The term "water management district" is not defined in the Draft TMDL, nor does it appear in the TMDL rules. Instead, the Draft TMDL simply offers a short discussion on page 156 of how most of the water in USBR's Klamath Reclamation Project is delivered by irrigation and drainage districts that are members of KWUA (footnote 1 below), and then includes a map at Figure 4-12 purporting to show the location of such "water management districts" in the Klamath Project. Both LVID and HID are shown on the map. However, the Draft TMDL fails to state a legal basis for including the Districts as entities with legal authority to ensure compliance with TMDL targets. Neither is listed in the document as a DMA and neither has authority to require changes in land management practices after water is delivered to district patrons to achieve TMDL targets. In contrast, ODA checks these boxes by virtue of the AgWQMA. Furthermore, LVID's conveyance system is owned by USBR, such that it would also fall within the scope of USBR's designation as the "DMA responsible for developing a source-specific implementation plan to address load allocations associated with water delivery or drainage facilities that are federally owned and/or operated in the Klamath Reclamation Project." As drafted, the Draft TMDL fails to provide the Districts with the basic jurisdictional certainty needed before requiring them to develop a TMDL implementation plan for agricultural activities occurring within their respective boundaries.

If DEQ does not amend the Draft TMDL to remove the designation of the Districts as "water management districts" subject to the TMDL's implementation plan requirements based on their status as "responsible persons," the Districts will be subjected to new and significant operational and fiscal constraints. This unfunded mandate will impair the Districts' ability to comply with their obligations under the Irrigation District Law. In addition, the TMDL compels the Districts to take actions for which they lack authority or jurisdiction, potentially exposing the Districts to lawsuits by landowners or from third parties, or to enforcement action by DEQ (footnote 2 below). Finally, achievement of the surrogate measures included in the Draft TMDL would violate multiple federal laws including the Reclamation Act, the Endangered Species Act, and ironically, 33 USC § 1251(g) of the federal Clean Water Act.

footnote 1: Neither of the Districts are members of KWUA, though the Draft TMDL fails to recognize this fact. footnote 2: While the Districts believe DEQ has no authority to bring an enforcement action against any entity other than a DMA (see OAR 340-012-0055(2)(e)), they are nonetheless concerned about the likelihood of having to defend such an action and assert that defense.

Response: The TMDL covers the entities that have authority over sectors and sources that affect water quality in the Upper Klamath and Lost River Subbasins. The Oregon Department of Agriculture (ODA) and the Bureau of Reclamation (BOR) have been named as Designated Management Agencies (DMA's) who are responsible for developing source specific TMDL Implementation Plans. The Water Quality Management Plans facilitated by ODA are written for the individual landowners throughout the watershed and do not cover the Water Management Districts (WMDs). In addition, it is DEQ's understanding that through transferred works all operation and maintenance on the BOR-owned facilities are delegated to the WMDs. For this reason, DEQ has identified all WMD's as responsible persons in the Water Quality Management Plan with the requirement to develop Source Specific TMDL Implementation Plan and associated Best Management Practices (BMP's). In establishing a TMDL, OAR 340-042-0040(4)(l)(G) states that the department will include a WQMP that includes "Identification of persons,

including Designated Management Agencies (DMAs), responsible for implementing the management strategies and developing and revising sector-specific or source-specific implementation plans." This rule provides that while a WQMP can designate DMAs it can also identify other persons with a role in implementation. Additionally OAR 340-042-0080(4) states that persons identified in the WQMP must prepare an implementation plan. The Environmental Quality Commission adopted these rules under the authority granted to it to take acts necessary to implement the Federal Clean Water Act under ORS 468B.035. Additionally, ORS 468B.110 grants the EQC or DEQ authority to establish and enforce TMDLs by rule or order. This TMDL was issued by DEQ as an order.

10. Comments from: Oregon Department of Agriculture

ODA#1: Suggested Change ID #194

Description: Editorial - general use of similar terms related to vegetation

Comment: The TMDL document uses two similar terms, “streamside vegetation” (first use is in Section 1.2, page 8) and “near stream vegetation” (first use is in Figure 1-4, page 9); if these terms mean the same thing, select the preferred term and use it throughout the documents

The TMDL document uses two similar terms, “restored (streamside) vegetation” (first use is in Section 2.3.3, page 28); and “system potential vegetation” (first use is in Section 6.35.5, page 243); if these terms mean the same thing, select the preferred term and use it throughout the documents

Response: “Streamside vegetation” was changed to “near-stream vegetation” throughout the document. “System potential vegetation” has been changed to “restored vegetation” throughout the document as well.

ODA#2: Suggested Change ID #195

Description: Editorial - use of both US/Imperial units of measurements

Comment: The TMDL document (text, tables, and graphs) uses both US/Imperial measurements (e.g. feet, miles) and Metric (e.g. meters, kilometers), sometimes with both used in close proximity; please select the preferred measurement system and use it throughout the documents

Response: DEQ tried to make units consistent in the TMDL but could not in all cases. Generally DEQ uses the SI metric system of units but in some cases units in the United States Customary System (USCS) are still used. For example the extent of impaired streams is reported in river miles because DEQ’s 303(d) integrated report use river miles. It is important for TMDL reviewers to be able to understand the extent of streams impaired and how it relates to the streams being addressed in the TMDL. We also sometimes report important geographic features in terms of river miles because the public is familiar with these locations using those references.

ODA#3: Suggested Change ID #196

Description: Appendix A - graphs of results by stream km (or mi)

Comment: For all graphs of results by stream km (or mi), put 0 km (or mi) at left; avoid mirrored graphs (e.g. Figs A-53, A-55, A-57, A-59, A-61, A-64)

Response: The graphs were fixed so all have stream km zero on the left side of the x-axis.

ODA#4: Suggested Change ID #197

Description: Editorial - scientific exponent notation (E)

Comment: Most audiences do not understand numbers in scientific exponent notation (E), e.g. Table 2-9 (page 31); write out full numbers where space allows; e.g. 320,000 is best, 3.2 x 10^5 is OK, whereas many audiences do not understand 3.2E+5

Response: Scientific exponent notation is a standard and acceptable way to notate large numbers. Using scientific exponent notation also allows the fewest number of characters to be used compared to using the exponent operator symbol or writing the full number. This allows efficient use of space in tables. For these reasons we kept the numbers as they are.

ODA#5: Suggested Change ID #198

Description: Editorial - Additional Explanation & related limitations required for model year selected

Comment: Section 2.3.2.1 Discrete Nonpoint Sources (page 23): First mention of "model year (year 2000)" Add explanation of why 2000 is used as the model year, since that is almost 20 years ago; add related limitations (here or in Appendix A)

Response: The existing Klamath River model and multiple scenarios that were developed and run for the original TMDL in 2010 formed the basis of the various scenarios that were re-run for this 2019 revision effort. The upper Klamath River model was configured and calibrated using data from the year 2000. This year was selected because relatively good boundary condition data and in-stream data were available. The approach, calibration results, and corroboration results for the Klamath River Model for TMDL development were documented previously and are described in the modeling report "Model Configuration and Results - Klamath River Model for TMDL Development" (Tetra Tech, Inc., 2009). This Klamath River Model report has been included as Appendix B - Klamath River Model for TMDL Development.

ODA#6: Suggested Change ID #199

Description: Editorial - Clarifying text required Section 3.2.7 Temperature Data (page 79):

Comment: o Figure 3-11 - add range of years for these temperature data o Figure 3-12 - add explanation for why this location has 2018 data, whereas the temp data in Figures 3-13 through 3-19 are from 2001 o Alternative is to refer the reader to Appendix A, and provide dates of temperature date in Section A.2.1 (Available Data – Ground Level Data)

Response: Updated narrative and a new table have been added to Section 3.2.7 of the TMDL summarizing the available temperature data. The figure captions in figures 3-11 through 3-19 have also been updated to include the data source and period of record.

ODA#7: Suggested Change ID #200

Description: Editorial - text update required - Near Stream Vegetation Disturbance/Removal - Section 3.4.2.1 & Section 4.4.2.1

Comment: Similar comments provided for Section 3.4.2.1 & Section 4.4.2.1.

Section 3.4.2.1 Existing Pollution Sources - Near Stream Vegetation Disturbance/Removal: o Page 85 - “See Appendix A for the methodology used to determine restored condition vegetation.” - add a statement saying that Appendix A includes a section on limitations of the methodology

o Page 86-87 - Figures 3-20 and 3-21: -Can the vegetation conditions also be shown on these graphs, so the reader can compare vegetation conditions with stream temperatures? - Add a reference to Appendix A, Figure A-5 (Jenny Creek) and Figure A21 (Spencer Creek) for maps of the model extent

Section 4.4.2.1 Existing Pollution Sources – Near Stream Vegetation Disturbance / Removal: o Page 163 - “See Appendix A for the methodology used to determine restored condition vegetation.” - add a statement saying that Appendix A includes a section on limitations of the methodology o Page 165 - Figure 4-16: -Can the vegetation conditions also be shown on this graph, so the reader can compare vegetation conditions with stream temperatures? -Add a reference to Appendix A, Figure A-36 for map of the model extent

Response: We did not add additional narrative to reference the limitations. Vegetation conditions are shown in plots in Appendix A so they were not added into Chapter 3.

ODA#8: Suggested Change ID #201

Description: Editorial - Clarifying text required Section 3.7.3.4 Surrogate Measures (page 124)

Comment: Section 3.7.3.4 Surrogate Measures (page 124): “It is simple to measure effective shade at the stream surface using a relatively inexpensive instrument called a Solar Pathfinder™.” - add a statement that Appendix A, Section A.2.1 (Available Data – Ground Level Data), summarizes where and when Solar Pathfinder readings were obtained (this information needs to be added to that section)

Response: Section A.2.1 of Appendix A has been referenced in Section 3.7.3.4 of the TMDL.

ODA#9: Suggested Change ID #202

Description: Editorial - Clarifying text required Section 3.7.3.4.1 Site Specific Effective Shade Simulations (page 124):

Comment: Section 3.7.3.4.1 Site Specific Effective Shade Simulations (page 124): “Appendix A contains detailed descriptions of the methodology used to develop these simulations of effective shade.” - add a statement that the vegetation was mapped from aerial photos mostly from 2000-2003, and that Appendix A includes limitations of the data and methodology

Response: The purpose for Section 3.7.3.4.1 is to discuss the site specific effective shade surrogate measure which is located within Section 3.4.3.4 - Surrogate Measures. We do not feel this section is an appropriate location to include discussion of model methodology and model documentation. We have clarified the intent of this section by changing the section title from“Site Specific Effective Shade Simulations” to “Site Specific Effective Shade”. The modeling methodology is described in Appendix A and includes information about the aerial photo years used to map vegetation in addition to limitations of the data and methodology. Section 3.7.3.4.1 includes a reference to Appendix A.

ODA#10: Suggested Change ID #203

Description: Editorial - Miller Creek 303d listing information in Figure 4-2 and Table 4-4 don't match

Comment: Section 4.1.3 Impaired Waterbodies and 303(d) Listings:

Page 143 - Figure 4-2 shows that the lowest ~3 miles of Miller Creek is not a "temperature listed waterbody" (also Figure 4-13 on page 157). Page 144 - Table 4-4 shows that the "water quality limited segments for temperature" include river miles 0 - 9.6 for Miller Creek. The map and table seem contradictory; edits are needed to address this apparent contradiction.

Response: Figure 4-13 correctly shows the extent of the temperature listing on Miller Creek based on information from the Final 2012 303(d) list. The portion of Miller Creek upstream of Pine Creek is impaired for temperature while the reach between Pine Creek and the Lost River is not identified as being impaired for temperature. The impaired river miles identified in Table 4-4 (0 to 9.6) came directly from the Final 2012 303(d) list.

We believe the river miles are incorrect and instead should be 3.1 to 12.7. The source of the inconsistency is likely the original GIS stream features used when Miller Creek was originally assessed and first listed as impaired for temperature in the 1998 303(d) list. The GIS features used for that assessment identify the portion of Miller Creek downstream of Pine Creek as an "Unnamed Stream" with a different LLID number. This is likely why river mile zero was assumed to start at the confluence with Pine Creek. Since then, the river mile extent information has been carried forward in each of the subsequent 303(d) lists.

ODA#11: Suggested Change ID #204

Description: Editorial - Clarification requested on model year 1999 and on the word "continuous"

Comment: Section 4.3 Seasonal Variation and Critical Period (page 159):

"… the 1999 continuous model hourly temperature output." - clarify what "continuous" means in this sentence. Explain why the model year is 1999 (or refer the reader to Appendix A, specific section, and clarify there)

Response: The word "continuous" has been removed from the sentence as it is not necessary. The daily maximum values were calculated based on the 1999 modeled hourly temperature output. Language was added to Section 4.3 indicating that the year 1999 was used to configure and calibrate the Lost River model because of data availability and exceedances of the water quality criteria. Appendix F, Lost River Model for TMDL Development, has been added and referenced for more details.

ODA#12: Suggested Change ID #205

Description: Editorial - Clarifying text & table provided for update - Section 4.4.1 Existing Pollution Sources – Point Sources:

Comment: Section 4.4.1 Existing Pollution Sources – Point Sources:

o Page 161 - “There are also 11 CAFO permits…” - use the following updated language from the ODA CAFO Program:[Note the updated text is provided below, please look at the original comment document pdf to see the updates with track changes]

“There are also 13 CAFO permits in the Lost subbasin (Table 4-8). Any person who owns or operates a CAFO in Oregon is required to have a permit. There are two permit options. Any person who owns or operates a CAFO that discharges to a surface water of the state is required to obtain NPDES permit coverage. Any person who owns or operates a CAFO that discharges to groundwater of the state or operates a disposal system is required to obtain Water Pollution Control Facilities (WPCF) Permit coverage.”

Page 162 - Table 4-8 (Permits in the Lost subbasin) - use the following updated CAFO permit information from the ODA CAFO Program, instead of what is currently in Table 4-8:

File Number Permittee Permit Type AG-P0062958CAFG Bonanza View Dairy Inc CAFO-NPDES AG-P0062960CAFG JD Dairy LLC CAFO-NPDES AG-P0062962CAFG Holland’s Dairy, Inc CAFO-NPDES AG-P0062965CAFG Solid Rock Dairy LLC CAFO-NPDES AG-P0156431CAFG Matney Way Dairy CAFO-NPDES AG-P0175702CAFG Hill, Drew CAFO-NPDES AG-P1000016CAFG Windy Ridge, LLC CAFO-NPDES AG-P1000072CAFG Hammerich Goat Dairy CAFO-NPDES AG-P1000081CAFG Orella Dairy CAFO-NPDES AG-P1000098CAFG Brave Colt Goat Farm CAFO-NPDES AG-P1000125CAFG Red Bird Ranch LLC CAFO-NPDES AG-P1000140CAFG Noonan Farms CAFO- WPCF AG-P1000143CAFG McFarland Livestock LLC CAFO-NPDES

Response: Language is section 4.4.1 has been updated to read “There are also 13 CAFO permits in the Lost subbasin (Table 4-8). Any person who owns or operates a CAFO in Oregon is required to have a permit. There are two permit options. Any person who owns or operates a CAFO that discharges to a surface water of the state is required to obtain NPDES permit coverage. Any person who owns or operates a CAFO that discharges to groundwater of the state or operates a disposal system is required to obtain Water Pollution Control Facilities (WPCF) Permit coverage.”

The following updated CAFO permit information from the ODA CAFO Program has been added to Table 4-8.

File Number Permittee Permit Type AG-P0062958CAFG Bonanza View Dairy Inc CAFO-NPDES AG-P0062960CAFG JD Dairy LLC CAFO-NPDES AG-P0062962CAFG Holland’s Dairy, Inc CAFO-NPDES AG-P0062965CAFG Solid Rock Dairy LLC CAFO-NPDES AG-P0156431CAFG Matney Way Dairy CAFO-NPDES AG-P0175702CAFG Hill, Drew CAFO-NPDES AG-P1000016CAFG Windy Ridge, LLC CAFO-NPDES AG-P1000072CAFG Hammerich Goat Dairy CAFO-NPDES AG-P1000081CAFG Orella Dairy CAFO-NPDES AG-P1000098CAFG Brave Colt Goat Farm CAFO-NPDES AG-P1000125CAFG Red Bird Ranch LLC CAFO-NPDES AG-P1000140CAFG Noonan Farms CAFO- WPCF AG-P1000143CAFG McFarland Livestock LLC CAFO-NPDES

ODA#13: Suggested Change ID #206

Description: Editorial - Text revision suggested for Miller Creek Shade deficit description and restoration priorities

Comment: Miller Creek: o The following two statements say that the shade deficit and associated stream warming are very small, and that riparian restoration would have little influence on stream temperature:

1. Page 164 (TMDL) - “Miller Creek has a shade deficit but it is very small. For example, vegetation removal along Miller Creek contribute a maximum of 0.19°C.”

2. Appendix A, page A-66 - “The Miller Creek model does not predict much influence of restoring riparian vegetation on stream temperatures (at current flow rates).”

However, the next two statements (3 and 4) seem inconsistent with the previous two statements (1 and 2); need to clarify this apparent inconsistency:

3. Page 164 (TMDL) - “… the lower three miles of Miller Creek lack vegetation and should be a priority for streamside vegetation restoration.”
4. Page 166 (TMDL) - “The lower three miles of Miller Creek lack vegetation and the stream channel appears to have been straightened and heavily modified. This section should be a priority for instream improvements and channel morphology restoration.”

Additional comments on statements 3 and 4: The TMDL document (Chapters 2-4) generally does not identify specific restoration priorities, therefore statements 3 and 4 (which single out miles 0-3 of Miller Creek as a restoration priority) seem anomalous in Chapter 4 Statements 3 and 4 are related to planning, prioritization, and implementation, which is the focus of Chapter 6 (WQMP); for ODA as a DMA, the WQMP refers to existing ODA processes and program tools for planning, prioritization, and implementation; therefore, statements 3 and 4 should be removed from Chapter 4, and either (1) defer to the ODA processes described in the WQMP to identify restoration priorities, or (2) include statements 3 and 4 in Chapter 6, in a more comprehensive priority list for implementation

Response: We have removed from the TMDL statements 3 and 4 related to prioritization and implementation

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ODA#14: Suggested Change ID #218

Description: Editorial - Additional explanation/clarifications needed Section 4.7.4.1.2 Site Specific Effective Shade Simulations

Comment: Section 4.7.4.1.2 Site Specific Effective Shade Simulations: o Page 205 - “Appendix A contains detailed descriptions of the methodology used to develop these simulations of effective shade.” - add a statement that the vegetation was mapped from 2011 Lidar, and that Appendix A includes limitations of the data and methodology o Page 206 - Figure 4-28 (shade on Lost River) is not explained in the text; the missing text needs to be added on Page 205 o Page 207 - Figure 4-29 (shade on Miller Creek) is not explained in the text; the missing text needs to be added on Page 205

Response: Language has been added to Section 4.7.4.1.2 stating that “LiDAR data from 2011 were used to characterize vegetation along the Lost River. Appendix A includes limitations of the data and methodology”.

The text in the three paragraphs above Figure 4-28 and 4-29 applies to Figures 4-28, 4-29, and 4-30. the references to the figures has been added to section 4.7.4.1.2 to clarify.

ODA#15: Suggested Change ID #219

Description: Editorial - proposed text provided for Reasonable Assurance Section 5.2

Comment: Section 5.2 Reasonable Assurance – Programs to Achieve Nonpoint Source Reductions:

Page 222 - “the Agricultural Management Act”, change to “the Agricultural Water Quality Management Act” o Page 224 - use the following updated language about ODA and the Agricultural Water Quality

Management Program: [Note the updated text is provided below, please look at the original comment document pdf to see the updates with track changes]

The Oregon Department of Agriculture (ODA) is the DMA responsible for regulating agricultural activities that affect water quality. In areas subject to the Agricultural Water Quality Management Act, the ODA, under ORS 568.900 to 568.933 and 561.190 to 561.191, and OAR chapter divisions 90 and 95, develops and implements Agricultural Water Quality Management Area Plans (Area Plans) and Agricultural Water Quality Management Area Rules (Area Rules) to prevent and control water pollution from agricultural activities. Area Plans and Area Rules are the TMDL implementation mechanism for agricultural activities. In areas where a TMDL has been approved, Area Plans and Area Rules must be sufficient to meet the TMDL load allocations. If DEQ determines that the Area Plan and Area Rules are not adequate to implement the load allocations, DEQ will provide ODA with guidance on what would be sufficient to meet the TMDL load allocations. If a resolution cannot be achieved, DEQ will request the Environmental Quality Commission to petition ODA for a review of part or all of the Area Plans and Area Rules (ORS 568.930 (3)) implementing the TMDL.

The Klamath Headwaters Agricultural Water Quality Management Area Rules (ODA 2004) and Area Plan (ODA 2017) and the Lost River Agricultural Water Quality Management Area Rules (ODA 2004) and Area Plan (ODA 2017) apply to nonfederal and nontribal agricultural lands in the Upper Klamath subbasin and the Lost subbasin, respectively. The Area Rules are regulatory outcome- based requirements that can be enforced by ODA, whereas the Area Plans are voluntary and identify strategies to prevent and control water pollution from agricultural lands through a combination of outreach programs, suggested land treatments, management activities, and monitoring. The combination of Aarea Rules and Area Plans are to implements TMDL load allocations for agriculture nonpoint sources and is expected to aid in the achievement of water quality standards. The Area Plans are reviewed and revised every two years, with the most recent reviews completed in 2017. DEQ expects ODA and the Local Advisory Committees in the Klamath basin to revise the Area Plans to address the LAs in the Upper Klamath and Lost subbasin temperature TMDLs (DEQ 2019).

Response: The narrative in Sections 5.2 and 5.2.1.1 was updated with the suggested text and other minor additions. It now says:

The Oregon Department of Agriculture (ODA) is the DMA responsible for regulating agricultural activities that affect water quality. In areas subject to the Agricultural Water Quality Management Act, the ODA, under ORS 568.900 to 568.933 and 561.190 to 561.191, and OAR chapter divisions 90 and 95, develops and implements Agricultural Water Quality Management Area Plans (Area Plans) and Agricultural Water Quality Management Area Rules (Area Rules) to prevent and control water pollution from agricultural activities. Area Plans and Area Rules are the TMDL implementation mechanism for agricultural activities. In areas where a TMDL has been approved, Area Plans and Area Rules must be sufficient to meet the TMDL load allocations. ODA must consult with the DEQ or the Environmental Quality Commission in the adoption and review of Area Plans and in the adoption of Area Rules (ORS 568.930 (2)). If DEQ determines that the Area Plan and Area Rules are not adequate to implement and achieve the TMDL load allocations, DEQ will provide ODA with guidance on what would be sufficient to meet the TMDL load allocations. If a resolution cannot be achieved, DEQ will request the Environmental Quality Commission to petition ODA for a review of part or all of the Area Plans and Area Rules (ORS 568.930 (3)) implementing the TMDL.

The Klamath Headwaters Agricultural Water Quality Management Area Rules (ODA 2004) and Area Plan (ODA 2017) and the Lost River Agricultural Water Quality Management Area Rules (ODA 2004) and Area Plan (ODA 2017) apply to nonfederal and nontribal agricultural lands in the Upper Klamath subbasin and the Lost subbasin, respectively. The Area Rules are regulatory outcome-based requirements that can be enforced by ODA, whereas the Area Plans are setup to be voluntary and identify strategies to prevent and control water pollution from agricultural lands through a combination of outreach programs, suggested land treatments, management activities, and monitoring. The combination of Area Rules and

Area Plans are to implement TMDL load allocations for agriculture nonpoint sources and is expected to aid in the achievement of water quality standards. The Area Plans are reviewed and revised every two years, with the most recent reviews completed in 2017. DEQ expects ODA and the Local Advisory Committees in the Klamath basin to revise the Area Plans to address the Load Allocations and surrogate measures in the Upper Klamath and Lost subbasin temperature TMDLs.

ODA#16: Suggested Change ID #222

Description: Editorial - Suggested text and changes to Limitations (page A-1 to A-3)

Comment: Appendix A (Temperature and Effective Shade Models): Section A.1 Limitations (page A-1 to A-3): Consider moving the "Limitations" section after the "Available Data" section (and/or integrate the data limitations into the "Available Data" section); the reader will understand the limitations more fully if they have first read about the data o Add these limitations: -Age of data - most data (stream temperature; aerial photos; flow; TIR) are from around the year 2000 and may not represent "current" (2019) conditions -Model year(s) - list in one place which model years are used and why -Scientific complexity - the draft Monitoring Strategy (Section 1.2, page 3) has statements that would be useful to include: "Adaptive management is well suited for settings and situations that feature significant scientific complexity. As described in the KLR TMDL (TMDL sections 2.2.6 and 3.2.6, hydrology in the Upper Klamath and Lost subbasins is highly modified to support irrigation agriculture and hydropower. The high degree of hydromodification in the KLR subbasin represents significant scientific complexity in the spatiotemporal heat budget and consequently, uncertainties in thermal restoration potential."

Response: We have moved the limitations section to the end of the document so readers have the opportunity to review all the data and model results beforehand. We prefer not to integrate the limitations narrative into the rest of the document in order to make it easier to find.

We don't disagree that some of the temperature data, aerial photos, etc are older and may not represent current conditions in 2019 but we don't view this as a limitation to the modeling methodology. Every modeling analysis in a TMDL is based on a baseline year. The important factor in the modeling methodology is that model input data represent the conditions at the time the temperature data was collected. This provides us a way to evaluate the performance and suitability in replicating stream temperatures with the model. We then use the models to evaluate the efficacy of allocations and various management strategies in achieving the temperature criteria. With implementation of the TMDL and changes in conditions water quality will improve and achieve the criteria. DEQ plans to evaluate progress in the Upper Klamath and Lost Subbasins and will compare changes to the 2000/2001 baseline year.

Adaptive management concepts are discussed in Chapter 5 -Reasonable Assurance and Chapter 6 - Water Quality Management Plan.

The model year has been identified at the beginning of each section where each of the relevant streams are discussed.

ODA#17: Suggested Change ID #225

Description: Editorial - Additional clarifying text requested for Section A.2.1 Available Data – Ground Level Data (page A-4)

Comment: Appendix A (Temperature and Effective Shade Models): Section A.2.1 Available Data – Ground Level Data (page A-4): o For each type of data, add the dates and locations of data acquisition;

state whether more recent data exist but were not used, and if so, state why the more recent data were not used o Add a section on field work / ground surveys related to vegetation, channel morphology, and effective shade, including where and when data were acquired, and how it is used (subsequent sections mention field data, but do not provide specifics) o Add a section on meteorological data

Response: Tables were added documenting the continuous temperature monitoring, flow related measurements, and effective shade measurements. We added a section discussing vegetation surveys but presentation of the data itself would result in multiple tables. We feel it is better suited for viewing in spreadsheet format so we did not include it in the TMDL. If you wish to get this data you can contact DEQ or the BLM which is the agency that originally collected it. The meteorological data used for model configuration is discussed in the Model Setup and Calibration section (Section A.5).

You requested that "we state whether more recent data exist but were not used". The purpose of Appendix A is to document the data and information that were used for the Heat Source modeling analysis, not any and all data available.

ODA#18: Suggested Change ID #226

Description: Editorial - Additional clarifying text requested for Section A.2.2 Available Data – GIS and Remotely Sensed Data (page A-5 to A-6)

Comment: Appendix A (Temperature and Effective Shade Models) Section A.2.2 Available Data – GIS and Remotely Sensed Data (page A-5 to A-6)

Add a section on Lidar; explain Lidar availability (most of the two subbasins have Lidar from 2010-2012); explain why Lidar was only used for the mainstem Lost River, and was not used elsewhere (for DEMs or DSMs)

Aerial Imagery – "Color DOQs are now available for the entire state" - explain why more recent imagery was not used

Response: We added a section into Appendix A discussing LiDAR. In addition to the Lost River, LiDAR was used to update ground elevations, topographic shade, and verify the vegetation heights for the Miller Creek model. This was not apparent in Appendix A so we added additional language to clarify.

In Jenny Creek and Spencer Creek, DEQ chose not to update the models with LiDAR.

The temperature data, TIR data, flow data, and vegetation/habitat information used in the modeling in Jenny Creek and Spencer Creek were collected in year 2001. LiDAR and aerial imagery is useful for characterizing current vegetation conditions. LiDAR is also useful for characterizing ground elevations which are inputs used in the model. DEQ considered updating the model to incorporate vegetation and ground elevation data from the more recent LiDAR but decided against it. Updating to LiDAR would have required DEQ to either 1) collect new temperature, TIR, and flow data that centered closer to the year the LiDAR was collected in order to accurately represent the vegetation conditions at that time, or 2) reconcile differences in the vegetation between the two years and modify the LiDAR DSM so it more closely represents vegetation conditions in the year 2001. In addition, updating the model with LiDAR data would require a significant reconfiguration of the model. Given the scale of work and the number of changes that needed to occur in order to incorporate LiDAR DEQ did not believe it was feasible given the time and resources devoted to the project. In the Lost River and Miller Creek we felt it was appropriate to utilize LiDAR because the vegetation conditions when LiDAR was collected do not significantly differ from the model year. There was also no prior vegetation assessment on the Lost River so starting with LiDAR made the most sense.

For the reasons stated above DEQ did not find it feasible to use more recent color DOQs.

ODA#19: Suggested Change ID #227

Description: Editorial - clarification text needed - Section A.3.1.2 Channel Morphology – Channel Width Assessment (page A-9)

Comment: Section A.3.1.2 Channel Morphology – Channel Width Assessment (page A-9):

Multiple different terms are used for the “channel edge”; select the preferred term and use it here and elsewhere in the document, to avoid confusion -Step 1 uses “active channel width” -Figure A-2 (text within figure) uses “channel edge” and “near stream disturbance zone width” -Figure A-2 (caption) uses “right bank” and “left bank”

Step 3 - “ground level measurements” - add information about the type, number, locations, and dates acquired

Response: We changed the picture and the caption for Figure A-2. The caption now says: “Digitized active channel with centerline, model nodes (points), right bank, and left bank”.

We have added information about the type, number, location, and dates of ground level measurements into section A.3.1.

ODA#20: Suggested Change ID #228

Description: Editorial - Additional Explanation requested - Section A.3.2.2 Vegetation – Mapping, Classification and Sampling (pages A-10 to A-11)

Comment: Section A.3.2.2 Vegetation – Mapping, Classification and Sampling (pages A-10 to A-11): o Relevant quotes: - DOQs - “Vegetation features were mapped 300 feet in the transverse direction from channel edge.” -Step 3 - “… the vegetation was sampled radially every 15 meters; starting at the channel center, out to 60 meters.” -Lidar - “… the vegetation height was sampled radially every 8 meters; starting at the channel center, out to 40 meters.” Add an explanation: -For DOQs, why was vegetation mapped out to 300’ (91 m) but only modeled out to (197’) 60 m? Why were those distances chosen? -For Lidar, why were vegetation heights modeled out to 40 m rather than 60 m? Why was 40 m chosen?

Response: The information in the section referenced in your comment was not correct and was revised. The transverse sample distance for each modeled stream is unique to each stream and was determined based on stream specific factors. The transverse sample distance is influenced by the width of the stream and the type and spatial extent of vegetation. Wider streams require larger sample distances. The type and spatial extent of vegetation influence the amount of shade over a stream. The sampling distance is set to characterize vegetation that is likely to produce shade. Often in upland or drier habitats the primary source of shade is closer to the stream. This was a factor on many of the Lost River tributaries. On these streams the primary shade producing vegetation was typically within 16 meters from the stream. Beyond that distance were dryland grasses that was not expected to change even after considering restoration. These areas did not need to be sampled.

Information about the sample distance was added into the model setup sections.

ODA#21: Suggested Change ID #229

Description: Editorial - Additional clarification requested - A.3.41 Effective Shade Overview (page A-14)

Comment: A.3.41 Effective Shade Overview (page A-14): o “Effective shade simulations were performed for a total of 114 stream kilometers in the Upper Klamath River and Lost River Subbasins.” - add a reference to Figure A-4 (map of modeled streams) o “Solar Pathfinder® data was used to collect all ground level data.” - explain how many measurements were taken, when, and where; change “was” to “were”

Response: Appendix A was updated to include a new section in Section A.3.1 describing the number and location of effective shade measurements. A reference was added to Figure A-4.

ODA#22: Suggested Change ID #231

Description: Editorial - clarification requested for Figure A-12

Comment: Page A-23, Figure A-12, we infer that there were no Solar Pathfinder readings here; add that information explain why there were no readings

Response: We have added narrative to clarify that no field based effective shade data were collected on Jenny Creek.

ODA#23: Suggested Change ID #232

Description: Editorial - Add imagery dates in Table A-4

Comment: Page A-23, Table A-4, add date(s) of aerial photos used

Response: The imagery years were added to the table. This information is also located in Section 3.2.5 Aerial Imagery.

ODA#24: Suggested Change ID #233

Description: Editorial - map update requested for Figure A-18

Comment: Page A-31, Figure A-18, add line on graph at 20°C

Response: The figure has been updated to include a line at the criteria including the human use allowance (20.3 deg-C).

ODA#25: Suggested Change ID #234

Description: Editorial - clarification requested on page A-32

Comment: Page A-32, Restored Vegetation Scenario, specify which level IV ecoregions

Response: Information was added to explain what Level IV Ecoregions.

ODA#26: Suggested Change ID #235

Description: Editorial - Add imagery date in Table A-15

Comment: Page A-40, Table A-15, add date(s) of aerial photos used

Response: The imagery year was added to the table. This information is also located in Section 3.2.5 Aerial Imagery.

ODA#27: Suggested Change ID #236

Description: Editorial - clarification requested for Figure A-28

Comment: Page A-42, Figure A-28, explain that “measured effective shade” is from Solar Pathfinder readings and date(s) of readings; explain why are some measured shade readings are very different from the modeled shade

Response: Tables were added into section A.3.1 documenting the field based effective shade measurements. Differences between the model results and the field measurements could be due to any number of factors including: errors in field measurements, differences in the actual measurement location and the model output location, or model parameterization at this location that differs from actual site conditions.

ODA#28: Suggested Change ID #237

Description: Editorial - map update requested for Figure A-33

Comment: Page A-48, Figure A-33, add line on graph at 20°C

Response: The figure has been updated to include a line at the criteria including the human use allowance (20.3 deg-C).

ODA#29: Suggested Change ID #238

Description: Editorial - map update Figure A-36

Comment: Page A-55, add extent of shade model to Figure A-36

Response: We added a map to show the extent of the modeled stream. See Figure A-1. Narrative has been added to each model section to clearly describe landmarks and the geographic extent.

ODA#30: Suggested Change ID #239

Description: Editorial - Additional clarification requested - Page A-56 available shade data

Comment: Page A-56, "Unfortunately, there are no shade data available to corroborate the predicted effective shade" - clarify that this means no field-based readings from a Solar Pathfinder and state why there were no readings

Response: The sentence was changed to "Unfortunately, field based effective shade data was not collected so model calibration statistics cannot be generated for model derived effective shade".

ODA#31: Suggested Change ID #240

Description: Editorial - Additional clarification requested - Page A-56 Miller Creek model extent

Comment: Page A-56, "Due to diversions of water from Miller Creek, there was too little flow downstream of the confluence with Pine Creek to calibrate the model." - add clearer explanation that the shade model starts at river mile 0, but the temperature model starts at river mile 3

Response: The extent and distance for both the temperature and shade models are discussed in the Miller Creek Overview (section A.4.4.1). To clarify why the extent is different, we added the following sentence: "The temperature model stops at the confluence with Pine Creek because there was too little flow downstream to calibrate the model."

ODA#32: Suggested Change ID #241

Description: Editorial - Add imagery dates in Table A-23

Comment: Page A-60, Table A-23, add date(s) of aerial photos used

Response: The imagery year was added to the table. This information is also located in Section 3.2.5 Aerial Imagery.

ODA#33: Suggested Change ID #242

Description: Editorial - map update requested for Figure A-49

Comment: Page A-65, Figure A-49, add line on graph at 20°C

Response: The figure has been updated to include a line at the criteria including the human use allowance (20.3 deg-C).

ODA#34: Suggested Change ID #244

Description: Editorial - Additional formatting and clarification requested Table A-31

Comment: Page A-68, Table A-31, add range of stream km to reach column, and improve formatting to make it clear that there are only reaches, and the 3rd line is the average for the first two

Response: The kilometer length of each reach extent has been added to Table A-31.

ODA#35: Suggested Change ID #246

Description: Editorial - Clarify shade methodology used for Lost River

Comment: Page A-79, explain more clearly that the shade methodology used for Lost River (Lidar and two zones) is different from the other streams (aerial photos and vegetation polygons)

Response: Additional narrative was added to the text to explain how shade was modeled on the Lost River.

ODA#36: Suggested Change ID #247

Description: Editorial - Additional clarification requested in Table A-38

Comment: Page A-81, Table A-38, add range of river km or miles for each “extent”

Response: The kilometer length of each reach extent has been added to Table A-38.

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11. Comments from: Oregon Farm Bureau

OFB#1: Suggested Change ID #169

Description: General Comment - OFB summary_KR TMDL should not be adopted

Comment: Thank you for the opportunity to comment on the Upper Klamath and Lost Subbasins Temperature TMDL ("Klamath TMDL"). The Oregon Farm Bureau and Oregon Water Resources Congress write to express concerns with the process used to the create the Klamath TMDL, the water quality standards the Klamath TMDL is based upon, and the data and modeling used to create the Klamath TMDL.

By way of background, Oregon Farm Bureau Federation (OFB) is a voluntary, grassroots, nonprofit organization representing Oregon's farmers and ranchers in the public and policymaking arenas. As Oregon's largest general farm organization, its primary goal is to promote educational improvement, economic opportunity, and social advancement for its members and the farming, ranching, and natural resources industry. Today, OFB represents over 7,000-member farm families professionally engaged in the industry. Klamath-Lake County Farm Bureau is the voice for farmers and ranchers in Klamath County, and we have members located in the Klamath Basin who would be impacted by this TMDL.

The Oregon Water Resources Congress (OWRC) is a nonprofit association representing irrigation districts, water control districts, improvement districts, drainage districts and other local government entities delivering agricultural water supplies. These water stewards operate complex water management systems, including water supply reservoirs, canals, pipelines, and hydropower facilities. Our members deliver water to roughly 1/3 of all irrigated land in Oregon, including farmers, nursery growers, and other agricultural water users in the Willamette Basin. We have member districts throughout the Klamath Basin.

The development of the Klamath TMDL through underinclusive process, paired with the flawed water quality standard and the data and modeling failures throughout the Klamath TMDL make it unworkable for agricultural stakeholders in the basin, and not something our membership can credibly work under. As such, the Klamath TMDL should not be adopted by the Department of Environmental Quality ("DEQ").

Response: The TMDL was developed with the input of a local stakeholder advisory committee and in accordance with the Oregon Administrative Procedures Act. The temperature water quality standard is protective of sensitive uses and TMDLs are developed to address water quality impairments and not to set water quality standards, which are revised through other Clean Water Act processes.

OFB#2: Suggested Change ID #182

Description: TMDL Process - The Advisory Committee Did Not Include Agricultural Operators or Irrigation Districts

Comment: The Advisory Committee Did Not Include Agricultural Operators or Irrigation Districts

As we reviewed the Klamath TMDL, it became apparent that agricultural operations, including both both agricultural operators and irrigation districts, are a central party DEQ seeks to include in order to meet their temperature standard. As such, we were shocked when we learned that the Advisory Committee

convened to provide advice and feedback on the Klamath TMDL excluded agricultural stakeholders. There were no farmers, ranchers or irrigation districts from anywhere in the basin invited to participate, nor were there any agricultural groups. Instead, the only agricultural entity who participated in the development of the TMDL was the Oregon Department of Agriculture, who operates as the "designated management agency" – the regulator – of agricultural operations. This means that the Klamath TMDL was developed without the historical perspective and on the ground expertise about the basin needed to develop an effective TMDL.

We understand that DEQ had side conversations with some irrigation districts during the development of the Klamath TMDL. These conversations are not a substitute for real, meaningful participation in the development of the Klamath TMDL through a seat on the advisory committee.

Given how significant agricultural nonpoint sources are alleged to be in the Klamath TMDL, it is inexcusable that DEQ did not include those stakeholders in developing the Klamath TMDL.

Response: DEQ solicited an extensive list of agencies and individuals to be included in the Advisory Committee (AC). The AC has representation from the Bureau of Reclamation and the Oregon Department of Agriculture, as well as, tribal and fish and wildlife.

OFB#3: Suggested Change ID #183

Description: Water Quality Standard - standard that the TMDL is based upon is flawed

Comment: The Water Quality Standards for Temperature in the Basin is Flawed

As with temperature standards statewide, the standard that the TMDL is based upon is flawed. As the agency is aware, the District Court of Oregon held in 2012 that DEQ's development of the natural conditions criterion was flawed, and the EPA subsequently disapproved the natural conditions criterion in 2013.

The natural conditions criterion was a method of accounting for the fact that some Oregon streams have water temperatures that are naturally warmer than the numeric criteria contained in Oregon's water quality standards. Under the natural conditions criterion, when DEQ determined that a water body under natural conditions, without human impacts, could not meet the numeric criteria in the temperature standard, the natural temperatures became the goal for the waterbody. Without the natural conditions criterion, DEQ is basing development of the Klamath TMDL off of the numeric water quality standard.

The Klamath Basin is home to many waterbodies that are naturally slow moving and have naturally warmer temperatures. Given that the water quality standard the Klamath TMDL is seeking to achieve does not account for the natural variability of the stream systems and the basin, it is flawed and should not be used as the basis for the Klamath TMDL.

Response: We agree that the loss of the natural conditions criterion was a disappointing outcome. This however does not change the fact that DEQ must develop the Upper Klamath and Lost Subbasin temperature TMDL based on the current water quality standards and set allocations such that they add up to the Loading Capacity defined in OAR 340-042-0040(4)(d) and 40 CFR 130.2(f) as the amount of a pollutant or pollutants that a waterbody can receive and still meet water quality standards. We have provided allocations that add up to the Loading Capacity and will meet the current water quality standards.

OFB#4: Suggested Change ID #184

Description: Modeling - The modeling supporting the TMDL is flawed and is based upon inadequate data

Comment: The modeling supporting the TMDL is flawed and is based upon inadequate data. We understand that a number of organizations, including the Bureau of Reclamation, several irrigation districts, and private landowners have submitted comments detailing several technical flaws with the Klamath TMDL that must be addressed. Chief among these are the use of daily maximum temperatures to determine exceedances, inadequate data – in some cases data was only collected one year – to determine exceedances, failure to account for increasing ambient air temperatures over time, the use of California's water quality targets, the use of effective shade targets, and other critical issues. OFB and OWRC share these concerns, which must be addressed for the TMDL to be defensible.

Response: The models used in this TMDL have gone through extensive review by DEQ and others (see section 2.3). Where DEQ has found errors they have been addressed. DEQ believes the models to be sound and the best available tools that meets TMDL objectives. DEQ respectfully disagrees that there is not sufficient data to develop the TMDL and assign allocations; or that one year of data is not sufficient to determine if an exceedance occurred. The biologically based numeric criteria are based on 7-day average daily maximums and therefore only seven days of continuous data are needed to determine if an exceedance has occurred. DEQ has decided as a policy matter to draft the TMDL to achieve the California water quality standards at the border.

OFB#5: Suggested Change ID #185

Description: Flow Target - oppose use of instream flow target in TMDL

Comment: Critically, we strongly oppose the use of instream flow targets as a surrogate for temperature. Flow targets are not a valid load allocation under a TMDL, and the allocation of water supply is not within DEQ's purview as a state agency. Water rights are valid property rights in the State of Oregon, and DEQ's attempt to reallocate them to meet a TMDL would constitute a taking. Further, the flow targets are not remotely based on the natural system, but rather seek to commandeer irrigation facility operations to achieve dilution of a temperature impact that is caused by natural conditions of the system. Further, the flow targets in the Klamath TMDL are based on stale data that does not accurately represent current conditions. DEQ's use of flow as a temperature surrogate illegal and highly improper, and we strongly oppose it. This issue was addressed in significantly more depth in the comment letter submitted by the Klamath Water Users Association, we incorporate their comments herein.

Response: DEQ does not view the temperature increases resulting from the practice of flow diversion in the Lost River to be caused by natural sources. The source of warming is from the practice of diverting nearly all the water out of the Lost River which facilitates rapid temperature warming because of the loss in loading capacity due directly to the practice of said diversions. OAR 340-042-0030(12) defines a pollutant "Source" to mean "any process, practice, activity or resulting condition that causes or may cause pollution or the introduction of pollutants to a waterbody". The diversion of water is a practice that causes the existing heat loading to be heat pollution, that results in a condition where that heat pollution contributes to the exceedance of the temperature criteria.

DEQ acknowledges the concerns raised about the model and model results. DEQ is open to resolving the concerns about the model by using a monitoring and performance based approach. DEQ has modified the TMDL language to clarify that the flow targets are only necessary when the temperatures of the Lost River exceed 27.9 degrees Celsius as measured using temperature monitoring probes placed in the Lost River. Note that 0.1 deg-C is placed into reserve capacity. In order for DEQ to properly evaluate

compliance with a monitoring and performance based approach we have added monitoring and data reporting requirements into the water quality management plan.

There seems to be some confusion in the meaning of the flow surrogate measure and its relationship to the load allocation, particularly in the comments submitted by KWUA which are referenced and incorporated into this comment.

A surrogate measure is another appropriate measure for implementing a load allocation and is acceptable for use in a TMDL as defined in 40 CFR 130.2(i) which says "TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure." OAR 340-042-0030(14) defines a surrogate measure as "substitute methods or parameters used in a TMDL to represent pollutants".

The Department may use surrogate measures, in this case flow, to estimate allocations for pollutants addressed in the TMDL, in this case heat. Surrogate measures are closely related to the pollutant, and are typically easier to monitor and track. The heat load allocation for these sources has been set as an excess thermal load equal to zero kilocalories/day when the Lost River exceeds 27.9 degrees Celsius. This means that there can be no warming when temperatures exceed 27.9 degrees Celsius and there must be a 100 percent reduction in the excess loading in order to achieve the cool water species temperature criteria.

DEQ has clarified in the TMDL that the flow targets are but one way the Lost River may come into compliance. DEQ did not intend that the flow targets be the only approach available for DMAs or responsible persons to achieve their allocations. DMAs or responsible persons may also propose alternative management strategies in their implementation plan. If DEQ determines that alternative strategies proposed will also achieve the allocation and temperature water quality criteria those management strategies may be used instead of the flow targets.

OFB#6: Suggested Change ID #186

Description: LAs - object to DEQ creating a new definition of "discrete nonpoint source"

Comment: We also object to DEQ creating a new definition of "discrete nonpoint source." A non-point source is one that results from a diffuse set of influences which are not capable of being controlled at the "end of pipe." This is true for the features that DEQ names "discrete nonpoint sources." While irrigation canals and facilities may be readily identifiable, they are part of an overall agricultural system that all flows to a main waterway. The irrigation ditches and canals should not be treated as their own discrete waterway, but should be considered part of the larger group of nonpoint source influences that can impact a main waterway.

Response: DEQ used the term "discrete nonpoint sources" to refer to the warming in the in the irrigation canals from the management by water management districts and other sources with heat inputs into the canals. To clarify DEQ's intent and to respond to this comment, DEQ has removed references to discrete nonpoint sources from the TMDL and instead revised the text to refer to sources that warm the KSD. DEQ has authority to describe sources or source categories in TMDLs (OAR 340-042-0040(4)(f)) and assign them allocations. Our rationale for identifying irrigation canal systems as sources is documented in the TMDL.

OFB#7: Suggested Change ID #187

Description: Implementation Plan - DEQ Lacks the Authority to Designate "Responsible Parties"

Comment: DEQ Lacks the Authority to Designate "Responsible Parties"

Our organizations are very concerned about the designation of irrigation districts as "Responsible Parties" under the TMDL. As an initial matter, the DEQ does not have statutory authority to designate "responsible parties" nor do they have a definition for such parties in statute or rule. It appears to be designation DEQ created to be something less or different than a "designated management agency." At any rate, DEQ appears to be using this designation in their implementation plan in an attempt to require districts to regulate the activities of their members. Districts lack the legal authority to regulate the land use of their members, nor is that the proper role of an irrigation district. OFB and OWRC are very concerned about the creation of a new, undefined and unauthorized definition through a TMDL in an attempt to allocate direct responsibility for achieving the Klamath TMDL to an entity that is not a proper designated management agency or a point source regulated by DEQ.

Response: The TMDL covers the entities that have authority over sectors and sources that affect water quality in the Upper Klamath and Lost River Subbasins. The Oregon Department of Agriculture (ODA) and the Bureau of Reclamation (BOR) have been named as Designated Management Agencies (DMA's) who are responsible for developing source specific TMDL Implementation Plans. The Water Quality Management Plans facilitated by ODA are written for the individual landowners throughout the watershed and do not cover the Water Management Districts (WMDs). In addition, it is DEQ's understanding that through transferred works all operation and maintenance on the BOR-owned facilities are delegated to the WMDs. For this reason, DEQ has identified all WMD's as responsible persons in the Water Quality Management Plan with the requirement to develop Source Specific TMDL Implementation Plan and associated Best Management Practices (BMP's). In establishing a TMDL, OAR 340-042-0040(4)(l)(G) states that the department will include a WQMP that includes "Identification of persons, including Designated Management Agencies (DMAs), responsible for implementing the management strategies and developing and revising sector-specific or source-specific implementation plans." This rule provides that while a WQMP can designate DMAs it can also identify other persons with a role in implementation. Additionally OAR 340-042-0080(4) states that persons identified in the WQMP must prepare an implementation plan. The Environmental Quality Commission adopted these rules under the authority granted to it to take acts necessary to implement the Federal Clean Water Act under ORS 468B.035. Additionally, ORS 468B.110 grants the EQC or DEQ authority to establish and enforce TMDLs by rule or order. This TMDL was issued by DEQ as an order.

OFB#8: Suggested Change ID #188

Description: General - The Agricultural Sector Cannot Support the Klamath TMDL

Comment: The Agricultural Sector Cannot Support the Klamath TMDL

The agricultural sector has always been proactive about protecting, maintaining and enhancing water quality on agricultural lands, which represents the largest land use in the Klamath Basin. Indeed, our industries were proactive in developing the Agricultural Water Quality Management Program years before most states had thought of developing their nonpoint source programs. Since that time, we have invested millions in studies, on-the-ground work, and compliance with our respective programs, particularly in the Klamath Basin. This work as not always well quantified in terms of environmental outcome, something we believe DEQ must invest in for the future. We will continue to be proactive into the future, as evidenced by the millions invested by each of our sectors each year in proactive water quality improvements.

As it relates to temperature in the Klamath Basin, the agricultural sector has been proactive about partnering on stream restoration projects to address legacy issues and water conservation basin wide. While we do not believe we are the source of temperature exceedances in the Klamath Basin, as it is a naturally warm, stagnant system, we will continue to invest in water quality on our lands and meet our requirements under the Agricultural Water Quality Management Program. However, without addressing the flawed temperature standard, the modelling issues, and data shortcomings, we cannot support the Klamath TMDL as drafted.

Oregon's agricultural sector is doing an exceptional job investing in water quality improvements, studying water quality on our lands, and meeting the requirements of our programs, and we will continue to do so after this TMDL is adopted. That said, we have concerns about the Klamath TMDL which must be addressed prior to adopting the TMDL.

Thank you for the opportunity to comment and please do not hesitate to contact us if you have any concerns.

Response: DEQ understands the sensitivity around water quality and quantity in the Klamath Basin and would encourage the Agriculture Community to continue to collaborate with the various stakeholders on projects and scenarios that would benefit water quality conditions. The temperature TMDL and modeling scenarios are based on sound science and data and DEQ along with the technical team believe the outputs are sound and appropriate for issuance of a legal TMDL that will be important for restoring water quality. However, DEQ welcomes additional data should it be available that could be used as part of the adaptive management process and reasonable assurance. DEQ suggests the Agriculture Community continue to work with ODA through the Water Quality Management Plans to ensure the best possible outcome for the environment and the Agriculture Community.

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12. Comments from: Oregon Stream Protection Coalition

OSPC#1: Suggested Change ID #189

Description: General-Summary from Oregon Stream Protection Coalition

Comment: The Oregon Stream Protection Coalition submits the following brief comments focused on Chapters 5 and 6 of the Klamath/Lost Creek Temperature TMDL with an emphasis on nonpoint source control by the Department of Forestry. We are strongly supportive of active oversight by DEQ in DMA implementation of nonpoint source water quality management plan (WQMP) implementation, and we are heartened by calls for annual monitoring tracking, biennial reporting, 5-year reporting, copious references to the need for timelines, milestones and monitoring and acknowledgement of DEQ's authorities with respect to attainment of TMDL targets.

Response: Thank you for the feedback.

OSPC#2: Suggested Change ID #190

Description: Reasonable Assurance - lack of timelines and milestones for compliance

Comment: Based on the draft document, it appears to us that DEQ does not have an adequate basis for a reasonable assurance finding that the TMDL will be implemented because far too much is left to vague future processes and determinations. For example, specific timelines and dates for target attainment remain unspecified ("ODEQ expects that DMAs will develop benchmarks" p. 235), and there is inadequate detail about what monitoring will actually occur by whom and when ("each DMA . . will monitor and document progress" p. 235). It is critical that quantitative targets and milestones be established by DEQ at the time of TMDL approval and linked directly to monitoring and compliance. Notably, the water quality management plan does not clearly state triggers for EQC action if targets are not met and does not explicitly integrate the information provided by Designated Management Agency mapping into the plan itself or to expectations for sector-specific implementation plans.

It is also unclear whether the "monitoring strategy" is part of the WQMP and how and when the monitoring component of sector-specific implementation plans will be approved by DEQ. Reasonable Assurance and Oregon Department of Forestry Requirements The reasonable assurance and WQMP chapters lack specificity and over-rely on boilerplate recitation of existing legal requirements, the dysfunctional, outdated interagency memorandum of agreement with DEQ (see e.g. 5.2.1.2) and references to the content of several guidance documents about monitoring and implementation plan elements and considerations. For example, at page 222-24 the "elements" of the "reasonable assurance and accountability framework" and of Water Quality Management Plans are listed generically. This is a good start in terms of establishing expectations, but there is inadequate follow-through. Rather, it is simply stated that "DEQ will work with the DMAs and Responsible Persons to develop TMDL implementation plans that contain site specific information, costs, and timelines for the implementation process."

What assurance does the public have this critical piece of work will actually happen and that it will create a clear road map to target attainment? We have seen promises made in TMDL documents before that have not been fulfilled, without consequences for DMAs or accountability by DEQ. At 5.2.2 it is stated that "[i]ndividual TMDL implementation plans developed by the DMAs" will address timelines for

completing measurable milestones and these will be “as specific as possible.” This kind of general statement of intent does not give the public much to go on, though we strongly agree that timelines should include a schedule for BMP implementation, evaluation, monitoring, reporting and progress milestones. But these should be specifically identified in this document. It is simply not enough to state that “DEQ will work with ODF for biennial reporting on timelines and milestones for compliance with FPA regulatory requirements and voluntary measures that are more protective than FPA management practices.” We know the current FPA practices are inadequate and should require timelines and milestones up front at the time of TMDL approval. Nor is it adequate for this document to merely “present” “recommended management strategies” in the Chapter 6 WQMP that may, could, or might possibly be implemented through the authorities of the various programs described. (p. 223).

We are further concerned by the disconnect between the issuance of the “TMDL and WQMP” as an enforceable order (Section 5.2.4) and the utter un-enforceability of the WQMP as it is currently written: how can DEQ enforce the non-development of a plan if there aren’t clear expectations set here and now? While it seems to be expected that DMAs will “submit” implementation plans to DEQ “within 18 months” of receiving a “notification letter” from DEQ, it is not clear what the consequences of non-submittal are, what is expected from the plan and at what scale, or what the approval criteria are. Similarly, the mere submission of a 5-year “evaluation report” is not enough: the public needs milestones and other criteria to know how the determination of sufficient progress on the basis of such reports will actually be made.

Response: DEQ has updated the WQMP to include specific goals, milestones and compliance targets.

OSPC#3: Suggested Change ID #191

Description: Monitoring Strategy - “entirely aspirational”

Comment: Monitoring Strategy: The monitoring strategy provides important and seemingly valid guidance but is also entirely aspirational as far as we can tell. On the one hand it clearly states that DMAs “will submit monitoring data and project tracking summary to DEQ on an annual basis” and that DEQ will use this information - and the 5-year reporting presumably — to determine the adequacy of management actions and request “corrective action” if progress is “insufficient.” Exactly what monitoring DMAs will conduct under “site-specific Quality Assurance Project Plans” is left to the future discretion of DMAs as informed by the strategy’s monitoring design guidance (1.5). It is also unclear to us whether these plans are part of implementation plans.

Response: The monitoring strategy will be required as part of the TMDL Implementation Plans for DMA’s and Responsible Persons. The monitoring portion of the plan will incorporate the strategy as identified and information gathered will be used to identify needs for improvement. All data submitted to DEQ will be uploaded in the state WQ database and available for public access.

OSPC#4: Suggested Change ID #192

Description: Implementation Plan - no specificity around the approval process

Comment: We recognize that most of what we ask for is deemed the stuff of “sector-specific TMDL implementation Plans” which are characterized as the “second tier of planning” by DMAs such as ODF. But the DEQ states that the WQMP itself is supposed to establish timelines for DMA implementation plans (p. 232), which is consistent with rule requirements that the WQMP include a “schedule” for review and approval of sector-specific implementation plans. We do not understand Table 6-3 and the “18

months from receipt" of a notification letter to meet this requirement for ODF - more is needed than a submittal date. Development and submittal appears to be required in 2019, with implementation 2019-2024 but there is no specificity around the approval process itself and it appears that DEQ has essentially already approved the OFPA rules as the implementation plan. 2024 is shaded as a review date, consistent with DEQ's intent to "regularly review" the progress of individual plans at least every five years or "whenever necessary" but again, the exact criteria for sufficiency of plans or progress toward meeting them are unstated.

Response: DEQ has updated the WQMP to include specific goals, milestones and compliance targets.

OSPC#5: Suggested Change ID #193

Description: Implementation Plan - expected form of planning in response to TMDL for ODF is insufficient

Comment: With respect to ODF, we are extremely disappointed that the "expected form of planning in response to TMDL" for ODF is simply "ongoing implementation of the Forest Practices Act." (page 244, 247). Surely in light of DEQ's technical understanding of the inadequacy of current OFPA stream protection rules to prevent stream warming and the limitations of the administrative process to change them this cannot equate to reasonable assurance that the TMDL temperature targets will be met? But the plan states that "the Forest Practice Rules of ODF are already in effect" as though nothing further will be required than the documentation of ongoing activities. (See 6.3.12). In our view, the fact that temperature water quality standards are not being met during the summer in most of the Upper Klamath and Lost Subbasins (p. 236) is cause for grave concern and rapid action to address all sources of steam warming, especially nonpoint sources. Instead, this TMDL appears to set the stage for business as usual on nonfederal forestland streams, an outcome which does not serve the best interests of Oregonians or meet the requirements to state and federal law.

Thank you for your consideration of these comments, Mary Scurlock 503-320-0712

Response: DEQ will continue to work with our partners and various stakeholder groups to better understand the restoration needs throughout the Klamath and Lost Watersheds. Through reporting, monitoring and adaptive management we will identify areas of concern and areas that need improvement through best management practices.

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13. Comments from: PacifiCorp

PC#1: Suggested Change ID #23

Description: FERC relicensing - Edits

Comment: Page 5, 1.1.3 FERC Relicensing

Section 1.1.3 does not present the most current status of the FERC relicensing process. This section needs to be updated.

Section 1.1.3 of the Draft TMDL discusses only the 2010 Klamath Hydroelectric Settlement Agreement (KHSA). This section needs to be updated to reflect material developments with regard to the KHSA since this text was originally drafted. For example, updates need to include the outcome of the Secretarial Determination process, the fate of the Klamath Basin Restoration Agreement in 2015, and the revisions to the KHSA in 2016 that resulted in an Amended KHSA. PacifiCorp is currently implementing the interim measures as required in the Amended KHSA, and dam removal by the Klamath River Renewal Corporation (KRRC), subject to obtaining required approvals from the Federal Energy Regulatory Commission (FERC) and other agencies, is now targeted for 2022, not 2020.

Response: This section (1.1.3) has been updated with new language.

PC#2: Suggested Change ID #139

Description: Editorial - Global Check Use of "Percentile"

Comment: Page 99 Last paragraph and Table 3-9

The 95th percentile would mean 95% of flows from the relevant period of record are lower (only 5% are higher). The 95th percentile is an example of a high flow scenario. Alternatively, at the 95% exceedance flow, 95% of flows in the period of record are higher, which does represent a dry condition. As such, I think there was just a mix up in terminology here and I recommend revising wherever "percentile" is incorrectly used.

Response: The percentiles in Table 3-9 are based on flow duration intervals described in USEPA 2007 (An Approach for Using Load Duration Curves in the Development of TMDLs). A flow duration curve relates flow values to the percent of time those values have been met or exceeded. Section 1c on page 7 of USEPA 2007 identifies the flow zones as percentiles: "This particular approach places the midpoints of the moist, mid-range, and dry zones at the 25th, 50th, and 75th percentiles respectively (i.e., the quartiles). The high zone is centered at the 5th percentile, while the low zone is centered at the 95th percentile" (USEPA 2007). To clarify the meaning of the percentiles, we have edited the document narrative to use the term "flow duration percentile" instead of "flow percentile". In Table 2-8, Table 3-9, and Table 4-11 we have renamed the column that said "Applicable Flow Range" to "Applicable Flow Duration Range".

PC#3: Suggested Change ID #230

Description: Editorial - map update Figure A-4

Comment: A.4 Model Setup, Calibration and Scenarios (Page A-17): o Figure A-4, add Lost River to this map

Response: The Lost River was added.

PC#4: Suggested Change ID #243

Description: Editorial - Text revision suggested for Miller Creek Shade deficit description and restoration priorities - Page A-66

Comment: Page A-66, "The Miller Creek model does not predict much influence of restoring riparian vegetation on stream temperatures (at current flow rates)." - see previous comments on Miller Creek on page 3-4 of this document (These have been coded in under the Suggested change name "Editorial - Text revision suggested for Miller Creek Shade deficit description and restoration priorities" - the same are also shown in the associated comments.

Response: Noted.

PC#5: Suggested Change ID #245

Description: Editorial - Clarification requested on vegetation characterization for Lost River-Page A-79

Comment: Page A-79, "The restored vegetation model scenario incorporates these vegetation types as a single composite mix broken down into two zones: 0-10 meters from the stream bank, and > 10 meters from the stream bank." - previous section said shade was modeled out to 40 m, therefore clarify that the two zones are 0-10 meters and 10-40 meters

Response: The inner zone is 0-10 meters from the channel. The outer zone that was modeled was 10-40 meters.

PC#6: Suggested Change ID #252

Description: Editorial - Figure 1-2 add units

Comment: Figure 1-2 What are the units of heat load? Figure 1-2 indicates a linear relationship – as flow increases, heat load (not necessarily water temperature) increases.

Response: Figure 1-2 is a conceptual diagram so the heat loading units were not specified. In this TMDL we are using kilocalories per day for heat loading.

PC#7: Suggested Change ID #253

Description: Allocations - how can reductions be assigned to unknown sources

Comment: Section 1.1 Page 3

How can a heat load reduction be assigned to background and unknown/unidentified sources?

Response: The Clean Water Act and Oregon's administrative rules allow DEQ to assign nonpoint sources, including background sources, a portion of the loading capacity in the form of a load allocation.

A load allocation is defined in OAR 340-042-0040(4)(h) and 40 CFR 130.2(g)) as the portion of the receiving water's loading capacity that are allocated to nonpoint sources or background sources.

Unquantified anthropogenic sources as described in Section 2.3.2.4 are examples of anthropogenic nonpoint sources that have a potential to contribute heat and cause warming. We are calling them "unquantified" because we lack sufficient data to explicitly quantify their current loading using the TMDL model. It is common in TMDLs to identify potential sources and assign them a load allocation. The portion of loading from that exceeds the allocation must be reduced, hence a heat load reduction.

PC#8: Suggested Change ID #254

Description: Allocations - reductions too conservative

Comment: p.4 In the section titled Critical Conditions, the Draft TMDL states that loading capacities and heat load reductions are set conservatively in the TMDL to specifically address critical conditions, which the Draft TMDL acknowledges occur only on rare occasions. PacifiCorp questions the appropriateness of setting TMDL loading capacities and heat load reductions so conservatively, especially given that daily maximum water temperature changes from PacifiCorp's Project facilities and operations during summer are commonly appreciably less than would otherwise occur in the absence of the Project.

Response: TMDLs are based on the critical conditions that must be met to determine attainment of water quality standards (USEPA 1991 - Guidance for Water Quality-based Decisions: The TMDL Process). TMDLs are based on a reasonable worst case scenario. The Upper Klamath and Lost subbasins TMDLs use the maximum exceedance of the applicable criteria as the critical condition because it aligns with the existing requirements of the water quality standards. The applicable water quality standards state that temperature "may not exceed 20 degrees Celsius" for cold water species and "no increase in temperature allowed that would reasonably be expected to impair cool water species". Using the maximum exceedance as the critical condition ensures that the water quality criteria will be met at all times.

PC#9: Suggested Change ID #255

Description: Figure 1-3 - conceptually incorrect bc temperature is nonconservative

Comment: Draft TMDL Figure 1-3 is supposed to illustrate how attainment of the water temperature standard is addressed. While we recognize that this figure is hypothetical for purposes of providing context, we question whether the relationships shown on the figure are even conceptually correct for the Klamath River. For example, the purple line in Figure 1-3 shows a gradually rising linear relationship between Heat Load and Flow for purposes of quantifying Loading Capacity. This linear relationship implies that Heat Load is a conservative pollutant; that is, that Heat Load increases in direct proportion to

the increase in Flow. However, we know that water temperature is nonconservative and, therefore, heat is a nonconservative pollutant. Nonconservative pollutants (such as heat) decay or are otherwise removed over time, from changes in any number of factors such as solar radiation and meteorological changes. This distinction is important because the methodology to calculate TMDLs varies with the type of pollutant, with one method of calculation for pollutants which are generally classified as conservative and another method for pollutants generally classified as nonconservative (Federal Register, Vol. 43, No. 250). Because nonconservative pollutants vary dynamically with a number of factors and processes in the aquatic environment, nonconservative pollutant TMDLs can only be calculated with fairly sophisticated techniques (such as dynamic modeling), which takes these factors into account. Figure 1-3 should be revised to reflect the nonconservative nature of water temperature and the Draft TMDL should be clarified regarding how the TMDL assessment specifically deals with the nonconservative nature of water temperature and heat loading.

Response: The conceptual diagram is applicable to the Klamath River. The instream heat load is an extensive quantity equal to the product of flow, temperature, and a conversation factor. An extensive quantity is one that is additive. Flux is a term used to identify the rate of movement of an extensive quantity like heat. Temperature on the other hand is an intensive property (size-independent) much like concentration. It measures the "strength" rather than "quantity" of pollution (Chapra 1997). Oregon's temperature criteria is based on minimizing temperature change (and intensive quantity) and can be easily converted to an extensive quantity (heat load) for use as TMDL allocations.

DEQ used the Klamath River model to evaluate temperature changes in response to specific allocation scenarios. The model tracks heat fluxes and input loads affecting the Klamath River and calculates the temperature response. The models support establishment and evaluation of allocations of both temperature change and heat load.

We have added a new section into Chapter 2 (Section 2.3 - Water Quality Modeling Overview) which provides an overview of the modeling on the Klamath River. This section of the TMDL provides a summary of the calibration and validation of the models and summarized the assumptions and limitations of the models. Appendices B and F have also been added to the TMDL report. Appendices B and F provide more details on the setup of the Klamath River and Lost River models, respectively.

Citations: Chapra, S.C. 1997. Surface Water Quality Modeling. Waveland Press., Reissued 2008. Long Grove, IL. p. 844.

PC#10: Suggested Change ID #256

Description: General - TMDL assigns reductions to unidentified sources to achieve 20 deg C criteria

Comment: Despite DEQ's use of sophisticated water quality models to attempt to develop a realistic representation of basin water quality conditions, the fundamental flaw in the Draft TMDL is that it relies on thermal load allocations that cannot possibly be achieved to meet water quality standards. As the Draft TMDL acknowledges, thermal loads from natural and unidentified anthropogenic sources by themselves result in stream temperatures that far exceed the 20.0 degrees Celsius (°C) cold-water criterion in many waterbodies, including the Klamath River downstream of Keno Dam. Assuming, contrary to all available evidence, that the criterion will be achieved by reducing thermal loads from natural or anthropogenic sources that are not even identified serves no environmental or legal purpose.

There are only two potential solutions to the problem presented by the unachievable 20.0°C criterion. First, because the Clean Water Act (CWA) requires temperature TMDLs to be based on the stream temperature that will "…assure protection and propagation of a balanced indigenous population of

shellfish, fish, and wildlife," (33 U.S.C. § 1313(d)(1)(D)) rather than numeric temperature criteria, the TMDL need not and should not be based on the 20.0°C criterion. A TMDL properly based on assuring "…protection and propagation of a balanced indigenous population of shellfish, fish, and wildlife" (Ibid) would allow DEQ to fully accommodate natural thermal loads and de minimis heat loads from identified anthropogenic sources without having to achieve an unachievable numeric criterion. If, however, DEQ continues to base the TMDL on a numeric temperature criterion, the second and only remaining alternative under the CWA and the Environmental Protection Agency's (EPA) regulations is to revise the unachievable 20.0°C criterion—either before or in conjunction with establishing the TMDL—to one that is achievable.

Response: DEQ must develop the Upper Klamath and Lost Subbasin temperature TMDL based on the current water quality standards and set allocations such that they add up to the Loading Capacity defined in OAR 340-042-0040(4)(d) and 40 CFR 130.2(f) as the amount of a pollutant or pollutants that a waterbody can receive and still meet water quality standards. We have provided allocations that add up to the Loading Capacity and will meet the current water quality standards.

Section 1.3 of the Monitoring Strategy to Support Implementation of the Upper Klamath and Lost River Subbasins Temperature Total Maximum Daily Load states that "in some cases, modeling indicates that even with the removal of known, quantifiable sources, the water quality criteria will not be attained. In these cases, DEQ assigns a heat load reduction to background and unidentified anthropogenic sources in order to meet the criteria". We have clarified in the TMDL that DEQ will prioritize reductions from known sources first. In the case that the removal of known quantifiable sources still does not result in meeting the applicable water quality criteria, system response studies will be initiated by DEQ for segments that do not meet water temperature criteria within 10 years of EPA's approval of the Upper Klamath and Lost subbains TMDLs. Additional heat budget and system response information will be collected to identify remaining anthropogenic sources of heat. If DEQ determines all anthropogenic sources of warming have been addressed, DEQ may consider a change in standards (inducing site specific criteria) or UAA.

PC#11: Suggested Change ID #257

Description: Model Period - Need to address interannual variability and the limitation of using a single year for an analysis.

Comment: p. 4 The Draft TMDL section titled Natural Variability in Temperature states: "Temperatures in streams naturally fluctuate over the day and year in response to changes in solar energy, air temperature, wind, river flows, groundwater flows and other factors. This natural variability in river temperatures is always an important factor in the water quality status of the waterbody." The Draft TMDL does not address interannual variability and the limitation of using a single year for an analysis. (See also Margin of Safety discussion below.)

Response: DEQ understands the temperature conditions in the Klamath River will vary from year to year. We do not agree that quantifying temperature variability over multiple years is a necessary precondition to establishing the TMDL allocations. The TMDL allocations are set at a level necessary to achieve the temperature criteria. The temperatures that attain the criteria (e.g. 20 degrees Celsius plus 0.3 degrees for human sources) does not change from year to year. In turn the establishment of the allocation to attain the criteria is less reliant on the year to year variability.

PC#12: Suggested Change ID #258

Description: General - Draft TMDL inconsistent with CWA and EPA regulations

Comment: The Draft TMDL is inconsistent with the CWA and EPA's regulations because it does not determine the total maximum daily thermal load required to assure protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife.

Response: The CWA and EPA's implementing regulations have specific provisions for TMDLs for waters impaired by thermal discharges. 33 U.S.C. § 1313(d)(1)(B), 40 C.F.R. § 130.7(b)(2). These provisions allow that temperature TMDLs can be written to assure the "protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife," rather than a numeric temperature criterion. However, this provision does not mean that TMDLs for temperature cannot also be written to the existing numeric criteria, given that the criteria protects beneficial uses. Oregon's water quality standards for temperature are consistent with 40 C.F.R. § 130.7(c)(1) because they were developed and approved by EPA to "assure protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife." As described in the TMDL achieving the temperature standards will assure propagation of indigenous Redband Trout, Lost River Sucker, Shortnose Sucker, and other aquatic life.

PC#13: Suggested Change ID #259

Description: Editorial - define who is the DRE

Comment: p. 6 Section 1.1.4 of the Draft TMDL makes the first mention in the TMDL document of the Dam Removal Entity (DRE). The DRE should be defined for the reader here as the Klamath River Renewal Corporation (KRRC).

Response: Section has been updated.

PC#14: Suggested Change ID #260

Description: Reasonable Assurance - identify specific mechanisms for reducing heat loads including from natural and unknown sources

Comment: p. 7 Section 1.1.5 of the Draft TMDL states: "The implementation of TMDLs and the associated TMDL Implementation Plans are generally enforceable by DEQ, other state agencies, and local government." This broad statement is not accurate in the context of this TMDL, which relies on temperature reductions from natural and other sources that are entirely or largely outside the control of DEQ and other state and local agencies. To the extent that TMDL load allocations to natural and nonpoint sources are less than their current thermal loads, the TMDL should identify a specific enforcement mechanism or other reasonable assurance that the load allocations are feasible and will be achieved.

Response: Section 6.3.3 of the Water Quality Management Plan (Section 6 of the TMDL) provides examples of management strategies for various heat sources. Table 6-2 has been updated to include additional implementation options including management strategies for dams and reservoirs.

PC#15: Suggested Change ID #261

Description: Allocations - not achievable in stream sections relying heavily on natural/unknown source reductions

Comment: Section 1.1.5 of the Draft TMDL states: "DEQ recognizes a time period from several years to several decades will be necessary after full implementation before management practices identified in a TMDL implementation plan become fully effective in reducing and controlling certain forms of pollution, especially heat loads from lack of riparian vegetation." PacifiCorp agrees that it likely will take several decades for riparian vegetation measures to become fully effective. But given the substantial reductions in thermal loads that the Draft TMDL would require from natural sources, unidentified anthropogenic sources, and other sources outside Oregon's control, the Draft TMDL is not achievable at all in the Klamath River downstream of Keno Dam and in other waterbodies for which reductions from such sources are required.

Response: Comment noted.

PC#16: Suggested Change ID #262

Description: Implementation - cannot assume shade implemented upstream of UKL will transfer to sections downstream

Comment: Section 1.1.5 of the Draft TMDL additionally states: "DEQ recognizes a time period from several years to several decades will be necessary after full implementation … especially heat loads from lack of riparian vegetation. Much of this is due to the lag between planting vegetation and growth for providing shade." (emphasis added) Shade assessment was not completed in the Klamath River TMDL analysis and this statement is therefore not applicable. Any reductions in temperature through shade prescriptions in reaches upstream of Upper Klamath Lake would not be transferred through the lake and thus cannot be applied to the Klamath River downstream of the lake. Additionally, the long, wide, and shallow layout of Keno Reservoir would limit the benefit of shading, if such plantings were even possible.

Response: This statement is primarily in reference to tributaries of the Klamath River and in the Lost Subbasin. We agree that loss of streamiside vegetation along the Klamath River is not a major source or warming but the loss does have some warming effect on the Klamath River. We revised the discussion of vegetation on the Klamath River to further explain our thinking and findings on vegetation, and incorporate results of shade modeling conducted by Sullivan et al 2013.

Section 2.4.2.2 was revised to say:

"Vegetation removal on the Klamath River does result in some warming in the Klamath River but based on DEQ's review of available data and information does not appear to be a major source of stream warming for the following reasons: (1) Following DEQ's review of aerial imagery and LiDAR upstream of Keno Dam we conclude there appear to be areas with opportunity for vegetation restoration but the effectiveness of riparian shading on maintaining cooler stream temperatures is decreased because of the width and volume of the river. Sullivan et al 2013 conducted shading scenarios on the reaches upstream of Keno Dam and found that the daily average decrease in temperature from the current condition baseline was nearly zero near the Link River to 0.6 degrees Celsius at Keno Dam. The shading scenario assumed a continuous block of 20 meter (65.6 ft) tree heights on both banks with transmission of solar radiation through the canopy assumed to be zero (100 percent solar blockage). DEQ does not consider these assumptions to be realistic estimates of restored vegetation and it's extent upstream of Keno so the true reduction in temperature will likely be smaller; (2) the riverine portions from Keno Dam to the state line does not appear to be significantly degraded by human activity based on our review of aerial imagery and LiDAR data, and (3) since the river is constrained by steep canyon walls downstream of Keno Dam, the potential for restoring extensive riparian vegetation is limited.

Because warming from vegetation removal is not a significant source, DEQ has provided a human use allowance to land management DMAs of zero (Table 2-15). This means there can be no excess loading from land management activities such as vegetation removal."

Citation:

Sullivan, A.B., Sogutlugil, I.E., Rounds, S.A., and Deas, M.L., 2013, Modeling the water-quality effects of changes to the Klamath River upstream of Keno Dam, Oregon: U.S. Geological Survey Scientific Investigations Report 2013–5135, 60 p., http://pubs.usgs.gov/sir/2013/5135.

PC#17: Suggested Change ID #263

Description: Model Analysis - TMDL fails to account for updated models, discuss equilibrium temperatures or dissipation of anthropogenic sources of heat

Comment: There is no discussion of equilibrium temperature in the pollutant identification section. Waters in Upper Klamath Lake, Keno Reservoir, the Klamath River downstream of Keno Reservoir, and J.C. Boyle Reservoir are in approximate equilibrium with meteorological conditions. Dissipation of anthropogenic sources of heat energy are not discussed in the TMDL. As mentioned previously, heat energy is not a conservative constituent in a water body, and for streams near equilibrium, additions or subtractions of heat should explicitly include the challenge of managing temperatures under such circumstances. For example, even with conservative assumptions, there is likely a combination of hydrology and meteorology that will cause an exceedance of identified temperature thresholds and targets in the 2001-2018 period (particularly because the TMDL is based on a single year [2000]).

Response: The purpose of the pollutant identification section is to identify the pollutant addressed in the TMDL. The TMDL identifies that the pollutant in this TMDL is heat.

PC#18: Suggested Change ID #264

Description: Allocations - no legal or factual basis for the load allocations to natural and unidentified anthropogenic nonpoint sources

Comment: The Draft TMDL’s load allocations for natural and nonpoint sources are inconsistent with EPA’s regulations because they are not based on the thermal loads reasonably attributable to those sources, now or in the foreseeable future. In particular, there is no legal or factual basis for the load allocations to PacifiCorp’s facilities and to natural and unidentified anthropogenic nonpoint sources.

There is no legal or factual basis for the Draft TMDL’s load allocations to natural and unidentified anthropogenic nonpoint sources. For many waterbodies, including the Klamath River downstream of Keno Dam and streams within the Jenny Creek Watershed, the Draft TMDL includes load allocations for natural background and unidentified sources that equal the loading associated with achieving the 20.0°C criterion. Draft TMDL at 2-4, 28-30, 44-45, 96-98, 113. As the Draft TMDL acknowledges, these load allocations are less than, and, in the case of the Klamath River, much less than, the heat loads actually attributable to these sources. For example, the Draft TMDL attributes to background sources temperatures of 25.2°C at the Keno Dam outlet and 20.7°C in Jenny Creek. Id. at 28, 97. These sources are “targeted for reduction” by the Draft TMDL, id. at 28, but the Draft TMDL does not identify any mechanism for achieving any such reduction, nor could it, given that the sources are natural or unknown human sources. Nature is not a designated management agency.

The TMDL must include load allocations to natural and unidentified anthropogenic sources that reflect the actual thermal loads expected from these sources. Of course, if the thermal loads from these sources exceed the thermal loading capacity of the waterbody, the TMDL, which is the sum of the WLAs and LAs, cannot be established at a level "necessary to implement the applicable water quality standards," as required by CWA subparagraph 303(d)(1)(C), 33 U.S.C. § 1313(d)(1)(C). But the solution to this conundrum is not to assign these sources unrealistically low load allocations that are inconsistent with EPA's TMDL regulations. The solution is to evaluate the attainability of the temperature criterion and to revise it, as appropriate, in accordance with the CWA and EPA's regulations. See 33 U.S.C. § 1313(c); 40 C.F.R. §§ 131.10-.11, 131.20-.21.

Response: Your claim that the "allocations have no legal or factual basis" and that the "TMDL must include load allocations to natural and unidentified anthropogenic sources that reflect the actual thermal loads expected from these sources". These statements are not correct. Load allocation do not have to reflect the actual thermal loads expected from these sources. Allocations must be set such that they add up to the Loading Capacity defined in OAR 340-042-0040(4)(d) and 40 CFR 130.2(f) as the amount of a pollutant or pollutants that a waterbody can receive and still meet water quality standards. We have provided allocations that add up to the Loading Capacity and will meet the current water quality standards.

TMDLs are not the appropriate regulatory vehicle through which water quality standards may be changed. TMDLs are used to determine appropriate pollutant load allocations for point and nonpoint sources, including natural sources, to meet existing water quality standards. Note that for the Upper Klamath subbasin, waterbodies that flow directly and indirectly to California are also subject to California's downstream water quality standards as it is the policy of Oregon DEQ to achieve water quality standards established by neighboring states in interstate waters.

The Water Quality Management Plan (Section 6) and the Monitoring Strategy to Support Implementation of Water Temperature Total Maximum Daily Loads for the Upper Klamath and Lost subbasins (EPA & DEQ 2019) will be used to evaluate progress toward meeting the TMDL targets. Future monitoring will be used to assess the effectiveness of BMPs and to better understand sources of thermal loads to the impaired segments, including currently unidentified anthropogenic sources. This information will be used to evaluate progress toward meeting the TMDL allocations and make adjustments as necessary.

PC#19: Suggested Change ID #265

Description: Allocations - exceeds the scope of DEQ's TMDL authority to the extent that it requires temperature reductions that are not associated with thermal loading.

Comment: The Draft TMDL exceeds the scope of DEQ's TMDL authority to the extent that it would require temperature reductions from activities that are not associated with thermal loading, including PacifiCorp's diversion of water from Spring Creek and hydraulic changes in the Klamath River caused by the existence and operation of the J.C. Boyle and Keno developments.

A TMDL is a determination of the total maximum daily pollutant "load." See 33 U.S.C. § 1313(d)(1)(C)-(D). EPA's regulations define "load" or "loading" as: "An amount of matter or thermal energy that is introduced into a receiving water; to introduce matter or thermal energy into a receiving water. Loading may be either man-caused (pollutant loading) or natural (natural background loading)." 40 C.F.R. § 130.2(e) (emphasis added). Similarly, EPA defines "loading capacity" as "[t]he greatest amount of loading that a water can receive without violating water quality standards," id., § 130.2(f), and "load allocation" as "[t]he portion of a receiving water's loading capacity" that is attributed to nonpoint and background sources, id., § 130.2(g).10A TMDL, then, addresses only the addition of pollutants, including heat, to a waterbody; it does not address other actions or circumstances that may affect water quality.

1. PacifiCorp's diversion of water from Spring Creek is not subject to the TMDL because it does not add any thermal load to the creek. PacifiCorp's Fall Creek Development diverts water from Spring Creek to Fall Creek. Although the diversion may affect the temperature of Spring Creek downstream of the diversion by reducing the flow in Spring Creek, the diversion does not add any thermal load to the creek. Indeed, it removes thermal energy from the creek by diverting water and the heat load carried by that water out of the creek. Because the diversion adds no thermal load to the creek, it is not subject to the TMDL.

2. Hydraulic changes in the Klamath River attributable to the existence and operation of the J.C. Boyle and Keno developments may be addressed in the TMDL only to the extent that they add a thermal load to the river. The Draft TMDL uses temperature models to assess the effects that the J.C. Boyle and Keno developments have on the temperature of the Klamath River. Not all of these effects, however, are caused by thermal energy being added to the river. For example, the projects' reservoirs store thermal energy already present in the river and release it downstream later. This may affect the timing of downstream river temperatures, but it does not add any thermal load to the river. On the other hand, reservoirs may, at least indirectly, increase thermal loading to the river by increasing the surface area exposed to solar warming. Again, because the TMDL may address only thermal loading added to the river, project changes in river temperatures that are not associated with adding thermal energy to the river are not subject to the TMDL.

footnote 10: Oregon's TMDL regulations similarly define "loading capacity" as "the amount of a pollutant or pollutants that a waterbody can receive and still meet water quality standards" and "load allocations" as "portions of the receiving water's loading capacity." OAR 340-042-0040(4)(d), (h).

Response: DEQ views the temperature increases in Spring Creek and Jenny Creek to be from heat pollution as a direct result from the practice of flow diversion in Spring Creek. The source of warming and heat input is from the practice of diverting water out of the Spring Creek which facilitates rapid temperature warming because of the loss in loading capacity due directly to the practice of said diversions. OAR 340-042-0030(12) defines a pollutant "Source" to mean "any process, practice, activity or resulting condition that causes or may cause pollution or the introduction of pollutants to a waterbody". The diversion of water is a practice that causes the existing heat loading to be heat pollution. The heat pollution results in a condition that contributes to the exceedance of the temperature criteria. We have identified the Spring Creek diversion as a source of warming and provided allocations accordingly.

It is PacfiCorp's responsibility to evaluate their operations in Spring Creek and propose management strategies in their TMDL implementation plan that will show achievement of allocations and temperature criteria.

PC#20: Suggested Change ID #266

Description: Water Quality Standards - improperly applied for Klamath and Jenny Creek Watershed in OR

Comment: The TMDLs for the Klamath River and Jenny Creek Watershed in Oregon are improperly based on water quality standards applicable to the river and watershed in California.

The Draft TMDL is for waterbodies within the Upper Klamath River and Lost River Subbasins in Oregon. Yet it also includes wasteload and load allocations intended to implement water quality standards for waterbodies in California. Draft TMDL at 18, 20, 45. For example, entirely on the basis of the temperature standard applicable to the Klamath River in California, the Draft TMDL includes year-round thermal load allocations of zero for PacifiCorp's Keno and J.C. Boyle developments, expressed as their monthly average temperature effect on the river at the California border. Id. Table 2-20 at 49. To the

extent that wasteload and load allocations, including those for PacifiCorp's facilities, are based on water quality standards applicable to waterbodies in California, the Draft TMDL exceeds Oregon's authority.

The CWA's TMDL requirement applies only to waterbodies within each State's jurisdiction and the water quality standards applicable to those waters. CWA subparagraph (1)(A) provides: "Each State shall identify those waters within its boundaries for which the effluent limitations required by [CWA section 301] . . . are not stringent enough to implement any water quality standard applicable to such waters." Id., § 1313(d)(1)(A) (emphasis added). Subparagraph 303(d)(1)(C) provides: "Each State shall establish for the waters identified in [sub]paragraph (1)(A) of this subsection . . . the total maximum daily load . . . . Such load shall be established at a level necessary to implement the applicable water quality standards." 33 U.S.C. § 1313(d)(1)(C) (emphasis added). A TMDL, then, must be for waterbodies within the State's boundaries and must be based on the water quality standards applicable to those waterbodies. California's water quality standards do not apply to the Klamath River and other waterbodies within Oregon. Accordingly, to the extent that the Draft TMDL and its wasteload and load allocations are based on California's water quality standards, they must be revised to reflect allocations based solely on the applicable Oregon water quality standards [footnote 11]

footnote 11: Similarly, the CWA requires that thermal TMDLs be based on the estimated total maximum daily thermal load required to assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in waters within the state's boundaries. CWA subparagraph 303(d)(1)(B) provides: "Each State shall identify those waters or parts thereof within its boundaries for which controls on thermal discharges . . . are not stringent enough to assure protection and propagation of a balanced indigenous population of shellfish, fish, and wildlife." 33 U.S.C. § 1313(d)(1)(B) (emphasis added). And subparagraph 303(d)(1)(D) provides: "Each State shall estimate for the waters identified in [sub]paragraph (1)(B) of this subsection the total maximum daily thermal load required to assure protection and propagation of a balanced indigenous population of shellfish, fish, and wildlife." Id., § 1313(d)(1)(D) (emphasis added).

Response: It is the policy of Oregon DEQ to achieve water quality standards established by neighboring states in interstate waters. We agree that a change in temperature of 0.04 degrees Celsius is not measurable with standard temperature monitoring equipment.

The CWA and EPA's implementing regulations have specific provisions for TMDLs for waters impaired by thermal discharges. 33 U.S.C. § 1313(d)(1)(B), 40 C.F.R. § 130.7(b)(2). These provisions allow that temperature TMDLs can be written to assure the "protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife," rather than a numeric temperature criterion. However, this provision does not mean that TMDLs for temperature cannot also be written to the existing numeric criteria, given that the criteria protects beneficial uses. Oregon's water quality standards for temperature are consistent with 40 C.F.R. § 130.7(c)(1) because they were developed and approved by EPA to "assure protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife." As described in the TMDL achieving the temperature standards will assure propagation of indigenous Redband Trout, Lost River Sucker, Shortnose Sucker, and other aquatic life.

PC#21: Suggested Change ID #267

Description: Modeling Analysis - Errors in temperature model-arbitrary 20 percent reduction in solar radiation in river reaches

Comment: Temperature modeling errors have caused the Draft TMDL to overstate the temperature effects of the Keno and J.C. Boyle developments on the Klamath River between Keno Dam and the California border. PacifiCorp identified these errors in its comments on the previous Klamath River temperature TMDL issued in 2010 [footnote 12] but they have not been corrected or justified. Although

the Draft TMDL states that, "[a]fter DEQ review and acceptance, a different temperature model using different assumptions may be used to calculate the required reductions for implementation," Draft TMDL at 48, these errors should be corrected so that the Draft TMDL accurately reflects the temperature effects of J.C. Boyle and Keno developments before the final TMDL is issued. PacifiCorp is concerned that the required temperature reductions stated in the Draft TMDL, if not corrected, may become presumptive reductions that would shift the burden to PacifiCorp and other sources to disprove.

1. The model arbitrarily reduces solar radiation by 20 percent in river reaches, which results in overstating the temperature effects of project reservoirs. The Draft TMDL relies on a comprehensive water quality model of the Klamath River that was originally developed by PacifiCorp's consultant, Watercourse Engineering, Inc. At the request of EPA, PacifiCorp provided the model to an EPA contractor who was preparing a river model for DEQ and California to use in developing their TMDLs for the river. The model uses a linked set of modeled river and reservoir reaches to predict water quality parameters, including temperature. For the river reaches, the model is based on the RMA11 (RMA) model; for the reservoir reaches, the model is based on the CE-QUAL-W2 (W2) model. Although the original, peer-reviewed model was calibrated for the Klamath River to accurately predict water temperatures, EPA's contractor made several adjustments to the model before DEQ used it to develop the Draft TMDL. PacifiCorp submitted detailed comments on this very topic in response to the 2010 Draft TMDL. The following is a summary of the issue; please refer to Appendix B in PacifiCorp's 2010 [footnote 13] comment letter for details.

A particularly significant model adjustment is a 20 percent reduction in solar radiation in RMA-modeled river reaches. No such adjustment, however, is made in the W2-modeled reservoir reaches. Two reasons have been given for this adjustment. First, RMA calculates solar radiation for use in the model, whereas W2 relies on measured solar radiation. If the solar radiation calculated by RMA is reduced by 20 percent, it more closely approximates the measured solar radiation values used by W2. Second, for the model year 2000, the original model without the solar radiation adjustment predicts temperatures that are warmer than those measured at one river site near the California border. Reducing solar radiation values in the RMA-modeled river reaches purportedly better predicts the measured temperatures at this site. Upon examination, however, the model adjustment is not warranted by either of these reasons, and it creates a substantial bias in the model's predictions that exaggerates the temperature effects of reservoirs.

The original model was calibrated to account for the higher-than-measured solar radiation values calculated by the RMA model. Reducing the RMA solar radiation values by 20 percent in a model that is already calibrated for the higher solar radiation values requires that the model be recalibrated. The model, however, was not recalibrated after the solar radiation adjustment, and its predictive ability for temperature is inferior to that of the original model. More importantly, the reduction in solar radiation in the RMA model introduces a systematic bias that causes it to predict temperatures that are lower than the measured temperatures in river reaches. This bias, in turn, exaggerates the temperature effects of the reservoirs when they are compared to a hypothetical river without reservoirs.

With respect to the monitoring site near the California border, the original model does not predict temperatures that are significantly higher than measured temperatures during the TMDL model year of 2000, and it does not consistently predict temperatures that are higher than measured temperatures if years other than the TMDL model year are considered. Indeed, even considering only the model year 2000, the original model predicts temperatures at this site that are higher than the measured temperatures by about the same amount that the TMDL model predicts temperatures that are lower than the measured temperatures. Furthermore, as was noted in the peer review comments on the original model, the temperature measurements at this site were likely influenced by a local source of colder water, resulting in measured temperatures that are not representative of the warmer temperatures at other locations in this reach of the river. The differences between predicted and measured temperatures at the site, then, do not warrant applying a 20 percent solar radiation reduction at the site, much less to the entire river.

footnote 12:See Appendix A in Hemstreet, T. 2010. Letter to Steve Kirk, DEQ, Regarding Transmittal of PacifiCorp's Comments on the draft TMDL. Dated May 26, 2010. 68 pp.. footnote 13: Hemstreet, T. 2010. Letter to Steve Kirk, DEQ, Regarding Transmittal of PacifiCorp's Comments on the draft TMDL. Dated May 26, 2010. 68 pp.

Response: This assertion has been shown to be incorrect and there is no bias (response to comments during 2010 (DEQ, 2010)). The Draft TMDL relies on a comprehensive water quality model of the Klamath River that was originally developed by PacifiCorp's consultant, Watercourse Engineering, Inc. Upon running the model and evaluating the results it was found that PacifiCorp's model over predicted temperatures in the reach between JC Boyle Dam and Copco reservoir. Tetra Tech investigated and found that the PacifiCorp model was using unadjusted RMA-11 predicted solar radiation which was approximately 20% higher than the solar radiation data for a site nearby. To maintain consistent solar radiation inputs between models and to correct for RMA-11's over prediction of solar radiation, Tetra Tech adjusted the RMA-11 solar radiation downward by 20%.

Contrary to your suppositions, the solar radiation DEQ used in the different scenarios is in much closer agreement than the scenario you proposed (i.e. using 100% of the RMA predicted solar radiation) (See figure contained in DEQ's response PacifiCorp 63 from DEQ, 2010). Additionally, DEQ's solar radiation inputs are in closer agreement with predictions from Heat Source at the mouth of Spencer Creek . Given the history of using CE-QUAL-W2 and Heat Source for temperature TMDLs in Oregon, DEQ has more confidence in their solar radiation predictions than RMA without adjustments. The comparison of measured temperatures to model results shows the model is appropriately calibrated and can be used to derive allocations (see Appendix B of the TMDL).

Oregon Department of Environmental Quality (DEQ). 2010. Response to Comments - Upper Klamath and Lost River Subbasins - TMDL & WQMP. December 2010

PC#22: Suggested Change ID #268

Description: Allocations - little to none of the available HUA available for PacifiCorp

Comment: PacifiCorp should receive the full 0.3°C human use allowance (HUA) at Stateline and downstream of Keno Dam. Allocating little to none of the available HUA to PacifiCorp's Keno (only 0.12°C allocated at the outlet to Keno Dam) and J.C. Boyle (no allocation) developments when the remaining HUA is unallocated or unneeded by other sources is unjustified.

2. Keno Development The point and nonpoint sources that enter Keno Reservoir likely do not contribute to thermal loading at the Keno Dam outlet. Given the small amount of inflow from these sources, with normal flow rates and mixing in Keno Reservoir, the thermal load added to Keno Reservoir by these sources should not be apparent at Keno Dam. In 2011 PacifiCorp used the DEQ's TMDL model to conduct a specific analysis of the effects of these sources on temperatures at Keno Dam that demonstrated that, collectively, these sources do not contribute to warming at Keno Dam outlet [footnote 17]. Because these sources do not contribute to the thermal loading at Keno Dam outlet, PacifiCorp should be allocated the entire 0.3°C HUA at this location.

footnote 17: Input of thermal load from Klamath Falls and South Suburban Waste Water Treatment plants and Collins Forest Products were individually tracked through the 2010 DEQ TMDL model and only showed a maximum increase in the 7-DMAX of 0.01°C at Keno Dam Outlet. In the model year 2000, thermal load input from Klamath Straits Drain actually cooled the river by up to 0.11°C at Keno Dam Outlet. When all of these sources of thermal loading were modeled together, the cooling input from Klamath Straits Drain resulted in net reduction in thermal loading at the Keno Dam Outlet. For a detailed discussion of this see Limanto, E. and M. Deas. 2011. Technical Memorandum: Analysis of River

Temperature Contributions of Sources that Discharge to Lake Ewauna/Keno Reservoir. Dated July 15, 2011. 6 pp.

Response: DEQ has reviewed the analysis summarized in the July 15, 2011 memo from Limanto and Deas. As far as we can tell their analysis utilized the TOD2RN scenario where each source was added and removed so their their warming could be assessed individually. TOD2RN is a scenario that has the dams removed so this analysis does not explicitly evaluate warming through Lake Ewanua and Keno dam as it exists today with the dam included. That fact aside and/or if our understating is not correct, the analysis of the below dam warming was computed by taking the monthly mean 7DADM river temperature change. Oregon's temperature criteria downstream of Keno is not based on a monthly mean. It is based on having all 7DADM river temperature changes from human sources not exceed 0.3 deg-C when the 7DADM river temperatures exceed 20.0 deg-C. When using this metric the allocations provided to sources upstream of Keno Dam have cumulative warming downstream of Keno Dam as determined from the difference between TOD2RN2 and T1BSR2. Even when using the monthly mean, the results presented by Limanto and Deas in table 6 shows the increase from all sources in September at Keno outlet was 0.10 deg-C. Our results and those of Limanto and Deas do not support your statement "point and nonpoint sources that enter Keno Reservoir likely do not contribute to thermal loading at the Keno Dam outlet". Based on the revised allocations in the TMDL, DEQ calculates the maximum 7DADM warming from all other sources at the Keno Dam outlet to be 0.14 deg-C and maximum monthly average warming to be 0.04 deg-C at Stateline. These results are based on the difference between TOD2RN2 and T1BSR2. For this reason, DEQ cannot allocate the entire 0.3 HUA allowance to Keno Dam or J.C Boyle.

PC#23: Suggested Change ID #269

Description: Water Quality Standard - applicability of criteria (detailed Narrative)

Comment: Thermal loading from PacifiCorp's developments should be limited only to those periods when stream temperatures exceed the applicable 20.0°C criterion, not year-round G. Thermal loading from PacifiCorp's projects should be limited only when stream temperatures exceed the 20.0 °C 7-DMax criterion.

The Draft TMDL's load allocations to PacifiCorp's hydroelectric developments appear, at least in some instances, to be applied year-round in order to implement the 20.0°C 7-DMax criterion. For example, Draft TMDL Table 2-20 would require year-round temperature reductions from the J.C. Boyle and Keno developments to implement their thermal load allocation of zero in the Klamath River at the California border [footnote 19] No temperature restrictions are appropriate, however, during those portions of the year when the 20.0°C 7-DMax criterion is met. Accordingly, the final TMDL should clarify that load allocations to implement this criterion restrict thermal loading only when the temperature of the relevant waterbody exceeds 20.0°C as a 7-DMax.

The HUA restricts temperature increases from anthropogenic sources to 0.3°C "above the applicable criteria." See OAR 340-041-0028(12)(b)(B). When 7-DMax stream temperatures are less than the 20.0°C criterion, anthropogenic warming is not limited to 0.3°C. In those instances, anthropogenic warming is limited only by the temperature criterion itself. Restrictions on anthropogenic warming by PacifiCorp and other sources when the criterion is met are unwarranted, and the final TMDL should clarify that its thermal load allocations to implement the 20.0°C 7-DMax criterion do not restrict thermal loads when the criterion is met in the waterbodies affected by the source [footnote 20]

footnote 19: Table 2-20 would require separate year-round temperature reductions at the California border to achieve Oregon's 20.0°C 7-DMax criterion and California's requirement, as interpreted by DEQ, of no monthly average anthropogenic temperature increase. Section D, above, explains why California's temperature requirements are inapplicable to a TMDL for Oregon waterbodies. But even if California's

requirements applied, a year-round 7-DMax allocation of zero is not appropriate to implement California's monthly average temperature restriction.

footnote 20: Oregon's "protecting cold water" criteria, OAR 340-041-0028(11), do not apply to the Klamath River or to Spring and Jenny creeks downstream of PacifiCorp's Fall Creek diversion. These criteria apply only to (a) "waters of the State that have summer seven-day-average maximum ambient temperatures that are colder than the biologically based criteria in section (4) of this rule" and (b) "point source[s] that discharge[] into or above salmon & steelhead spawning waters that are colder than the spawning criterion." OAR 340-041-0028(11)(a)-(b). The Klamath River and Spring and Jenny creeks downstream of PacifiCorp's Fall Creek diversion do not have summer maximum 7-DMax ambient temperatures less than 20.0 °C; PacifiCorp's projects are not "point sources"; and no salmon or steelhead spawning temperature criteria apply to these waters.

Response: It is the policy of Oregon DEQ to achieve water quality standards established by neighboring states in interstate waters. This is why allocations are established year-round.

PC#24: Suggested Change ID #270

Description: Modeling Analysis - model is outdated

Comment: The Draft TMDL continues to rely on outdated water quality models and water management information, as well as only a single model year (2000), that reflect conditions that are nearly two decades old and that do not illustrate the temperature variability inherent in the Klamath River. The models that DEQ relies on, and in fact all of the water quality models for the entire Klamath River, have been significantly updated and upgraded to more accurately represent current conditions. Further, water management in the river has changed substantially since 2000, with five different biological opinions issued over that period of time that govern how the U.S. Bureau of Reclamation manages river flows, which impacts observed and modeled water quality and temperature conditions.

Response: DEQ understands the temperature conditions in the Klamath River will vary from year to year. We do not agree that quantifying temperature variability over multiple years is a necessary precondition to establishing the TMDL allocations. The TMDL allocations are set at a level necessary to achieve the temperature criteria. The temperatures that attain the criteria (e.g. 20 degrees Celsius plus 0.3 degrees for human sources) does not change from year to year. In turn the establishment of the allocation to attain the criteria is less reliant on the year to year variability.

In regards to your comment on model updates. We reviewed PacifiCorp 2016 which we understand to be at this time the most recent application submitted to DEQ. This particular application was originally submitted in 2014 and administratively withdrawn by PacficCorp and most recently resubmitted in 2016. As far as we can tell the application content has not changed since it's original submittal in 2014.

DEQ is also aware of Klamath River models developed by the USGS (Sullivan et al 2011, Sullivan et al 2013a, Sullivan et al 2013b, and Sullivan and Rounds 2016). DEQ did consider using these models for the 2019 Temperature TMDL but eventually decided against it because they have two major limitations. 1) The model domain is only for the Klamath River from Link Dam to Keno Dam and excludes the portion of the Klamath River from Keno Dam to the OR/CA Stateline. 2) The USGS models do not include a natural condition scenario. These models and scenarios would all have to be developed. Constructing these new models and scenarios is not an insignificant effort and would require data for these particular years that in some cases was not available. Other than having a larger set of available continuous data to set boundary conditions, most of the USGS model enhancements were focused on updating the rates and coefficients for various nutrient parameters, adding prediction of macrophytes, and

alternative pH-buffering calculations. None of these updates are relevant for temperature. Because of these limitations and the fact that having additional years of temperature information is not a precondition for setting allocations, we felt the year 2000 model was the best tool currently available that would meet TMDL objectives.

Citations:

Sullivan, A.B., Rounds, S.A., Deas, M.L., Asbill, J.R., Wellman, R.E., Stewart, M.A., Johnston, M.W., and Sogutlugil, I.E., 2011, Modeling hydrodynamics, water temperature, and water quality in the Klamath River upstream of Keno Dam, Oregon, 2006–09: U.S. Geological Survey Scientific Investigations Report 2011-5105, 70 p.

Sullivan, A.B., Rounds, S.A., Asbill-Case, J.R., and Deas, M.L., 2013a, Macrophyte and pH buffering updates to the Klamath River water-quality model upstream of Keno Dam, Oregon: U.S. Geological Survey Scientific Investigations Report 2013-5016, 52 p. [Available online at https://pubs.usgs.gov/sir/2013/5016/]

Sullivan, A.B., Sogutlugil, I.E., Rounds, S.A., and Deas, M.L., 2013b, Modeling the water-quality effects of changes to the Klamath River upstream of Keno Dam, Oregon: U.S. Geological Survey Scientific Investigations Report 2013-5135, 60 p. [Available online at https://pubs.usgs.gov/sir/2013/5135/]

Sullivan, A.B., and Rounds, S.A., 2016, Modeling water quality, temperature, and flow in Link River, south-central Oregon: U.S. Geological Survey Open-File Report 2016-1146, 31 p. [Available online at https://pubs.er.usgs.gov/publication/ofr20161146]

PC#25: Suggested Change ID #271

Description: Editorial - text update required for updated information about Klamath Hydroelectric Settlement Agreement (KHSA)

Comment: H. The information presented in the Draft TMDL regarding PacifiCorp's projects is obsolete and should be updated. The Draft TMDL's statements regarding PacifiCorp's projects are obsolete and do not appear to have been updated since the previous temperature TMDL was issued in 2010. See, e.g., Draft TMDL at 5-6, 226-27, 249-50. Some of the more significant information that should be updated includes:

Klamath Hydroelectric Settlement Agreement (KHSA). PacifiCorp; DEQ; several federal, tribal, state, and local governments or agencies; non-governmental organizations; and private entities entered into the KHSA on February 10, 2010. Although the Draft TMDL at pages 5-6 refers to the KHSA, other statements in the Draft TMDL incorrectly state that this agreement is still being negotiated, see, e.g., Draft TMDL at 226-27, 249. The purpose of the KHSA, as stated in KHSA section 1.2, is to "resolv[e] among [the parties] the pending FERC relicensing proceeding [for PacifiCorp's Klamath Hydroelectric Project] by establishing a process for potential Facilities Removal and operation of the Project until that time." Under the KHSA, the "Facilities" are defined as the four project dams under consideration for removal, together with their "appurtenant works": Iron Gate, Copco 1, and Copco 2 on the Klamath River in California, and J.C. Boyle Dam on the Klamath River in Oregon. PacifiCorp's Fall Creek Development in California, which includes the diversion of water from Spring Creek in Oregon, is not part of the Amended KHSA and would remain in PacifiCorp's ownership should the Amended KHSA be fully implemented.

Amended KHSA. Because the federal legislation contemplated to implement dam removal under the KHSA was not enacted, the KHSA was amended in April and again in November, 2016 to provide a mechanism for removal of the dams through administrative action by FERC (The implementation of the Amended KHSA is described below). Unless otherwise noted, all references to the KHSA in the Draft TMDL should be updated to reference the amended KHSA.

PacifiCorp's TMDL obligations under the Amended KHSA. Amended KHSA Section 6.3 addresses PacifiCorp's TMDL obligations. Section 6.3.2 provides,

No later than 60 days[footnote 21] after ODEQ's . . . approval . . . of a TMDL for the Klamath River, PacifiCorp shall submit to ODEQ . . . proposed TMDL implementation plans for agency approval. . . . The plans shall . . . incorporate water quality-related measures in the Non-ICP Interim Measures set forth in Appendix D [to the Amended KHSA]. Facilities Removal by the DRE [Dam Removal Entity, now the Klamath River Renewal Corporation] shall be the final measure in the timeline. At PacifiCorp's discretion, the proposed plans may further include other planned activities and management strategies.

Under Amended KHSA section 6.3.4.A, PacifiCorp's TMDL implementation obligations are limited to the water quality-related measures in Amended KHSA Appendix D. The measures relevant to the Klamath River in Oregon are principally the maintenance of the current minimum flow release into the J.C. Boyle bypass reach of 100 cubic feet per second (cfs) and a maximum diversion of 3000 cfs at J.C. Boyle Dam. If the Amended KHSA terminates, then Amended KHSA section 6.3.4.B provides that PacifiCorp may seek modification of an approved implementation plan, and Oregon may use its reserved authority to revise or require submission of a new TMDL implementation plan [footnote 22]

Amended KHSA implementation. Pursuant to the Amended KHSA, in September 2016 PacifiCorp applied to FERC to amend the license for the Klamath Hydroelectric Project (FERC Project No. 2082) to (1) place the J.C. Boyle Development in Oregon and the Copco 1, Copco 2, and Iron Gate Developments in California in a new, separate license (the Lower Klamath Hydroelectric Project, FERC Project No. 14803) and (2) transfer that license for the Lower Klamath Hydroelectric Project to the Klamath River Renewal Corporation (KRRC), effective upon KRRC's acceptance of the license. At the same time (September 2016), KRRC filed an application with FERC to surrender the new license and physically remove J.C. Boyle Dam and the three dams in California. In orders dated March 15 and June 21, 2018, FERC approved and then stayed PacifiCorp's application to place the four facilities in a new license and deferred action on the other requests pending the receipt of additional information. FERC has taken no additional action on either of these applications at this time (July 2019).

PacifiCorp's pending application for a new license. PacifiCorp's application for a new FERC license for the Klamath Hydroelectric Project remains pending, although it was formally put in abeyance by FERC at PacifiCorp's request (per the Amended KHSA) on June 16, 2016. In addition to the Fall Creek Development, the application proposes to continue operating the J.C. Boyle, Copco 1, Copco 2, and Iron Gate developments if they are not transferred to another entity or removed pursuant to the Amended KHSA. The license application also proposes to decommission the East Side and West Side developments and to remove the Keno Development, which does not generate hydroelectric power, from the FERC Project license. The Amended KHSA contemplates transfer of the Keno facilities to the U.S. Department of Interior.

Waiver of DEQ's CWA section 401 certification authority. On January 25, 2019, the U.S. Court of Appeals for the D.C. Circuit held that Oregon and California had waived their authority under CWA section 401 to certify FERC's relicensing of the Klamath Hydroelectric Project because the states did not act on PacifiCorp's request for certification within the one year limit specified in the CWA. Hoopa Valley Tribe v. FERC, No. 14-1271. The court ordered FERC to "proceed with its review of, and licensing determination for, the Klamath Hydroelectric Project." On April 26, 2019, the D.C. Circuit denied petitions for rehearing of its decision.

footnote 21:The Draft TMDL at pages 227-27 and 249 is inconsistent with the Amended KHSA in that the Draft TMDL calls for PacifiCorp to submit a TMDL implementation plan within 18 months, not 60 days. footnote 22: Pursuant to the KHSA, PacifiCorp on February 22, 2011 submitted to DEQ a TMDL implementation plan for the previous "Upper Klamath and Lost River Subbasins Total Maximum Daily Loads" issued on December 21, 2010. Those TMDLs included TMDLs for temperature, as well as other water quality parameters.

Response: This section (1.1.3) has been updated with new language.

PC#26: Suggested Change ID #272

Description: Editorial - General comment about presentation of TMDL and organization of document

Comment: Much of the text of the Draft TMDL is not clearly presented. There are many confusing paragraphs and blocks of text that leave the reader wondering what the water quality objectives of the Draft TMDL are, how those objectives might be implemented, and their legal or factual justification. While PacifiCorp's submitted comments focus on technical concerns, DEQ is encouraged to conduct a comprehensive proof-reading and edit of the entire Draft TMDL.

Response: DEQ has made a number of editorial updates based on public comments.

PC#27: Suggested Change ID #273

Description: Modeling Analysis - Effects of East and West Side Hydroelectric Projects on temperature not included in TMDL

Comment: 1. East Side and West Side Hydroelectric Projects Both projects are allocated a thermal load of zero. Id., Table 2-15 at 40; Table 2-18 at 47. The allocations are based on PacifiCorp's proposal to decommission the projects. Id. at 27. The Draft TMDL does not include any analysis of the projects' effects on the temperature of the Klamath River.

Response: Correct. Since PacifiCorp is proposing the decommission of the East Side and West Side Hydroelectric developments, DEQ believes it is appropriate to provide allocations to other sources.

PC#28: Suggested Change ID #274

Description: Allocations - Additional explanation is needed for the way HUAs were assigned to Keno Dam/Reservoir, JCB, and at Stateline

Comment: 2. Keno Dam and Reservoir The dam and reservoir are allocated a flow-dependent thermal load equivalent to a maximum temperature increase of 0.12°C at the dam outlet (footnote 1),which the Draft TMDL determines to be the dam's "point of maximum impact." Id., Table 2-15 at 40; Table 2-18 at 47. The allocated temperature increase is the project's share of the 0.3 degrees Celsius (°C) human use allowance (HUA) provided by Oregon Administrative Rules (OAR) 340-041-0028(12)(b)(B). The HUA authorizes a cumulative temperature increase of up to 0.3°C from all anthropogenic sources combined when the river downstream of the dam exceeds the applicable 20.0°C criterion, which is expressed as the seven-day average of daily maximum temperatures (7-DMax). See id., OAR 340-041-0028(4)(e). The

Draft TMDL does not explain why the project is assigned this share of the HUA. Other anthropogenic sources, combined, are allocated 0.13°C of the HUA, and the remaining 0.05°C is allocated to reserve capacity. Draft TMDL, Table 2-15 at 40.

Based on modeled river temperatures for 2000, the Draft TMDL determines that the project would need to reduce temperatures at the dam outlet by as much as 0.54°C from June through September in order to meet its 0.12°C allocation (footnote 2) Id., Table 2-19 at 48. These reductions, however, are only the presumptive reductions required to meet the 0.12°C thermal load allocation. The Draft TMDL states: "After DEQ review and acceptance, a different temperature model using different assumptions may be used to calculate the required reductions for implementation, including reduction in other years." Id. at 48.

Keno Dam and Reservoir, together with J.C. Boyle Dam and Reservoir, are allocated a thermal load of zero at the California border, expressed as both a monthly average temperature and a 7-DMax temperature.(footnote 3) See id., Table 2-15 at 40, Table 2-18 at 47, Table 2-20 at 49. These allocations are intended to implement Oregon's 20.0°C 7-DMax criterion, which includes a 0.3°C HUA when the criterion is exceeded, as well as California's temperature TMDL for the Klamath River downstream of the border, which the Draft TMDL interprets to allow no monthly average temperature increase from anthropogenic sources at any time of the year. See id. at 18. At the border, the Draft TMDL does not allocate any portion of the HUA to existing sources; without explanation, it allocates the entire 0.3°C HUA to reserve capacity. Id., Table 2-15.

-footnote 1: Table 2-15 also allocates 0.12°C to Keno Dam and Reservoir "within the reservoir" (see table note 1), but the applicable cool water temperature standard (which the Draft TMDL interprets to be a maximum of 28°C, id., at 16) is met within Keno Reservoir year-round (see Draft TMDL Tables 2-11, 2-12 at 35-36). The Draft TMDL does not state or suggest that any changes in Keno Dam or its operations are needed to meet the cool water temperature standard upstream of the dam or to be consistent with the TMDL for the river upstream of the dam. -footnote 2: Draft TMDL Figure 2-10 (p. 50) shows the amount by which DEQ calculates the project increases river temperatures at the dam outlet. The figure shows increases in excess of 0.12°C before June and after September. Presumably, the increases before June and after September occur when the river temperature is less than the 20.0°C criterion. That Table 2-19, which would require project temperature reductions only from June through September, suggests that the 0.12°C limit on project warming is intended to apply only when the river temperature exceeds 20.0°C, but this is not clearly stated in the Draft TMDL. -footnote 3: Table 2-15 includes separate thermal load allocations for the Keno and J.C. Boyle developments, but Table 2-20 at page 49 describes the combined effects of, and required temperature reductions for, both developments together. This implies that the effects of both developments at the California border are intended to be addressed cumulatively, so that, for example, a temperature increase caused by the Keno Development could be offset by a temperature reduction from J.C. Boyle Development.

Response: DEQ has allocated the entire human use allowance at stateline (except 0.04) to reserve capacity in order to achieve California's temperature standard and TMDL targets. We have placed the HUA into reserve capacity for potential future use should there be a change to California's temperature standard or TMDL in the future.

PC#29: Suggested Change ID #275

Description: Allocations - HUA assignment to J.C. Boyle and Keno Developments

Comment: 3. J.C. Boyle Dam and Reservoir As described above, J.C. Boyle Dam and Reservoir, together with Keno Dam and Reservoir, are allocated a thermal load of zero at the California border, which the Draft TMDL determines to be the "point of maximum impact" for J.C. Boyle Dam. Id., Table

2-15 at 40, Table 2-18 at 47, Table 2-20 at 49. The allocation is expressed as both a monthly average temperature and a 7-DMax temperature.

1. J.C. Boyle and Keno Developments The Draft TMDL allocates all of the 0.3°C 7-DMax HUA to reserve capacity at the California border. Draft TMDL, Table 2-15 at 40. Because PacifiCorp's Keno and J.C. Boyle developments are the only anthropogenic sources that have—or are likely in the future to have—any effect on the temperature of the Klamath River at the California border, all of the HUA should be allocated to these projects. The only anthropogenic sources that the Draft TMDL specifically identifies as having an effect on Klamath River temperatures at the California border are PacifiCorp's J.C. Boyle and Keno developments. See Draft TMDL Table 2-20 at 49 and Figure 2-11 at 51. All other anthropogenic sources are 30 to 45 miles upstream, and whatever temperature effects they may have on the river likely equilibrate to atmospheric conditions long before reaching the California border [footnote 15]

Under Oregon's TMDL rules, the "reserve capacity" is "an allocation for increases in pollutant loads from future growth and new or expanded sources. The TMDL may allocate no reserve capacity and explain that decision." OAR 340-042-0040(4)(k). There is little likelihood of any significant future development in this area that would warrant a reserve capacity allocation, much less an allocation of the entire 0.3°C HUA to reserve capacity. The 11-mile segment of the Klamath River between the J.C. Boyle Powerhouse and the California border is designated as a National Wild and Scenic River. See 16 U.S.C. § 1273(a)(ii); ORS 390.826(2). This portion of the river flows through a deep canyon in an extremely remote, undeveloped area. There are no industries or business in the area and only a few isolated ranches and residences. No significant developments are planned for the area or are likely to be built in the foreseeable future that would require a portion of the reserve capacity. OAR 340-042-0040(6) contains a non-exclusive list of factors that DEQ may consider in distributing pollutant loads among sources. The very first factor is "[c]ontributions from sources"; others include "[c]osts of implementing measures," "[e]ase of implementation," and "[r]easonable assurances of implementation." These factors support allocating the entire 0.3°C HUA to PacifiCorp. All the current and future anthropogenic thermal loading identified by the Draft TMDL at the California border is from PacifiCorp's J.C. Boyle and Keno Developments; no allocation is needed for other current or future sources. Moreover, the Draft TMDL does not demonstrate or even suggest that the zero thermal load allocations assigned to these projects could be easily or feasibly achieved, nor does it provide any reasonable assurance that they will be. Under these circumstances, the 0.3°C HUA at the California border should be allocated to PacifiCorp's J.C. Boyle and Keno developments [footnote 16]

footnote 15: Draft TMDL Figure 2-14 at 53 shows modeled 7-DMax river temperatures at the California border (1) under current conditions "from Dams, KSD [Klamath Straits Drain], LRDC [Lost River Diversion Channel], and Point Sources" and (2) "with the dams achieving required reductions." With the temperature effect of the dams reduced to zero, the modeled river temperature at the border appears to show no anthropogenic warming, or at most 0.04°C of anthropogenic warming. This implies that the temperature contribution of all other anthropogenic sources is zero or no greater than 0.04°C.

Response: The 0.3°C HUA is not allocated to any sources in the Upper Klamath River subbasin because these waterbodies eventually flow into California and must meet Oregon's water quality criteria as well as California's downstream water quality criteria, which do not allow anthropogenic warming. If temperatures can be reduced to meet the water quality criteria, the HUA that has been kept in the Reserve Capacity may be reallocated to anthropogenic sources in the subbasin. Language has been added to Tables 2-1, 3-1, and 4-1 stating that "It is the policy of Oregon DEQ to achieve water quality standards established by neighboring states in interstate waters."

PC#30: Suggested Change ID #276

Description: Allocations - year-round reductions required

Comment: Based on modeled river temperatures for 2000, the Draft TMDL calculates that the Keno and J.C. Boyle developments would need to reduce 7-DMax temperatures by as much as 2.43°C at the California border in order to meet Oregon's temperature standard (footnote 4) Id., Table 2-20 at 49. These reductions would be required throughout the year whenever the projects increase the 7-DMax temperature in the river at the border, regardless of whether the river temperature met the 20.0°C 7-DMax criterion. Indeed, some of the largest temperature reductions would be required in November and December, when river 7-DMax temperatures are well below 20.0°C. Id.

footnote 4: Again, the specific reductions are only the presumptive reductions required to achieve the thermal load allocation of zero. The Draft TMDL states: "After DEQ review and acceptance, a different temperature model using different assumptions may be used to calculate the required reductions for implementation, including reduction in other years." Id. at 48.

Response: Keno and J.C. Boyle are only responsible for warming caused by the dam or dam operations. The reductions represent the portion of that warming that exceeds the allocated portion of the human use allowance. Reductions are needed throughout the entire year in order to achieve California temperature water quality standard targets established at Stateline where there can be no anthropogenic warming above the natural condition.

PC#31: Suggested Change ID #277

Description: Water Quality Standard - discrepancy due to interpretation of CA standard

Comment: The Draft TMDL also calculates the monthly average temperature reductions at the California border that the Keno and J.C. Boyle developments would need to achieve in order to meet their zero thermal load allocations for the river in California. Id., Table 2-20. Based on the 2000 model year, these would consist of monthly average reductions of up to 0.1°C during March, April, and November (footnote 5) Id.

footnote 5: The Draft TMDL interprets California's standards to be met if the modeled monthly average temperature increase from anthropogenic sources is 0.04°C or less, which the Draft TMDL considers to be "not measureable with most field instrumentation." Id., at 18, 52. Yet, Table 2-20 would require PacifiCorp to achieve a 0.01°C monthly average temperature reduction in April based on a modeled 0.01°C monthly average temperature increase during that month. The Draft TMDL does not explain the discrepancy.

Response: You are correct, although the reductions have been revised for the final TMDL based on updates to allocations for other sources in the Klamath River.

PC#32: Suggested Change ID #278

Description: Allocations - No HUA given to Fall Creek Diversion

Comment: 4. Fall Creek Diversion PacifiCorp's diversion of water from Spring Creek, a tributary of Jenny Creek, to Fall Creek for the Fall Creek Hydroelectric Facility is allocated a thermal load of zero from June through September to implement the 20.0°C 7-DMax criterion in the Jenny Creek Watershed.

Id. at 108, 119. The Draft TMDL does not identify the diversion's point of maximum impact, but the allocation is expressly applied to Jenny Creek at the California border. Id. at 119. The entirety of the 0.3°C HUA is allocated to reserve capacity at this point.

F. PacifiCorp should receive the full 0.3 °C HUA; allocating none of the HUA to PacifiCorp when the HUA is unallocated and unneeded by other sources is unjustified.

3. Fall Creek Diversion The Draft TMDL also allocates the entirety of the 0.3°C HUA to reserve capacity in Jenny Creek at the California border [footnote 18]. Draft TMDL Table 3-30 at 119. None of the HUA is allocated to anthropogenic sources, all of which have received load allocations of zero.

The Draft TMDL does not explain why the entirety of the HUA is allocated to reserve capacity, even though existing anthropogenic sources contribute thermal loads when stream temperatures exceed the 7-DMax 20.0°C criterion. Unlike in the Klamath River at the California border, anthropogenic sources may contribute thermal loads to Jenny Creek at the California border, but the contributions of these sources are not identified in the Draft TMDL. Anthropogenic sources, including the Fall Creek diversion if it is treated as a heat source, should receive an equitable allocation of a portion of the HUA in accordance with OAR 340-042-0040(6). Given these sources, there is no justification for allocating the entirety of the HUA to reserve capacity.

Response: The 0.3°C HUA is not allocated to any sources in the Upper Klamath River subbasin because these waterbodies eventually flow into California and must meet Oregon's water quality criteria as well as California's downstream water quality criteria, which do not allow anthropogenic warming. If temperatures can be reduced to meet the water quality criteria, the HUA that has been kept in the Reserve Capacity may be reallocated to anthropogenic sources in the subbasin. Language has been added to Tables 2-1, 3-1, and 4-1 stating that "It is the policy of Oregon DEQ to achieve water quality standards established by neighboring states in interstate waters."

PC#33: Suggested Change ID #279

Description: Allocations - No mechanism to reduce excess thermal loading attributed to natural and unidentified anthropogenic sources

Comment:

1. Keno Dam Outlet The Draft TMDL models natural and unidentified anthropogenic heat sources to warm the Klamath River at the outlet of Keno Dam to a maximum of 25.2°C as a 7-DMax—5.2°C above the applicable criterion (footnote 6) Id. at 28. It states that this warming is "considered excess warming and targeted for reduction," id., but it does not identify any reduction mechanism, nor does it explain how it would even be possible to reduce the portion that is natural.

2. Klamath River at the California Border The Draft TMDL models the maximum excess 7-DMax temperature California border to be 4.59°C in August. Because the maximum 7-PacifiCorp's operations during August is only 1.36°C, see id., Table Draft TMDL does not attribute any river warming at the border to anthropogenic source, more than 3°C of warming appears to be attributable unidentified anthropogenic sources. The Draft TMDL does not identify mechanisms for these sources, nor does it explain how it would be the thermal load that is of natural origin.

3. Jenny Creek The Draft TMDL states that the excess temperature in Jenny Creek 2.18°C and that the 20.0°C criterion can be achieved through 1.88°reductions from identified categories of human sources and without natural and unquantified human sources. Id., Table 3-24 at 113.

footnote 6: Table 2-13 (p. 37) models a slightly lower maximum excess temperature at the Keno Dam outlet of 4.56°C as a 7-DMax. The reason for the discrepancy is not clear.

Response: Section I of PacifiCorp's comments "does not contain specific comments regarding the Draft TMDL, it just states PacifiCorp's understanding of the Draft TMDL. DEQ thanks PacifiCorp for their comments and tries to address PacifiCorp's observations below. These responses refer to comments/observations on Klamath River and Jenny Creek Excess Thermal Loading attributed to natural and unidentified sources. 1. Keno Dam Outlet - Table 2-12 (previously 2-11) shows the maximum observed temperature of 25.8 deg C (of all available data), 5.8 deg C above the 20 deg C 7DADM criterion. Table 2-13 shows the maximum excess temperature of 4.6 deg C downstream of Keno Dam for the model year. Language has been added to this section to clarify. Natural loads are not targeted for reduction, but loads from unidentified anthropogenic sources are.

2. Klamath River at California border - The Klamath River model has been re-run and the maximum modeled temperature at the California/Oregon border is 4.29 deg C in August. Natural loads are not targeted for reduction, but loads from unidentified anthropogenic sources are. The Monitoring Plan (see DEQ and EPA 2019) outlines plans for continued monitoring to address unidentified anthropogenic sources.

3. Jenny Creek - This information is correct. Known human nonpoint sources can include vegetation disturbance/removal, channel modification and widening, and hydromodification. See section 3.4.2 for more details on nonpoint sources of heat to the Upper Klamath subbasin.

PC#34: Suggested Change ID #282

Description: Allocations - Draft TMDL inconsistent with CWA and EPA regulations (Detailed Narrative comment)

Comment: A. The Draft TMDL is inconsistent with the Clean Water Act (CWA) and the Environmental Protection Agency's (EPA) regulations because it does not determine the total maximum daily thermal load required to assure protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife.

The CWA contains two separate TMDL provisions, one for waters impaired by heat and one for waters impaired by all other pollutants. For waters impaired by pollutants other than heat, the CWA directs a TMDL to be established at a level necessary to implement the applicable water quality standard.

Each State shall establish for the waters identified in paragraph (1)(A) of this subsection [as not meeting water quality standards] . . . the total maximum daily load . . . . Such load shall be established at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality.

33 U.S.C. § 1313(d)(1)(C) (emphasis added). For waters impaired by heat, however, the CWA directs that the TMDL be based not on the applicable water quality standard, but on an "estimate" of the thermal load "required to assure protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife."

Each State shall estimate for the waters identified in paragraph (1)(B) of this subsection [as impaired for temperature], the total maximum daily thermal load required to assure protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife. Such estimates shall take into account the normal water temperatures, flow rates, seasonal variations, existing sources of heat input, and the

dissipative capacity of the identified waters or parts thereof. Such estimates shall include a calculation of the maximum heat input that can be made into each such part and shall include a margin of safety which takes into account any lack of knowledge concerning the development of thermal water quality criteria for such protection and propagation in the identified waters or parts thereof.

Id., § 1313(d)(1)(D) (emphasis added). In accordance with this dichotomy, EPA's implementing regulations provide that TMDLs established to meet applicable water quality standards are not to be established for heat. "For pollutants other than heat, TMDLs shall be established at levels necessary to attain and maintain the applicable narrative and numerical WQS [water quality standards] with seasonal variations and a margin of safety . . . ." 40 C.F.R. § 130.7(c)(1) (emphasis added). For heat however, "Each State shall estimate for the water quality limited segments . . . the total maximum daily thermal load which cannot be exceeded in order to assure protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife." Id., § 130.7(c)(2).

The Draft TMDL is contrary to the CWA and EPA's implementing regulations because it establishes loading capacities and allocations based on water quality standards for temperature, rather than estimates of the "thermal load which cannot be exceeded in order to assure protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife." Moreover, the Draft TMDL ignores the statutory requirement to "take into account the normal water temperatures" when developing thermal loads. The Draft TMDL acknowledges that natural and unidentified sources of heat cause stream temperatures to exceed the applicable criterion in some waterbodies, including the Klamath River downstream of Keno Dam. E.g., Draft TMDL at 2-3, 28-30, 38-39. But rather than evaluating whether and to what extent these "normal" temperatures may be consistent with "a balanced, indigenous population of shellfish, fish, and wildlife" in the Klamath River and other basin streams, the Draft TMDL establishes an unachievable thermal load based on the water quality criterion.

The Draft TMDL should be revised in accordance with CWA subparagraph 303(d)(1)(D), 33 U.S.C. § 1313(d)(1)(D), to estimate the total maximum daily thermal loads required to assure protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in the Upper Klamath and Lost River Subbasins, and to assign thermal wasteload and load allocations to heat sources based on these estimates.

Response: The CWA and EPA's implementing regulations have specific provisions for TMDLs for waters impaired by thermal discharges. 33 U.S.C. § 1313(d)(1)(B), 40 C.F.R. § 130.7(b)(2). These provisions allow that temperature TMDLs can be written to assure the "protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife," rather than a numeric temperature criterion. However, this provision does not mean that TMDLs for temperature cannot also be written to the existing numeric criteria, given that the criteria protects beneficial uses. Oregon's water quality standards for temperature are consistent with 40 C.F.R. § 130.7(c)(1) because they were developed and approved by EPA to "assure protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife." As described in the TMDL achieving the temperature standards will assure propagation of indigenous Redband Trout, Lost River Sucker, Shortnose Sucker, and other aquatic life.

PC#35: Suggested Change ID #292

Description: Modeling Analysis - use of a single model year (2000) does not account for climate variability and water year considerations

Comment: The use of a single model year (2000) upon which all HUAs are based does not account for more recent changes in river operations (by the U.S. Bureau of Reclamation for example), nor does it account for normal climatic variability or water year considerations.

Response: DEQ understands the temperature conditions in the Klamath River will vary from year to year due to anuual variability in hydrologic and climate conditions. We have reviewed and presented temperature data and it's distribution over multiple years (e.g. see boxplots in Excess Load section). We do not agree that quantifying temperature variability over multiple years is a necessary precondition to establishing the TMDL allocations. The TMDL allocations are set at a level necessary to achieve the temperature criteria. The temperatures that attain the criteria (e.g. 20 degrees Celsius plus 0.3 degrees for human sources) does not change from year to year. In turn the establishment of the allocation to attain the criteria is less reliant on the year to year variability. The TMDL allocations for sources upstream of Keno Dam (as well as those downstream) are based on an allowed amount of warming. We have provided a set of equations in the TMDL for how allocations and compliance with allocations are calculated. Calculation of the allocation does not require the use of absolute river temperature because the allocation is expressed as an excess load equal to the product of the allocated change in temperature, river flow, and conversion factor. To evaluate compliance with the allocation, the TMDL specifies that the upstream temperature and flow be used, or the temperatures at USGS 11507500- Link River at Klamath Falls for this calculation. For DMAs managing KSD and LRDC, DEQ added this information and the equation into the TMDL since it was not included in the draft. Using this approach accounts for temperature differences from year to year.

PC#36: Suggested Change ID #293

Description: Modeling Analysis - older version of model used and not a newer version updated with multiple years

Comment: The Keno Reservoir model used in the Draft TMDL is an older version of model that recently has been extensively updated and applied to multiple years; this updated version should be used instead of the single year version DEQ used for the Draft TMDL.

The Klamath River model between Keno Dam and J.C. Boyle Reservoir and the river model from J.C. Boyle Dam to Stateline, as well as the J.C. Boyle Reservoir model, have been updated and should be used instead of the single year version DEQ used for the Draft TMDL.

Response: We assume you are referring to the Klamath River models developed by the USGS (Sullivan et al 2011, Sullivan et al 2013a, Sullivan et al 2013b, and Sullivan and Rounds 2016). DEQ did consider using these models for the 2019 Temperature TMDL but eventually decided against it because they have two major limitations. 1) The model domain is only for the Klamath River from Link Dam to Keno Dam and excludes the portion of the Klamath River from Keno Dam to the OR/CA Stateline. 2) The USGS models do not include a natural condition scenario. These models and scenarios would all have to be developed. Constructing these new models and scenarios is not an insignificant effort and would require data for these particular years that in some cases was not available. Other than having a larger set of available continuous data to set boundary conditions, most of the USGS model enhancements were focused on updating the rates and coefficients for various nutrient parameters, adding prediction of macrophytes, and alternative pH-buffering calculations. None of these updates are relevant for temperature. Because of these limitations and the fact that having additional years of temperature information is not a precondition for setting allocations, we felt the year 2000 model was the best tool currently available that would meet TMDL objectives.

Citations:

Sullivan, A.B., Rounds, S.A., Deas, M.L., Asbill, J.R., Wellman, R.E., Stewart, M.A., Johnston, M.W., and Sogutlugil, I.E., 2011, Modeling hydrodynamics, water temperature, and water quality in the Klamath River upstream of Keno Dam, Oregon, 2006–09: U.S. Geological Survey Scientific Investigations Report 2011-5105, 70 p.

Sullivan, A.B., Rounds, S.A., Asbill-Case, J.R., and Deas, M.L., 2013a, Macrophyte and pH buffering updates to the Klamath River water-quality model upstream of Keno Dam, Oregon: U.S. Geological Survey Scientific Investigations Report 2013-5016, 52 p. [Available online at https://pubs.usgs.gov/sir/2013/5016/]

Sullivan, A.B., Sogutlugil, I.E., Rounds, S.A., and Deas, M.L., 2013b, Modeling the water-quality effects of changes to the Klamath River upstream of Keno Dam, Oregon: U.S. Geological Survey Scientific Investigations Report 2013-5135, 60 p. [Available online at https://pubs.usgs.gov/sir/2013/5135/]

Sullivan, A.B., and Rounds, S.A., 2016, Modeling water quality, temperature, and flow in Link River, south-central Oregon: U.S. Geological Survey Open-File Report 2016-1146, 31 p. [Available online at https://pubs.er.usgs.gov/publication/ofr20161146]

PC#37: Suggested Change ID #294

Description: Modeling Analysis - Tributary Shade Models

Comment: Related to the tributary shade models, the contribution of modeling assumptions to the uncertainty associated with modeled results is not addressed, and the models do not appear to be based on any appreciable amount of field data.

Response: The models uses the best data that were available at the time of model development/application (a total of nine different data sources listed in Section A2 Available Data in Appendix A were available). Assumptions along with the related uncertainty for each dataset in terms of spatial and temporal resolution used are also provided in Appendix A. Where appreciable amount of field data in terms of cross-sections, flow and continuous temperature data were available, Heat Source Models were developed (for Jenny, Spencer and Miller Creek) which account for detailed heat budget calculation to predict solar radiation, effective shade, and stream temperatures. When such detailed information was not available, a shade model was developed based on the best available data. The model goodness-of-fit summary statistics are presented in Appendix A.

PC#38: Suggested Change ID #295

Description: Modeling Analysis - Errors in temperature model-a modeling defect in the Keno Reservoir model

Comment: Temperature modeling errors have caused the Draft TMDL to overstate the temperature effects of the Keno and J.C. Boyle developments on the Klamath River between Keno Dam and the California border. PacifiCorp identified these errors in its comments on the previous Klamath River temperature TMDL issued in 2010 [footnote 12] but they have not been corrected or justified. Although the Draft TMDL states that, "[a]fter DEQ review and acceptance, a different temperature model using different assumptions may be used to calculate the required reductions for implementation," Draft TMDL at 48, these errors should be corrected so that the Draft TMDL accurately reflects the temperature effects of J.C. Boyle and Keno developments before the final TMDL is issued. PacifiCorp is concerned that the required temperature reductions stated in the Draft TMDL, if not corrected, may become presumptive reductions that would shift the burden to PacifiCorp and other sources to disprove.

The model for Keno Reservoir contains a defect that overstates the temperature effect of Keno Dam. As originally pointed out by PacifiCorp in comments [footnote 14] made on the 2010 TMDL, an error in the model code causes an incorrect temperature simulation output in the last segment of the model's 107-

segment computational grid for Keno Reservoir. PacifiCorp evaluated the model code used for the Draft TMDL and this error persists. Because of this error, the predicted temperatures for this last segment (segment 107) diverge sharply between model scenarios, even though the predicted temperatures are nearly the same between model scenarios for all the other 106 segments, and even though there is no physical feature between segment 106 and segment 107 that could account for this divergence. To address this error, the Draft TMDL uses the model segment at the Keno Dam outfall, segment 108, to determine the temperature effects of Keno Dam because the temperature output at segment 108 is similar to the temperature outputs at the segments upstream of segment 107. Although this reduces the effect of the modeling defect, the defect remains and likely also affects the output in segment 108, which is immediately downstream.

Keno Dam should not have any adverse effect on temperature in Keno Reservoir or in the river downstream of the dam. This is because the reservoir is more akin to a slow river than a large, thermally stratified reservoir. The reservoir does not seasonally stratify, and Keno Dam's only substantial effect on the river from the standpoint of temperature is to make the river somewhat deeper than it would be with solely the natural reef in the river that lies near the dam. With either the dam or the natural reef, the river's travel time through this segment is several days, which is more than enough time for the river to fully adjust to meteorological conditions. The removal of the dam would likely have almost no effect on the river's temperature, but the resulting shallower-but-not-substantially-narrower river would have less volume to absorb solar radiation and would be, if anything, slightly warmer, not cooler. Rather than determine the temperature effect of Keno Dam based on the model results for segment 108, the modeling error should be identified and corrected.

footnote 14: Ibid, see Appendix A

Response: Based on our review DEQ does not find an error. There is only a result that PacifiCorp cannot explain and supposes to be an error. We believe the difference is due to using a depth average for calculating the temperature. The temperatures at Keno Dam outlet are used as a compliance point because this is the most upstream location where the human use allowance must be achieved.

Your claim that Keno Dam should not have an adverse effect on temperature is not supported based on model results.

PC#39: Suggested Change ID #296

Description: Modeling Analysis - Errors in temperature model-adjustment of inflow temperatures of Klamath Straits Drain

Comment: Errors in the temperature model on which the Draft TMDL is based cause it to overstate the temperature effects of the J.C. Boyle and Keno developments on the Klamath River between Keno Dam and the California border. An adjustment of the inflow temperature for the Klamath Straights Drain to match temperatures in Keno Reservoir that effectively adds thermal load to inflow from the Klamath Straights Drain and adds a warm bias to the modeling results for Keno Reservoir.

Response: Both KSD and LRDC are essentially constructed canals, that take advantage and were constructed where water naturally used to flow to the Klamath. Given the modifications that have occurred over the years it is difficult to establish what the natural temperature of these waterbodies should be. Since historically both KSD and LRDC used to mix with Klamath River water, we set the temperatures to be the same as the Klamath River one segment upstream. DEQ feels that this is a better approach than assigning temperatures based on Upper Klamath Lake.

PC#40: Suggested Change ID #297

Description: Allocations - no legal or factual basis for the Draft TMDL's load allocations to PacifiCorp's facilities.

Comment: 2. There is no legal or factual basis for the Draft TMDL's load allocations to PacifiCorp's facilities. The Draft TMDL includes a thermal load allocation equivalent to 0.12°C for Keno Dam and Reservoir at the dam's outlet. The thermal load allocations for all other PacifiCorp facilities are zero, as well as for Keno Dam and Reservoir at the California border. The Draft TMDL does not describe the legal or factual basis for these load allocations, which are inconsistent with EPA's regulations in that they are not based on a reasonable estimate of the actual thermal loading from the facilities and do not identify any mechanism by which the allocated loads could reasonably be achieved.

Elements of PacifiCorp's Klamath Hydroelectric Project found in Oregon include the East Side, West Side, Keno, and J.C. Boyle developments, and the Spring Creek diversion portion of the Fall Creek Developments. PacifiCorp operates the Project pursuant to a Federal Power Act license issued by the Federal Energy Regulatory Commission (FERC) (FERC Project No. 2082 and No. 14803). The current license expired in 2006, but PacifiCorp continues to operate the Project under the terms of that license (in the form of annual licenses from FERC), pending FERC's final action on PacifiCorp's 2004 application for a new license [footnote 7]. Under the Federal Power Act, FERC has the exclusive authority to regulate the Project. See, e.g., First Iowa Hydro-Electric Coop. v. Federal Power Comm'n, 328 U.S. 152 (1946). In conjunction with any new license issued to the Project, FERC may require reductions in thermal loading attributable to the Project, but at this point any such reductions would be speculative. Moreover, FERC may be disinclined to require thermal load allocations that are not technically or economically feasible and that would not provide a substantial reduction in stream temperatures [footnote 8]

In order to achieve the load allocations to the Project, the Draft TMDL estimates that the Project will need to reduce the 7-DMax temperature of the Klamath River at the Keno Dam outlet by up to 0.54°C and at the California border by up to 2.43°C. Draft TMDL at 48-49. It will need to reduce the temperature of Jenny Creek by up to 2.6°C. Id. at 92. The Draft TMDL does not explain how these substantial temperature reductions could be achieved, much less feasibly achieved. Nor does it identify any mechanism for implementing the temperature reductions. The Water Quality Management Plan (WQMP) accompanying the Draft TMDL identifies PacifiCorp as a "Responsible Person" that must develop "a source-specific implementation plan," id. at 226-27, 249, but such a planning requirement does not address the feasibility of the specified temperature reductions nor FERC's necessary role in implementing any such reductions.9 Like the Draft TMDL's required thermal load reductions for natural and unidentified anthropogenic sources, its required reductions for PacifiCorp's facilities are arbitrary values that lack any factual or legal basis and that do not represent a reasonable attribution of the thermal loads from these facilities.

footnote 7: In 2010, PacifiCorp and various other parties, including the State of Oregon, entered into the Klamath Hydroelectric Settlement Agreement (KHSA). The KHSA, which was amended in 2016, provides a process for potentially removing J.C. Boyle Dam and three other Project dams on the Klamath River in California. Pursuant to the Amended KHSA, PacifiCorp applied to FERC to amend the license to place the J.C. Boyle development and three other Project developments in California in a new license (FERC Project No. 14803) and transfer that license to the Klamath River Renewal Corporation (KRRC), effective upon KRRC's acceptance of the new license. At the same time, KRRC filed an application with FERC to surrender the license and physically remove J.C. Boyle Dam and three dams in California. In orders dated March 15 and June 21, 2018, FERC approved and then stayed PacifiCorp's application to place the J.C. Boyle and three California developments in a new license and deferred action on the other requests pending the receipt of additional information. Notwithstanding the application to transfer portions of the Project to KRRC, PacifiCorp's application to FERC for a new license for the entire Project, including J.C. Boyle Dam, remains pending.

footnote 8: Notwithstanding FERC's exclusive authority to regulate the Project under the Federal Power Act, CWA section 401 prohibits FERC from issuing a new license to the Project until and unless Oregon and California either (1) certify that the Project will comply with specified sections of the CWA, including water quality standards, or (2) waive their right certify the Project. 33 U.S.C. § 1341(a)(1). Section 401 certifications may include conditions necessary to assure compliance with these CWA sections and "any other appropriate requirement of State law," and these conditions become part of the FERC license. See id., § 1341(d). In this instance, however, both Oregon and California have waived their right to certify the Project. See Hoopa Valley Tribe v. FERC, 913 F.3d 1099 (D.C. Cir. 2019).

Response: DEQ respectfully disagree with your claim that the TMDLs "required reductions for PacifiCorp's facilities are arbitrary values that lack any factual or legal basis and that do not represent a reasonable attribution of the thermal loads from these facilities".

The cumulative warming attributed to the dams and other project facilities are based on model results that have gone through extensive review and revision. In the case of the Klamath River model, the scenarios developed isolate the warming from points sources, KSD, and LRDC seperately from the warming of dams. As described in Appendix C the warming from dams is evaluated as the difference between the 7DADM of TOD2RN3 and T4BSRN2. At the Oregon/California border, the warming is calculated as the difference between the monthly averages.

We have also completed a new model scenario (T4BSRN3) that was used to evaluate the temperature impact from Keno Dam only. For this scenario run the T4BSRN2 flow and temperature output from the Lake Ewuana to Keno CE-QUAL-W2 model was used as the input into the no dams RMA model from Keno Dam to Iron Gate Dam. The combination of these models represents the new T4BSRN3. The impacts from Keno dam only is defined as the change in 7DADM temperature within Oregon and the monthly average temperature change at stateline between two model scenarios: TOD2RN3 where dams are excluded (except Link) and a modified version of T4BSRN2 (referenced here as T4BSRN3) where only Keno dam is included.

Demonstrating attainment of the HUA by Keno dam and JC Boyle is accomplished by evaluating the change in 7DADM temperatures and monthly average temperature at Stateline and requiring the appropriate reduction. The equation used to calculate the reductions are presented in the TMDL. The documentation of these model scenarios and results are included in Appendix C.

DEQ documented the modeling results used to quantify the temperature increase in Jenny Creek from the Spring Creek diversion in Appendix A. The increase contributes to an exceedance of the temperature criteria and we developed allocations accordingly.

DEQ must develop temperature TMDLs based on the current water quality standards and set allocations such that they add up to the Loading Capacity defined in OAR 340-042-0040(4)(d) and 40 CFR 130.2(f) as the amount of a pollutant or pollutants that a waterbody can receive and still meet water quality standards. We have provided allocations that add up to the Loading Capacity and will meet the current water quality standards. DEQ is not required to identify in a TMDL how the allocated loads are to be achieved. It is DEQ's expectation, per OAR 340, division 42, that PacfiCorp and other DMAs or responsible persons evaluate their operations and propose management strategies in their TMDL implementation plans that will show achievement of allocations.

PC#41: Suggested Change ID #298

Description: Model Analysis - add description of how equation was applied to KR

Comment: p. 8 Changes in temperature are also a function of the surface area associated with the volume. Including surface area in the numerator of the right-hand side of the equation would be more complete. The equation is also not specific to change in temperature with respect to time or space. The Draft TMDL should clarify how this relatively simplistic equation was applied to the Klamath River.

Response: The equation, being in the introductory chapter, is intended to be simple to illustrate the basic concept of what influences water temperature changes. We added "density", "specific heat", and a delta symbol for volume to indicate that a change in volume influence change in temperature (in addition to a change in heat). DEQ used the model to calculate change in temperature and those more sophisticated equations that include surface area are included in model documentation which are referenced in the TMDL.

PC#42: Suggested Change ID #299

Description: Source Characterization - TMDL may only address thermal loading

Comment: While anthropogenic actions such as channel modification or reduction in flow may increase stream temperatures, this is not a result of a change in heat load or source. The Draft TMDL may only address thermal loading.

Response: DEQ views the temperature increases resulting from the practice of flow diversion, vegetation removal, or channel modification to be a source of heat pollution. In the case of flow diversion, the source of warming is from the practice of diverting water which facilitates rapid temperature warming because of the loss in loading capacity due directly to the practice of said diversions. OAR 340-042-0030(12) defines a pollutant "Source" to mean "any process, practice, activity or resulting condition that causes or may cause pollution or the introduction of pollutants to a waterbody". The diversion of water is a practice that causes the existing heat loading to be heat pollution, that results in a condition where that heat pollution contributes to the exceedance of the temperature criteria. In the case of vegetation removal or channel modification, these modifications cause additional heat loading pollution to enter the stream.

A surrogate measure is another appropriate measure for implementing a load allocation and is acceptable for use in a TMDL as defined in 40 CFR 130.2(i) which says "TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure." OAR 340-042-0030(14) defines a surrogate measure as "substitute methods or parameters used in a TMDL to represent pollutants".

The Department may use surrogate measures, in this case flow or effective shade, to estimate allocations for pollutants addressed in the TMDL, in this case heat. Surrogate measures are closely related to the pollutant, and are typically easier to monitor and track.

PC#43: Suggested Change ID #300

Description: Applicable Standards - No authority for DEQ to establish TMDLs at Stateline based on California standards

Comment: Chapter 2 of the Draft TMDL states: "These Klamath River Temperature TMDLs were developed as part of a comprehensive multistate analysis and also achieve California water quality standards at Stateline (North Coast Regional Water Quality Control Board [NCRWQCB], 2010)."

This statement indicates that the Draft TMDL waste load allocations (WLA) and load allocations (LA) must or may be set at levels necessary to achieve California water quality objectives. PacifiCorp respectfully disagrees. The waterbodies addressed by the Draft TMDL are waterbodies in the Upper Klamath and Lost River subbasins of Oregon. The Draft TMDL WLA and LA must be based on the applicable water quality standards in those subbasins. DEQ does not have the authority to establish TMDLs at Stateline based on California standards.

Response: It is the policy of the Oregon DEQ to achieve water quality standards established by neighboring states in interstate waters.

PC#44: Suggested Change ID #301

Description: Pollutant Identification - Table 2-1 "temperature warming" is not a pollutant

Comment: Pollutant Identification: Although "heat" is a pollutant, "temperature warming" is not. See OAR 340-042-0030(8); 33 U.S.C. § 1362(6).

Response: "Temperature warming" has been removed throughout the TMDL document and replaced with "heat" when it is referring to a pollutant.

PC#45: Suggested Change ID #302

Description: TMDL Target - Does DEQ have Authority to use something not specified by Administrative Rule

Comment: Section 2.1.2.3 of the Draft TMDL states: "To be protective, the TMDL target will be expressed as a daily maximum instead of the 7-day average of the daily maximums." However, the 7-day average of the daily maximums is the temperature calculation approach set out in Oregon Administrative Rules (OAR) 340-041-0028. The 7-day average of the daily maximums also is a preferred temperature metric for assessing water temperature levels suitable for supporting life stages of salmonids, including Chinook Salmon, Coho Salmon, and Steelhead (USEPA 2003; NMFS 2015). It is unclear from the TMDL if DEQ has the regulatory authority to use a method other than is provided in the OAR.

Response: Additional narrative has been added to sections 2.1.2.3 and 4.1.2.4 to clarify DEQ's authority to interpret narrative standards into quantitative numeric TMDL targets.

The 7-day average of the daily maximum temperature metric is only applicable to the biologically based numeric criteria within OAR 340-041-0028(4). Section 2.1.2.3 discusses the narrative Cool Water Species criteria at OAR 340-041-0028(9). Unlike the biologically based numeric criteria, the Cool Water Species criteria is narrative and does not identify a numeric in-stream temperature target or temperature metric. It only states "no increase in temperature is allowed that would reasonable be expected to impair cool water

species." Since TMDLs are quantitative, TMDL endpoints (or targets) must also be quantitative. A TMDL is likely to fail if its endpoint lacks a measurable, unambiguous operational definition (EPA 1994). Therefore TMDLs often must define a numeric target that implements narrative standards like the cool water species criteria in order to provide a clear definition of attainability. Section 2.1.2.3 explains the rationale for why DEQ choose 28 degrees Celsius as a daily maximum as the numeric target where the cool water species criterion applies.

In waters where the biologically based numeric criteria apply, DEQ uses the 7-day average of the daily maximum temperature metric.

[EPA] United States Environmental Protection Agency. 1994. Watershed Protection: TMDL Note #3 TMDL Endpoints. EPA841-K-94-005b.

PC#46: Suggested Change ID #303

Description: Editorial - Figure 2-1 not legible

Comment: Figure 2-1 is not legible and is not referenced until page 24.

Response: Figure 2-1 was copied directly from the fish use designation map provided in OAR 340-041-0180 Figure 180A, therefore it cannot be improved. However, there is a footnote on the bottom of the page that includes a link to the original document so that it can be viewed with a higher resolution. Figure 2-1 is referenced prior to Figure 2-1 in Section 2.1.2 Applicable Water Quality Standards.

PC#47: Suggested Change ID #304

Description: Applicable Standards - DEQ doesn't have authority to establish TMDL based on California Standards

Comment: p. 18 Section 2.1.2.4 of the Draft TMDL states: "…allocations established in Oregon's TMDL must also achieve the water quality standards and numeric targets established in California." PacifiCorp respectfully disagrees. The waterbodies addressed by the Draft TMDL are waterbodies in the Upper Klamath and Lost River subbasins of Oregon. The Draft TMDL WLA and LA must be based on the applicable water quality standards in those subbasins. DEQ does not have the authority to establish TMDLs at Stateline based on California standards.

Response: It is the policy of the Oregon DEQ to achieve water quality standards established by neighboring states in interstate waters.

PC#48: Suggested Change ID #305

Description: Editorial - Table 2-4 clarify which standard being applied

Comment: table 2-4 The numeric targets for California/Oregon Stateline as identified in NCRWQCB (2010) are based on a single year (2000) of simulation. The use of monthly averages from only 2000 does not account for natural variability from year-to-year that makes attainment of these standards challenging at best. It is also unclear in the Draft TMDL if the target is the monthly average temperature from Table 2-4 or no warming from anthropogenic sources at Stateline; DEQ should clarify which standard is being

applied. See Appendix E comment E.1. See also comments 2.1 and 2.5 regarding the applicability of the California standards to Oregon waters.

Response: The target that applies at Stateline is no warming above the monthly mean. In Oregon it is warming above the 7DADM. We have clarified this in the TMDL. We recognize the river temperature targets identified in NCRWQCB (2010) are based on single year.

PC#49: Suggested Change ID #306

Description: Monitoring Strategy - address precision of field monitoring that will be used to track implementation progress

Comment: p.18 Section 2.1.2.4 of the Draft TMDL states: "In this TMDL, no warming is implemented as a modelled temperature increase no greater than 0.04 °C - a temperature considered not measureable with most field instrumentation." However, a temperature measurement sensitivity of plus or minus (±) 0.04°C is not possible with typical water-quality monitors and is unreasonable to assume. There is a disconnect in the Draft TMDL between modeling, which has a high level of resolution and field equipment, which can be an order of magnitude less precise. The Draft TMDL should be revised to clarify the connection between the modeled temperatures to field instrumentation and how DEQ expects TMDL compliance to be demonstrated given the precision of field instrumentation (monitoring versus modeling). Modern thermistors can measure temperature from ± 0.1°C to 0.4°C, but the user must verify the accuracy claimed by the manufacturer for the range of application (Wagner et al. 2006; Stamp et al. 2014). USGS procedures specify that thermometers be calibrated or checked against a National Institute of Standards and Technology (NIST)-certified thermometer, and thermistors should be accurate within ± 0.2°C (Wagner et al. 2006).

Response: No warming from anthropogenic sources is allowed at the state line in the Klamath River. Compliance with the TMDL target will be determined using monitored water temperature for comparison to the 20 degrees Celsius target as well as other methods. Section 1.5.5 of the Monitoring Plan (Monitoring Strategy to Support Implementation of the Upper Klamath and Lost River Subbasins Temperature Total Maximum Daily Load, DEQ & EPA 2019) states "A mixture of heat budget monitoring and modeling methods may be needed to link or translate DMA (Designated Management Agency) and responsible persons' management actions into changes in water temperature within WQLSs (water quality listed segments). In addition to water temperature and flow, modeling information that may be useful includes but is not limited to: water conveyance geometry, travel time, transient storage zones, specific conductivity, applicable meteorological data, and groundwater accretion".

PC#50: Suggested Change ID #307

Description: Editorial - Figure 2-2 clarify

Comment: Fig. 2-2 It is unclear what this figure, that is not referenced in the text, is supposed to be presenting. Were the temperature exceedances for the water quality-limited segments shown in this figure recorded only in 2012 or did temperature exceed criteria over multiple years?

Response: Language has been added to Section 2.1.3 of the TMDL and the caption for Figure 2-2 to indicate that the figures is showing the segments of the Klamath River that have been included on Oregon's Final 2012 section 303(d) list of impaired waters for temperature and are addressed in this TMDL.

PC#51: Suggested Change ID #308

Description: Applicable Standards - CA targets not applicable to Oregon waterbodies

Comment: As previously commented, (number 2.12, Section 2.1.2.4) the California temperature numeric targets are inapplicable to TMDLs for waterbodies in Oregon.

Response: It is the policy of Oregon DEQ to achieve water quality standards established by neighboring states in interstate waters.

PC#52: Suggested Change ID #309

Description: Editorial - update to reflect the actual conditions in the river as related to hydroelectric and agricultural operations.

Comment: p. 22 This section states: "Additionally, hydroelectric projects and multiple points of diversion in the Upper Klamath subbasin have altered stream flow levels. Low summertime flows decrease the thermal assimilative capacity of streams. Pollutant (solar radiation) loading causes larger temperature increases in stream segments where flows are reduced by human uses."

This statement seems to be a gross over simplification of water temperature conditions in the Upper Klamath River. Streamflows from Upper Klamath Lake to Keno Dam are maintained at relatively high levels during the summer months to support agricultural-diversions of water from Keno Reservoir. Downstream of J.C. Boyle Dam, higher flows would actually dilute the existing cold-water spring inflows and generate warmer water temperatures. The Draft TMDL should be updated to reflect the actual conditions in the river as related to hydroelectric and agricultural operations.

Response: More specific details on the various hydromodification projects in the Upper Klamath subbasin are discussed following the introduction to nonpoint sources in Section 2.1.5. language has been added to Section 2.1.5 to direct the reader to this more detailed information.

PC#53: Suggested Change ID #310

Description: Editorial - update the outdated description of KSD and LRDC operations

Comment: p. 23 Report states: "The Lost River Diversion Channel typically discharges to the Klamath River September to April and is diverting Klamath River water from May to August. During the discharge period in the model year (year 2000) the Lost River diversion Channel warmed the Klamath River at the point of discharge by 5.5°C (Figure 2-4). During the same year the Klamath Straits Drain warmed the Klamath River at the point of discharge by about 1.0°C (Figure 2-5)."

Operations of the Klamath Straits Drain and Lost River Diversion Channel have changed dramatically since 2000. The information presented in the TMDL is outdated and provides no value to the Draft TMDL nearly 20 years later. Up-to-date flow conditions and selected water quality information are available from the U.S. Bureau of Reclamation that could provide additional insight into Klamath River dynamics, and should be included herein.

Response: Updated flow and temperature information for LRDC and KSD, and how it relates to the allocations are provided in a new Appendix I.

PC#54: Suggested Change ID #311

Description: Source Characterization - describe mechanism of water warming for irrig. return flows and operational spills

Comment: pp.22-24 The mechanism of water warming for both irrigation return flows and operational irrigation system spills is not described.

Response: See Section 1.2 for a conceptual description of the process. DEQ used CEQ-QUAL-W2, RMA, and Heat Source models to evaluate temperature changes in response to specific allocation scenarios. These models track heat fluxes and input loads, including from irrigation return flow, and calculates the temperature response. The models support establishment and evaluation of allocations of both temperature change and heat load. See model documentation referenced in the TMDL for specific equations and methodology.

PC#55: Suggested Change ID #312

Description: Editorial - revise to clarify that the loss of streamside vegetation is not a source of increased loading in all cases.

Comment: pp.24-26 This section indicates the (riparian) vegetation removal is not considered a major source of stream warming for several reasons, including river width, lack of degradation, and a steep canyon in one segment. However, loss of vegetation and related increased solar radiation loading is the second source listed on page 8 under Section 1.2 Pollutant Identification when discussing the sources of heat that is the pollutant targeted by this TMDL. The Draft TMDL needs to be revised to clarify that the loss of streamside vegetation is not a source of increased loading in all cases.

Response: Section 1.2 is an introductory section and summarizes common pollution sources or potential pollution sources of temperature impaired segments. Removal of vegetation is a pollution source for many of the stream segments addressed in this temperature TMDL and therefore is a factual statement. Pollution sources for the Klamath River are discussed in Chapter 2, section 2.3.

PC#56: Suggested Change ID #313

Description: Editorial - TMDL should include more recent Project information that PacifiCorp has submitted in 401 Certification applications to DEQ

Comment: Section 2.3.2.3.1, page 26. This section of the Draft TMDL discusses PacifiCorp's Klamath River Hydroelectric Project facilities and their effects on water resources and water quality. The Draft TMDL states: "Much of the information in this section comes from documents produced by PacifiCorp for the relicensing of the project which provide a much more detailed description of the facilities and their impact on water resources and water quality (PacifiCorp 2004a and 2004b)." However, substantial additional and more up-to-date information is available that is not provided or cited in the Draft TMDL. For example, the TMDL should include more recent Project information that PacifiCorp has submitted in 401 Certification applications to DEQ (e.g., PacifiCorp 2016). The Draft TMDL also should include data

and information produced more recently by PacifiCorp as part of the Amended KHSA, such as posted on the PacifiCorp Project website (at https://www.pacificorp.com/es/hydro/hl/kr.html#; e.g., Watercourse 2011a, 2011b, 2012, 2013, 2014, 2015, 2016, 2017a, 2017b, 2018).

Response: The link provided by PacifiCorp is invalid. The reports referenced on PacifiCorp's webpage are of the final license application from 2004. At this time DEQ will leave the information in the TMDL as the most current information the agency has access to.

PC#57: Suggested Change ID #314

Description: Allocation - inappropriate to exclude East Side and West Side from the TMDL as their ultimate fate is unknown

Comment: 2.3.2.3.1, page 27. It is inappropriate to exclude East Side and West Side from the TMDL because their ultimate fate (removal or repurposing) is not currently known. While PacifiCorp is not currently operating them and is not currently planning to do so in the future, the length of time to their removal and ultimate fate is unclear. Further, these two facilities may simply be repurposed (if PacifiCorp were to sell them), and may continue to divert water in the future.

Response: DEQ acknowledges your comment and has decided to maintain the current zero load allocation to the East Side and West Side developments. A zero load allocation does not mean these facilities must be removed or cannot be re-purposed for other uses. It just means the facilities must be operated in a way that does not warm the Klamath River. As stated in the Water Quality Management Plan, PacifiCorp or another DMA/Responsible person that assumes responsibility for these facilities will need to develop an implementation plan and identify how operations will not warm the Klamath River.

PC#58: Suggested Change ID #315

Description: Editorial - Additional clarification required on use of natural bedrock reef

Comment: 2.3.2.3.1, Page 27. While there is a natural bedrock reef some distance upstream from Keno Dam, the reef is not used to control water surface elevations in Keno Reservoir as indicated in the Draft TMDL. PacifiCorp operates Keno Dam to control water surface elevations in the reservoir.

Response: Language is Section 2.3.2.3.1 stating that the bedrock reef upstream of Keno Dam is used to control water surface elevations has been removed.

PC#59: Suggested Change ID #316

Description: Editorial - Additional clarification requested on temperature impacts from reservoirs to be greatest downstream of the outlet

Comment: 2.3.2.3.1 Page 27. The Draft TMDL states: "It is common for temperature impacts from reservoirs to be greatest downstream of the outlet because of the decreased daily temperature range and consequent increase to daily minimum temperatures." This text should also note that the daily maximum is likewise reduced downstream of dams.

Response: The plots and figures show both warming and cooling by Keno and JC Boyle.

PC#60: Suggested Change ID #317

Description: Source Assessment - DEQ is overstating the effect of Keno and J.C. Boyle on water temperatures in the Klamath River

Comment: Section 2.3.2.3.1, Page 27. The Draft TMDL describes that the operation of Keno Dam increases 7-day average daily maximum temperature by a maximum of 0.66°C at the outlet. The Draft TMDL further describes that "J.C. Boyle and Keno Dam appears to cause 7-day average daily maximum temperatures to increase by a maximum of 1.73°C and a maximum of 0.1°C increase above the monthly mean temperature at state line." As has been stated elsewhere (comments 1.11, C.2, and C.5), DEQ is overstating the effect of Keno and J.C. Boyle on water temperatures in the Klamath River.

For context, it is important that the Draft TMDL clearly indicate that these values were calculated based on Critical Conditions, which the Draft TMDL acknowledges in Chapter 1 (page 4) occur on rare occasions. The Draft TMDL should further indicate that the 7-day average daily maximum temperatures at PacifiCorp's Project facilities are commonly appreciably less than would otherwise occur in the absence of the Project. It is also unclear why the Draft TMDL is bringing the discussion of daily minimum temperatures into the document at this point.

Response: The TMDL includes reference to critical conditions and shows warming and cooling by J.C. Boyle and Keno Dam. Daily minimums are discussed because increases to daily minimums can result in increases to daily maximums 12 hours travel distance downstream. See references cited in TMDL.

PC#61: Suggested Change ID #318

Description: Editorial - Additional clarification requested on description of impact of J.C.Boyle

Comment: Section 2.3.2.3.1, Page 27. The Draft TMDL states: "The impact of JC Boyle development is more complex because of the removal and return of water from the river." This sentence should be expanded to be more precise since effects of J.C. Boyle operations vary by conditions (such as, time-of-year and flow conditions, among other conditions), and it is unclear as to what is meant by "more complex."

Response: Additional detail has been added into section 2.3.2.3 to explain the impact of the J.C. Boyle and the removal and return of water from the river.

PC#62: Suggested Change ID #319

Description: Allocations - unidentified anthropogenic sources are not explicitly quantified in the TMDL

Comment: Section 2.3.2.4, Pages 27-28. This section states the unidentified/unquantified anthropogenic sources may contribute to exceedances but were NOT explicitly quantified in the TMDL modeling. This being so, how can they be presented numerically with the background sources? How can the background levels be quantified when the unidentified anthropogenic sources have not been, i.e., it does not appear that a given amount of the total warming in Figure 2-7 can be accurately attributed to background versus anthropogenic sources. Given that "Excess warming from these sources are targeted for reduction under

this TMDL," it seems imperative that they be identified and quantified for the TMDL to be successful and reasonable because it is impossible to reduce a source when that source is unidentified.

Response: Cost and court-ordered deadlines do not allow for the time it would take to separately quantify every potential anthropogenic source. Section 1.3 of the Monitoring Strategy to Support Implementation of the Upper Klamath and Lost River Subbasins Temperature Total Maximum Daily Load states that "in some cases, modeling indicates that even with the removal of known, quantifiable sources, the water quality criteria will not be attained. In these cases, DEQ assigns a heat load reduction to background and unidentified anthropogenic sources in order to meet the criteria". We have clarified in the TMDL that DEQ will prioritize reductions from known sources first. In the case that the removal of known quantifiable sources still does not result in meeting the applicable water quality criteria, system response studies will be initiated by DEQ for segments of Jenny Creek, Miller Creek, or the Klamath River that do not meet water temperature criteria within 10 years of EPA's approval of the Upper Klamath and Lost subbains TMDLs. Additional heat budget and system response information will be collected to identify remaining anthropogenic sources of heat. If DEQ determines all anthropogenic sources of warming have been addressed, DEQ may consider a change in standards (inducing site specific criteria) or UAA.

PC#63: Suggested Change ID #320

Description: Allocations - Draft TMDL needs to provide additional clarity on the portion of background warming that is attributed to unidentified human sources

Comment: Section 2.3.3, page 28.

The Draft TMDL states: "Background sources of warming were explicitly quantified on Klamath River through modeling (Figure 2-7)." The Draft TMDL further states: "During the model year background sources warmed the river to a maximum 7-day average daily maximum of 25.2°C at Keno Dam outlet (Figure 2-7)." Modeling of four years by PacifiCorp indicates that the background maximum 7-day average daily maximums at Keno Dam outlet are typically appreciably higher than 25.2°C (see PacifiCorp 2016). As discussed elsewhere in these comments, the Draft TMDL reliance on a single model year poses an analysis flaw by underrepresenting variability in water temperature conditions.

Additionally, given that the unidentified anthropogenic sources are included in the background and the background is explicitly quantified, some assumptions must have been made about the unidentified anthropogenic contribution to the total background. The Draft TMDL needs to provide additional clarity on the portion of background warming that is attributed to unidentified human sources.

Response: No other assumptions were made about background sources or unidentified/unquantified anthropogenic sources other than what is stated in the TMDL in sections 2.3.3 and 2.3.2.4. These sources may be included in the estimate of background because we lack sufficient data to represent them in the model. Since they are not explicitly included in the model it is not possible to separate their loading from background loading. Modeling additional years would not have provided any additional information on the portion of background that is attributed to unidentified human sources.

PC#64: Suggested Change ID #326

Description: Source Characterization - Additional analysis and discussion requested on excess warming vs background sources

Comment: Section 2.3.3, page 28.

The Draft TMDL states: “The portion that exceeds the applicable 20°C criteria (maximum of 5.2°C) is considered excess warming and targeted for reduction.” Only a portion of the maximum 7-day average daily maximum of 25.2°C at Keno Dam outlet is anthropogenic – far less than 5.2°C as indicted in the Draft TMDL. This sentence seems to state that the TMDL is targeting 5.2°C reduction, much of which is natural heating. Without an equilibrium water temperature discussion in the Draft TMDL, there is no context for this issue relating to the feasibility or infeasibility of modifying water temperature to attain TMDL compliance.

Response: DEQ provides a brief overview in Section 1.2 of factors that influence temperature. It is responsibility of DMAs or responsible persons to evaluate their operations and propose in their TMDL implementation plan what specific management strategies they deem feasible to achieve the load allocations.

PC#65: Suggested Change ID #327

Description: Allocations - how can the TMDL be achieved if the Background and Unidentified warming is already in excess of the criteria

Comment: Section 2.4, page 31. The TMDL previously stated that the background and unidentified anthropologic sources contribute excess warming above the applicable criteria on the Klamath River. If the Background and Unidentified warming is already in excess of the criteria, how can the TMDL ever be achieved?

Response: DEQ must develop the Upper Klamath and Lost Subbasin temperature TMDL based on the current water quality standards and set allocations such that they add up to the Loading Capacity defined in OAR 340-042-0040(4)(d) and 40 CFR 130.2(f) as the amount of a pollutant or pollutants that a waterbody can receive and still meet water quality standards. We have provided allocations that add up to the Loading Capacity and will meet the current water quality standards.

Section 1.3 of the Monitoring Strategy to Support Implementation of the Upper Klamath and Lost River Subbasins Temperature Total Maximum Daily Load states that “in some cases, modeling indicates that even with the removal of known, quantifiable sources, the water quality criteria will not be attained. In these cases, DEQ assigns a heat load reduction to background and unidentified anthropogenic sources in order to meet the criteria”. We have clarified in the TMDL that DEQ will prioritize reductions from known sources first. In the case that the removal of known quantifiable sources still does not result in meeting the applicable water quality criteria, system response studies will be initiated by DEQ for segments that do not meet water temperature criteria within 10 years of EPA’s approval of the Upper Klamath and Lost subbains TMDLs. Additional heat budget and system response information will be collected to identify remaining anthropogenic sources of heat. If DEQ determines all anthropogenic sources of warming have been addressed, DEQ may consider a change in standards (inducing site specific criteria) or UAA.

PC#66: Suggested Change ID #328

Description: Editorial - clarification requested on data used for StreamStats

Comment: Section 2.4, page 30. USGS Stream Stats can be based on extrapolative data as well as measured data. The Draft TMDL should describe if StreamStats relied on measured flow data for these waterbodies and if so, it should provide the date range of those measurements.

Response: USGS's Stream Stats was used to estimate flows on ungaged waterbodies without measured flow data. Language has been added to Section 2.4 of the TMDL to clarify that Stream Stats was applied to ungaged streams. See Appendix H for more information.

PC#67: Suggested Change ID #332

Description: Allocations - TMDL uses an unnecessarily conservative approach

Comment: Section 2.4, page 31. The TMDL states: "The loading capacity for each flow condition is calculated using the lowest flow estimate for that flow condition; however, the loading capacity applies to the entire range of flows within that condition." This is a very and unnecessarily conservative approach that doesn't account for gradations in the capacity of the water bodies to assimilate heat. The Klamath River is only in exceedance a small portion of the time (summer months), so the TMDL is overly conservative much of the year, but insufficient in summer. Background source allocation would be difficult to manage/change.

Response: Comment noted.

PC#68: Suggested Change ID #335

Description: Loading Capacity - LC could not be reproduced

Comment: Section 2.4, page 32. Loading Capacity (LC) was calculated using equation 2-1 (on TMDL page 30), the information provided in Table 2-9, and the human use allowance (HUA) value of 0.3°C provided in the TMDL. The LC Column 4 of Table 2-9 could not be reproduced. The table below [not included here] outlines the values used to calculate the loading capacity, as well as the reported loading capacity (TMDL) and difference.

PacifiCorp understands that DEQ interprets the HUA to be inapplicable to the cool water criterion, which applies upstream of Keno Dam. While that interpretation is inconsistent with OAR 340-041-0028(12)(b), which does not limit the application of the HUA to specific temperature criteria, it might account for some of the differences in the table. While these differences may seem small, they are larger than the load allocations assigned in Tables 2-16, 2-17, and 2-18. In certain cases these differences are similar in magnitude to the allocations and in others they are several orders of magnitude larger than the allocations. The calculations that created the load allocations in Table 2-9 should be verified

Response: The loading capacity calculations in Table 2-9 have been verified. They are correct as is. The HUA as defined in OAR 340-041-0028(12)(b) does not apply to the cool water speices criterion. Human caused warming is allowed where the cool water criterion applies but the warming is already incorporated into the target temperature of 28 degrees Celsius. Therefore as stated in the narrative for Equation 2-1 the HUA can be removed from the loading capacity equation or can be treated as zero as follows (using low flow as an example):

Tc = 28 HUA = 0 Qr = 422 Cf = 2,446,622

LC = (28+0)*(422)*(2,446,622) LC = 2.89 x 10^10 kilocalories per day.

To clarify how to apply Equation 2-1, we removed the reference to the HUA in footnote 2 from Table 2-9 since it is not relevant.

We do not agree that our interpretation of the Cool Water Species narrative is inconsistent with OAR 340-041-0028(12)(b). As stated above, human caused warming is allowed where the cool water criterion applies but the warming is allowed only up to the point that temperatures do not exceed 28 degrees Celsius. This works differently from the the human use allowance as defined in OAR 340-041-0028(12)(b). The HUA as defined here is warming “authorized in waters that exceed the applicable temperature criteria”, where the applicable temperature criteria are defined in OAR 340-041-0002(4) to mean “the biologically based temperature criteria in OAR 340-041-0028(4), or the superseding cold water protection criteria in 340-041-0028(11). The cool water species narrative is not included in this definition. More importantly the cool water species rule in OAR 340-041-0028(9)(a) states that”No increase in temperature is allowed that would reasonably be expected to impair cool water species". DEQ has determined that temperatures greater than 28 degrees Celsius would reasonable be expected to impair cool water species. To allow additional warming above this amount is contrary to the cool water species rule language. See section 2.1.2.3.

PC#69: Suggested Change ID #336

Description: Excess Load - clarification needed for main drivers in Keno Reservoir that impact water temperature and lateral variability

Comment: Section 2.4, page 33. If water temperature in Keno impoundment is largely controlled by the natural temperature regime of water discharged from Upper Klamath Lake, then water temperatures within Keno Reservoir should likewise be largely controlled by meteorological conditions. If warmer or cooler inputs enter the reservoir, shifting the thermal regime away from the dynamic equilibrium with meteorological conditions, the reservoir will, through time, shift back to the natural temperature regime. The inflow rates of many of the assigned allocations are a small fraction of the overall reservoir flowrate, suggesting that the impacts would probably be local and dissipate quickly downstream as the influent waters were diluted with reservoir waters and meteorological conditions returned the system to equilibrium (natural) temperature.

Lateral variations in Keno Reservoir are also notable in the reservoir (Vaughn and Deas 2006). These lateral variations in certain cases are well over the allocations assigned in the TMDL. The laterally averaged representation of the CE-QUAL-W2 model would lead to under-representing maximum daily water temperatures in near-shore areas, in turn leading to a nonconservative analysis assumption with regard to load allocations. The TMDL should include an explicit analysis of heat dissipation associated with each input, e.g., the local impact of a particular input and the return to “background” or “natural” temperature with distance downstream. Further, the TMDL should identify the potential range of natural lateral variability in water temperature, how the model assumptions are conservative or not conservative in this instance, and how compliance will be assessed if based on field temperature monitoring.

Response: The Klamath River system is highly dynamic it is difficult to say if it is in dynamic equilibrium with the meteorological conditions. The model is used to asses the conditions in the dynamic Klamath River System. The model does use meteorlogical boundaries which are an important component for heat budget calculations as one of the many boundary conditions entering into the system. Like any dynamic water quality model the Klamath River models were developed based on assumptions, and therefore have inherent limitations and uncertainty. This analytical tool went through multiple rounds of peer review. Staff with modeling expertise from DEQ, NCRWQCB, and EPA worked as a team with Tetra Tech reviewing and advising on model development and application for calibration and validation. The model was then used to simulate scenarios for the Klamath River model to isolate the warming impacts from points sources, KSD, LRDC and those due to dams in a systematic manner. Even though the sources are small in comparison to the inflows, the effect of these sources were evaluated using the various scenarios runs. Finally demonstration of attainment of the HUA by point sources, KSD, and LRDC was based on the difference between the dams out models with point and non point sources at

allocation (TOD2RN3) and the natural condition model (no sources) T1BSR2 scenario. The difference between T1BSR2 and TOD2RN3 scenario should be less than 0.1 deg C to attain the HUA at Keno Outlet.

The laterally averaged assumption of the CE-QUAL-W2 model is a well documented assumption. The CE-QUAL-W2 model has been extensively and successfully used to simulate temperatures successfully as in the Klamath River. That said, localized impacts cannot be determined using this model. Longitudinal plots were developed to evaluate the temperature variation due to scenarios spatially and compare with criteria. It should be noted that the current modeling framework and setup of the models is based on the original PacifiCorp models which selected the W2 model as the model of choice for the reserevoirs and RMA models for the riverine portion of the Klamath River (Water Course Engineering (2004)). The TMDL allocations are set at a level necessary to achieve the temperature criteria and appropriate HUA. That is the temperature criteria should be met at all locations in the reservoirs.

Watercourse Engineering, Inc. 2004. Klamath River Modeling Framework to Support the PacifiCorp Federal Energy Regulatory Commission Hydropower Relicensing Application Prepared for PacifiCorp (March 9, 2004).

PC#70: Suggested Change ID #337

Description: Source Characterization - Other conditions that influence water temperature in Keno Reservoir and not entirely UKL

Comment: Section 2.5, page 33. The Draft TMDL states: “Water temperature in Keno impoundment is largely controlled by the natural temperature regime of water discharging from Upper Klamath Lake.” Meteorological conditions, including solar radiation and ambient air temperature, also have an important influence on temperature in Keno impoundment. Nonetheless, these are natural conditions that influence water temperature in Keno Reservoir because Upper Klamath Lake is at equilibrium temperature with atmospheric conditions.

Response: We agree water temperature from Upper Klamath Lake have a large influence on the downstream temperatures.

PC#71: Suggested Change ID #338

Description: Editorial - citation is not appropriate

Comment: Section 2.5, page 33. The Draft TMDL states: “Peaking operations at the JC Boyle Powerhouse combined with the constant temperature spring inputs to the Klamath River also impose unique temperature signals on the river downstream of the Powerhouse with non-peaking flows dominated by cooler spring water and peaking flows dominated by warmer water from JC Boyle reservoir (PacifiCorp 2006).” The citation to PacifiCorp (2006) is not appropriate to this statement. PacifiCorp (2006) did not address water temperatures “signals” in the J.C. Boyle peaking reach.

Response: We have revised the text to cite the correct reference. The citation has been changed to. “See Appendix C, temperature calibration graphs for the Bypass/Full Flow Reach (Modeling Segment 5) Figure H-7, Figure H-10, and Figure H-12.”

PC#72: Suggested Change ID #339

Description: Source Characterization - graphs indicate temperature is very infrequently in exceedance

Comment: Section 2.5, page 34. Figure 2-8. The box plots for the Klamath River upstream of Keno Dam show the likely range of variation as consistently below the cool water species target, and even the outliers/maximums only exceed at one location. Similarly, the box plot of the river downstream of Keno Dam shows the 20°C target exceeded only by outliers, with the likely range of variation and median well below the target. These graphs indicate temperature is very infrequently in exceedance.

Further, if "Seasonal temperatures entering Keno impoundment through Link River typically exceed 25 deg C during summer months" as stated on page 33, management actions taken in or below Keno Reservoir will not have sufficient effect that a 20°C criteria can be met even if all anthropogenic sources are eliminated.

Response: We recognize the situation. The additional warming not attributed to anthropogenic sources is due to background loading. The TMDL provides an allocation to background sources.

DEQ must develop the temperature TMDL based on the current water quality standards and set allocations such that they add up to the Loading Capacity defined in OAR 340-042-0040(4)(d) and 40 CFR 130.2(f) as the amount of a pollutant or pollutants that a waterbody can receive and still meet water quality standards. We have provided allocations that add up to the Loading Capacity and will meet the current water quality standards.

Section 1.3 of the Monitoring Strategy to Support Implementation of the Upper Klamath and Lost River Subbasins Temperature Total Maximum Daily Load states that "in some cases, modeling indicates that even with the removal of known, quantifiable sources, the water quality criteria will not be attained. In these cases, DEQ assigns a heat load reduction to background and unidentified anthropogenic sources in order to meet the criteria". We have clarified in the TMDL that DEQ will prioritize reductions from known sources first. In the case that the removal of known quantifiable sources still does not result in meeting the applicable water quality criteria, system response studies will be initiated by DEQ for segments that do not meet water temperature criteria within 10 years of EPA's approval of the Upper Klamath and Lost subbains TMDLs. Additional heat budget and system response information will be collected to identify remaining anthropogenic sources of heat. If DEQ determines all anthropogenic sources of warming have been addressed, DEQ may consider a change in standards (inducing site specific criteria) or UAA.

PC#73: Suggested Change ID #340

Description: Editorial - text reference and clarification required for Figure 2-8

Comment: Section 2.5, page 34, Figure 2-8 The Figure 2-8 box plots of maximum stream temperatures do not appear to be introduced or discussed anywhere in the text. In addition, the red line in the plot for the Klamath River downstream of Keno Dam should be called out in the figure label as the cold water species criterion of 20°C and accurately placed on this figure; it appears to be at about 18°C.

Response: The text above Figure 2-8 has been updated to include a reference to the figure. Figure 2-8 has also been updated to show the red line at 20 deg C and 20 deg has been identified in the figure caption as the cold water target.

PC#74: Suggested Change ID #341

Description: Editorial - clarification and text update needed for Table 2-11

Comment: Section 2.5, page 35. Table 2-11

This table is cited in Section 2.3 of the TMDL as well, but any interpretation of this information in Section 2.3 is unclear. There are numerous pieces of information missing from this table that are necessary to understand it. For example, from which time period are these data derived? Are they year-round? Multiple years, a single year? At what depth are these collected? What is the frequency of the data collected?

If the time period is year-round, should the time period used to calculate the daily maximum and percent exceedance be restricted to June through September (consistent with Table 2-1, line 3, page 12)? This table should be revised to provide the reader the information necessary to understand where these data came from and how the exceedances were calculated.

Response: Table 2-11 is cited in Section 2.2 of the TMDL to support the fact that 23% of the temperature observations at the Keno Dam exceed the 20 degree Celsius Redband and Lahontan trout criterion based on all available data. Table 2-11 has been updated to include data sources and period of record for each monitoring station as well as a footnote that indicates the data are daily continuous data.

Table 2-1 indicates that the period of exceedance at the Keno Dam is typically June through September; however, the critical period for the Klamath River is year round. Table 2-1 also indicates that the 7-day-average maximum temperature may not exceed 20 degrees Celsius plus the 0.3 human use allowance at any time for streams identified as having Redband or Lahontan trout.

PC#75: Suggested Change ID #342

Description: Implementation - explain the basis of the calculation or measurement of the assumed changes in temperature

Comment: Section 2.6, page 38. The Draft TMDL states: “In order for the TMDL to be more meaningful to the public and guide implementation efforts, allocations have also been expressed in thermal loads for each source, as a change in temperature or <U+0394>T (delta T).” This sentence simply refers to <U+0394>T as a change in temperature, whereas the document subsequently refers to <U+0394>T as “allowable temperature increase” (page 44) or “maximum allowed temperature increase” (page 46). The TMDL should be revised to present a consistent definition of this term. Also, given the importance of these allocations and the fact that the Klamath River’s water temperatures are inherently (naturally) dynamic and variable over time and location, the TMDL should clearly explain the basis of the calculation or measurement of the assumed changes in temperature or <U+0394>T. For example, what is the assumed statistical metric (e.g., average, maximum) and time step (e.g., daily, weekly)?

Response: In the Klamath River the allowed anthropogenic change in temperature downstream of Keno Dam to the Oregon/California Stateline is measured above the 7DADM temperature when temperatures are 20 deg-C or warmer. At the Oregon/California Stateline, the change is above the monthly mean temperature.

For point sources and water management districts upstream of Keno Dam, the change measured at the point of discharge in the Klamath River is measured above the daily mean river temperature when daily maximums are < 28 deg-C. Other requirements apply to sources upstream of Keno and they are listed in Sections 2.72 and 2.73. We revised the TMDL text to make this information more consistent and clear.

PC#76: Suggested Change ID #343

Description: Load Allocations - LAs should not apply year-round

Comment: Section 2.6, page 38. Load allocations that restrict thermal loading should not apply year-round; thermal loading should be restricted only when the river does not meet the applicable temperature criterion. Because exceedances generally are restricted to summer months, thermal loading should be restricted only during those months.

Response: Thermal loading is restricted year round in order to achieve temperature targets established at Stateline by the California North Coast Water Quality Control Board. it is the policy of Oregon DEQ to achieve water quality standards established by neighboring states in interstate waters.

PC#77: Suggested Change ID #344

Description: Water Quality Standard - Additional clarification needed downstream of Keno Dam and at California's state line

Comment: Section 2.6.1, page 39. This paragraph is confusing because it does not clearly distinguish between wasteload and load allocations needed to achieve the cool water criterion upstream of Keno Dam and the 20°C criterion downstream of Keno Dam.

It states: "To achieve the human use allowance allocations downstream of Keno Dam and at California's state line, DEQ is limiting warming from anthropogenic sources such that all sources are limited to a cumulative thermal load equal to an increase of 0.3°C above the upstream ambient river temperatures when the daily maximum river temperatures are =27.7°C" [emphasis added]. The biologically based numeric criterion that applies to this reach is 20°C, not 28°C. Any sources upstream of Keno Dam that contribute to exceedances of the 20°C criterion downstream of Keno Dam should be further restricted as needed to achieve the 20°C.

The Draft TMDL needs to be revised to clarify this discussion and the criteria that apply to the different reaches of the river.

Response: The criteria that apply to different reaches of the Klamath River are discussed in Chapter 2, Section 2.1.

PC#78: Suggested Change ID #345

Description: Allocations - Allocating no warming to East Side, West Side, and J.C. Boyle Dam and Reservoir is not appropriate

Comment: Section 2.6.1, page 40 Allocating no warming to East Side, West Side, and J.C. Boyle Dam and Reservoir is not appropriate. While PacifiCorp proposed to decommission East Side and West Side and the removal of the J.C. Boyle Development is included in the Amended KHSA, the timing and implementation of these proposals is uncertain. If East Side and West Side were to be repurposed as opposed to removed, they may be present in some manner well into the future. The fate of J.C. Boyle remains to be determined by the Federal Energy Regulatory Commission as it considers the transfer and surrender proposed under the Amended KHSA.

Response: We acknowledge your comment and have decided to maintain the current zero load allocations. A zero load allocation does not mean these facilities must be removed or cannot be re-purposed for other uses. It just means the facilities must be operated in a way that does not warm the Klamath River. As stated in the Water Quality Management Plan, PacifiCorp or another DMA/Responsible person that assumes responsibility for these facilities will need to develop an implementation plan and identify how operations will not warm the Klamath River.

PC#79: Suggested Change ID #346

Description: Allocations- Additional explanation/clarification needed for HUA allocations to anthropogenic sources in the Klamath River Table 2-15

Comment: Section 2.6.1, page 40, Table 2-15. Cumulative warming in Keno for point sources is listed as 0.06°C, which can readily be ascertained from Table 2-16 (the four NPDES point sources 0.015°C allocations sum to 0.06°C). However, the two sources related to Lost River Diversion Channel and Klamath Straits Drain are both listed as 0.015°C and as discrete sources, while the cumulative warming is 0.04°C. The TMDL needs to be revised to explain where the additional 0.01°C originated from that is collectively applied to the Lost River Diversion Channel and the Klamath Straits Drain.

Aside from this apparent math error, DEQ should explain why temperature is sometimes being treated as a conservative parameter for some purposes but not for others. For example, cumulative warming at the Keno Dam outlet includes all the warming from the various point and non-point sources coming into the reservoir. The assumption that DEQ is making is that temperatures from these relatively small inflows do not equilibrate with atmospherically-driven temperatures before flows reach Keno Dam. This seems contrary to the final column in the table which is cumulative warming at the Oregon/California Stateline where somehow, these various sources do not contribute to warming and therefore receive no HUA.

Response: The cumulative warming at Keno Dam outlet presented in Table 2-15 of the draft TMDL is not based on the sum of the individual allocations, it is based on model results which isolate the warming from points sources separately from water management districts (e.g. KSD and LRDC). As described in Appendix C the warming from points sources was determined from the difference between TOD2RN2 and T1BSR2 scenarios.

The analysis DEQ used to arrive at the allocated portion of warming downstream of Keno Dam is described in Appendix C.4.1. and Section 2.7. Briefly, the allocated portion of warming assigned to sources upstream of Keno Dam were determined though iterative modeling using the difference between model scenarios TOD2RN3 and T1BSR2. We started with allocations to each point source and various water management districts (LRDC and KSD) equal to 0.075 deg-C. DEQ found these allocations did not meet all criteria including the CA targets established at Stateline. DEQ reduced the portion assigned to each source and remodeled until the model results demonstrated achievement of all criteria. DEQ has revised the allocations in the final TMDL but we followed the same approach. Based on the revised allocations, the cumulative impact at Keno outlet June 1- Sept 30 is 0.06 deg-C from points sources and 0.08 deg-C from LRDC and KSD (assigned to water management districts). 0.02 deg-C is allocated to two other water management districts. Zero is allocated to land management DMAs (see Section 2.4.2 for rationale).

PC#80: Suggested Change ID #347

Description: Allocations - inter-annual variation in the amount of natural warming or cooling should be quantified

Comment: Section 2.6.2, page 41 The TMDL states that according to OAR 340-041-0028(9)(a) "Natural background for the Klamath River means the temperature of the Klamath River at the outflow from Upper Klamath Lake plus any natural warming or cooling that occurs downstream." The Draft TMDL does not indicate if this has been quantified over multiple years or how DEQ understands what natural warming or cooling may be occurring. There is likely a great deal of variation in the amount of natural warming or cooling in any given year depending on climate and rainfall. The Draft TMDL needs to be revised to indicate how this is quantified and to take into account the difference in season and climate year to year.

Response: OAR 340-041-0028(9)(a) is the site specific criteria associated with requirements for points sources in the reach designated for cool water species upstream of Keno Dam. In this section of the river, allocations are based on a specific increase in temperature above the outflow temperatures from Upper Klamath Lake. DEQ recognizes there is annual variability in hydrologic and climatic conditions and that this will influence the temperature. We have reviewed and presented temperature data and it's distribution over multiple years (e.g. see boxplots in Excess Load section). However explicitly quantifying the difference in these changes from year to year is not a necessary precondition to establishing the TMDL allocations. The TMDL allocations for sources upstream of Keno Dam (as well as those downstream) are based on an allowed amount of warming. We have provided a set of equations in the TMDL for how allocations and compliance with allocations are calculated. Calculation of the allocation does not require the use of absolute river temperature because the allocation is expressed as an excess load equal to the product of the allocated change in temperature, river flow, and conversion factor. To evaluate compliance with the allocation, the TMDL specifies that the upstream temperature and flow be used, or the temperatures at USGS 11507500- Link River at Klamath Falls for this calculation. For DMAs managing KSD and LRDC, DEQ added this information and the equation into the TMDL since it was not included in the draft. Using this approach accounts for temperature differences from year to year.

PC#81: Suggested Change ID #348

Description: Allocations - additional clarification requested on HUA

Comment: Section 2.6.2, page 41 Please clarify how "…the 20°C Redband or Lahontan Cutthroat Trout use portion of the human use allowance established downstream of Keno Dam…" is established and why it equals 0.06°C. It is likely that these relatively small inflows fully equilibrate with atmospherically-driven water temperatures in Keno Reservoir and would not be detectable at Keno Dam; therefore there is no reason to apply a portion of the allowed cumulative warming at Keno Dam to these sources.

Response: The analysis DEQ used to arrive at the allocated portion of warming downstream of Keno Dam is described in Appendix C.4.1. and Section 2.7. Briefly, the allocated portion of warming assigned to sources upstream of Keno Dam were determined though iterative modeling using the difference between model scenarios TOD2RN3 and T1BSR2. We started with allocations to each point source, and various water management districts equal to 0.075 deg-C and found they did not meet all criteria including the CA targets established at Stateline. The model results demonstrated there to be cumulative warming downstream of Keno which resulted in monthly average increases that exceeded the 0.04 deg-C. DEQ reduced the portion assigned to each source and remodeled until the model results demonstrated achievement of all criteria. The portion of HUA remaining was distributed to the other sources including Keno Dam. DEQ has revised the allocations in the final TMDL for point sources and water management districts but we followed the same approach. Using the revised allocations, the maximum warming June 1 - Sept 30 at Keno outlet for Keno Dam is 0.08 deg-C . It is 0.06 deg-C for point sources, 0.10 deg-C for water management districts, and the remainder (0.06 deg-C) going to reserve capacity and other sources.

PC#82: Suggested Change ID #349

Description: Water Quality Standards - year-round criteria not applicable

Comment: Section 2.6.2, page 41 Although the statement that "The Klamath River is listed as impaired for temperature year-round" is correct insofar as Oregon's subsection 303(d) list is concerned, the statement is obviously incorrect and misleading insofar as when temperature criteria exceedances actually occur. As shown in Tables 2-12 through 2-14, the cool water criterion is not exceeded, and the 20.0°C criterion is, exceeded only in May-September.

Response: California targets are exceeded year-round because there is anthropogenic warming at Stateline outside of the summer period.The cool water species criteria was exceeded in the Klamath River at Miller Island Boat Ramp (USGS 420853121505500). See Excess Load section. The exceedance appears to be infrequent but it does occur.

PC#83: Suggested Change ID #350

Description: Load Allocations - approach substantially understates the background thermal load

Comment: Section 2.6.3.1, page 44 The background load allocation is based on the allowable temperature criterion, river flow, and a conversion factor. However, this substantially understates the background thermal load, as stated.

Response: Correct. The current loading from background sources and the load allocation provided to background sources are not the same. The load allocation provided to background sources is less than current loading in order to achieve the temperature criteria.

PC#84: Suggested Change ID #351

Description: Load Allocations - How are unquantified background sources separated in the analysis?

Comment: Section 2.6.3.1, page 44. Of the unquantified background sources, some are included in the modeling assessment (e.g., channel morphology, heat exchange at the air-water and bed-water interface) and some are not (e.g., hyporheic flow). How are these sources separated to effectively identify background sources in the analysis?

Response: Individual components of background loading are not quantified separately with the Klamath River model. The Klamath River model takes into account numerous characteristics of a background condition together as one model scenario (T1BSR2). That scenario includes no dams, no point sources, channel morphology conditions upstream of Keno that includes the natural basalt reef, and various other revisions to inputs that are documented in Appendix B and Appendix C.

PC#85: Suggested Change ID #352

Description: Load Allocations - How was the allowed temperature of 0.12 deg C determined for Keno Dam and Reservoir?

Comment: Section 2.6.3.3, page 47, Table 2-18 How was the allowed temperature increase of 0.12°C determined for Keno Dam and Reservoir? Specifically, was this value determined using the modeling

tools, or was this an assigned value based on some other approach? Because these point sources likely do not contribute to warming at Keno Dam, DEQ should allocate all of the available HUA to PacifiCorp at the Keno Dam and Reservoir.

Response: The cumulative warming at Keno Dam outlet is based on model results which isolate the warming from points sources separately from water management districts (e.g. KSD and LRDC). As described in Appendix C the warming from points sources was determined from the difference between TOD2RN2 and T1BSR2 scenarios.

The analysis DEQ used to arrive at the allocated portion of warming downstream of Keno Dam is described in Appendix C.4.1. and Section 2.7. Briefly, the allocated portion of warming assigned to sources upstream of Keno Dam were determined though iterative modeling using the difference between model scenarios TOD2RN3 and T1BSR2. We started with allocations to each point source and various water management districts (LRDC and KSD) equal to 0.075 deg-C. DEQ found these allocations did not meet all criteria including the CA targets established at Stateline. DEQ reduced the portion assigned to each source and remodeled until the model results demonstrated achievement of all criteria. DEQ has revised the allocations in the final TMDL but we followed the same approach. Based on the revised allocations, the cumulative impact at Keno outlet June 1- Sept 30 is 0.06 deg-C from points sources and 0.08 deg-C from LRDC and KSD (assigned to water management districts). 0.02 deg-C is allocated to two other water management districts. Zero is allocated to land management DMAs (see Section 2.4.2 for rationale).

PC#86: Suggested Change ID #353

Description: Load Allocations - It is incorrect for the Draft TMDL to conclude that Keno Dam and J.C. Boyle Dam increase water temperatures during the summer

Comment: Section 2.6.3.3, page 47 The Draft TMDL states that "Model results show both Keno Dam and JC Boyle Dam increase Klamath River temperatures for certain months (Figure 2-10, Figure 2-11, Figure 2-12, Table 2-19, and Table 2-20)." It is incorrect for the Draft TMDL to conclude that Keno Dam and J.C. Boyle Dam increase water temperatures during the summer. For context, it is important that the Draft TMDL indicate that these values were calculated based on critical conditions, which the Draft TMDL acknowledges in Chapter 1 (page 4) occur on rare occasions. The Draft TMDL should further indicate that the 7-day average daily maximum temperatures at PacifiCorp's Project facilities are commonly appreciably less than would otherwise occur in the absence of the Project. Modeling of 4 years by PacifiCorp indicates that the background maximum 7-day average daily maximums at Keno Dam and J.C. Boyle Dam outlets are typically less than would otherwise occur in the absence of the Project (see PacifiCorp 2016). Because the reservoirs' water volumes have a moderating effect on diurnal water temperature fluctuations, the PacifiCorp model results consistently show that the 7-day average daily maximum temperatures during summer at Keno Dam and J.C. Boyle Dam are cooler than would otherwise occur in the absence of the Project (see PacifiCorp 2016).

Response: Comment noted.

PC#87: Suggested Change ID #354

Description: Load Allocations - TMDL treats temperature as being conservative and should explain how the assessment deals with the the nonconservative nature of water temperature

Comment: Section 2.6.3.3, page 47, Equation 2-7.

Equation 2-7 indicates a simple formula was used to calculate thermal load allocations for dams and reservoirs in the Draft TMDL. The equation assumes that the thermal load allocation is the simple product of the allowed temperature increase and the average river flow rate. This simple equation seems to imply that the thermal load is a conservative pollutant that should increase in direct proportion to river flow. However, we know that water temperature is nonconservative and, therefore, heat is a nonconservative pollutant. As described above in the comment (number 1.4) pertaining to Figure 1-3 (Section 1.1, page 4), this distinction is important because the methodology to calculate TMDLs varies with the type of pollutant, with one method of calculation for pollutants which are generally classified as conservative and another method for pollutants generally classified as nonconservative (Federal Register, Vol. 43, No. 250). Because nonconservative pollutants vary dynamically with a number of factors and processes in the aquatic environment, nonconservative pollutant TMDLs can only be calculated with fairly sophisticated techniques (such as dynamic modeling) which takes these factors into account. The Draft TMDL should clarify how the TMDL assessment specifically deals with the nonconservative nature of water temperature and thermal load allocations.

Response: DEQ used the Klamath River model to evaluate temperature changes in the Klamath River and to support establishment and evaluation of allocations. The model development and calibration documentation was added as Appendix B . Model scenarios and results are in Appendix C.

PC#88: Suggested Change ID #355

Description: Load Allocations - Additional clarification requested on reductions calculated for the model year

Comment: Section 2.6.3.3, page 48. The Draft TMDL states: “The reductions calculated for the model year are shown in Table 2-19 and Table 2-20.” The Draft TMDL further states: “The reductions shown represent the maximum reduction for each month the allocations apply.” However, for context, it is important that the Draft TMDL indicate that these values were calculated based on critical conditions, which the Draft TMDL acknowledges in Chapter 1 (page 4) occur on rare occasions. The Draft TMDL should further indicate that the 7-day average daily maximum temperatures at PacifiCorp’s Project facilities are commonly appreciably less than would otherwise occur in the absence of the Project.

Response: The figures identify that these are the maximum reductions. Even if exceedances are rare, allocations must be established so that water quality criteria are achieved at all times.

PC#89: Suggested Change ID #356

Description: Models - DEQ should consider revising the Draft TMDL based on newer already-available models

Comment: Section 2.6.3.3, page 48 The Draft TMDL states: “The reduction calculations were based on flow and climate conditions in the year 2000.” The Draft TMDL further states: “DEQ expects the Klamath River models to be refined and improved upon, particularly to guide TMDL implementation.” As described in other comments (see comments 1.11 and 2.13), modeling based on the single year 2000 is inadequate to represent the natural variability and effects related to water temperature conditions in the Klamath River. As DEQ is aware, additional Klamath River models are readily available that include several other model years (e.g., see PacifiCorp 2016) and contain numerous refinements over the model used for the Draft TMDL. PacifiCorp recommends that DEQ consider revising the Draft TMDL based on these already-available more robust models.

Response: DEQ understands the temperature conditions in the Klamath River will vary from year to year. We do not agree that quantifying temperature variability over multiple years is a necessary precondition to establishing the TMDL allocations. The TMDL allocations are set at a level necessary to achieve the temperature criteria. The temperatures that attain the criteria (e.g. 20 degrees Celsius plus 0.3 degrees for human sources) does not change from year to year. In turn the establishment of the allocation to attain the criteria is less reliant on the year to year variability.

In regards to your comment on model updates. We reviewed PacifiCorp 2016 which we understand to be at this time the most recent application submitted to DEQ. This particular application was originally submitted in 2014 and administratively withdrawn by PacficCorp and most recently resubmitted in 2016. As far as we can tell the application content has not changed since it's original submittal in 2014.

In terms of the model updates, we assume you are referring to the Klamath River models developed by the USGS (Sullivan et al 2011, Sullivan et al 2013a, Sullivan et al 2013b, and Sullivan and Rounds 2016). DEQ did consider using these models for the 2019 Temperature TMDL but eventually decided against it because they have two major limitations. 1) The model domain is only for the Klamath River from Link Dam to Keno Dam and excludes the portion of the Klamath River from Keno Dam to the OR/CA Stateline. 2) The USGS models do not include a natural condition scenario. These models and scenarios would all have to be developed. Constructing these new models and scenarios is not an insignificant effort and would require data for these particular years that in some cases was not available. Therefore we do not agree that these models are "readily available" as stated in your comment. Other than having a larger set of available continuous data to set boundary conditions, most of the USGS model enhancements were focused on updating the rates and coefficients for various nutrient parameters, adding prediction of macrophytes, and alternative pH-buffering calculations. None of these updates are relevant for temperature. Because of these limitations and the fact that having additional years of temperature information is not a precondition for setting allocations, we felt the year 2000 model was the best tool currently available that would meet TMDL objectives.

Citations:

Sullivan, A.B., Rounds, S.A., Deas, M.L., Asbill, J.R., Wellman, R.E., Stewart, M.A., Johnston, M.W., and Sogutlugil, I.E., 2011, Modeling hydrodynamics, water temperature, and water quality in the Klamath River upstream of Keno Dam, Oregon, 2006–09: U.S. Geological Survey Scientific Investigations Report 2011-5105, 70 p.

Sullivan, A.B., Rounds, S.A., Asbill-Case, J.R., and Deas, M.L., 2013a, Macrophyte and pH buffering updates to the Klamath River water-quality model upstream of Keno Dam, Oregon: U.S. Geological Survey Scientific Investigations Report 2013-5016, 52 p. [Available online at https://pubs.usgs.gov/sir/2013/5016/]

Sullivan, A.B., Sogutlugil, I.E., Rounds, S.A., and Deas, M.L., 2013b, Modeling the water-quality effects of changes to the Klamath River upstream of Keno Dam, Oregon: U.S. Geological Survey Scientific Investigations Report 2013-5135, 60 p. [Available online at https://pubs.usgs.gov/sir/2013/5135/]

Sullivan, A.B., and Rounds, S.A., 2016, Modeling water quality, temperature, and flow in Link River, south-central Oregon: U.S. Geological Survey Open-File Report 2016-1146, 31 p. [Available online at https://pubs.er.usgs.gov/publication/ofr20161146]

PC#90: Suggested Change ID #357

Description: Implementation Plan - temperature management plan from PacifiCorp

Comment: Section 2.6.3.3, page 48 The Draft TMDL states: "The department may, on a case-by-case basis, require the Klamath River dams to develop and implement a temperature management plan." The WQMP at page 249 of the Draft TMDL would require PacifiCorp to submit a temperature management plan within 18 months of the final TMDL or in accordance with the Amended KHSA. Section 6.3 of the Amended KHSA provides that PacifiCorp will submit a TMDL implementation within 60 days of an approved TMDL and also specifies the contents of the plan. In response to this provision, PacifiCorp previously submitted a temperature management plan to DEQ in February 2011 following DEQ's issuance of December 2010 Klamath temperature TMDL.

Response: DEQ will ask that PacifiCorp update and resubmit the plan submitted as a response to the KHSA in 2011. The KHSA was amended in 2016 and this is an entirely new TMDL with new requirements and new allocations. In addition, the WQMP requires a monitoring plan and had a set of goals, milestones and compliance deadlines to meet.

PC#91: Suggested Change ID #358

Description: Modeling - limitations

Comment: Section A.1 - entire section - The limitations listed in this appendix to the Draft TMDL are considerable and are comprised of many assumptions, estimations, speculations, and other approximations. Yet how these many limitations contribute to uncertainty is not represented in the TMDL. There are so many degrees of freedom (parameters that can be estimated and adjusted) that it is no surprise that the model can be "fit" to match measured data. However, extrapolating those many assumptions, estimates, and so on to a "natural" conditions or other scenarios can introduce considerable error, especially as the errors compound between different interrelated variables. The Draft TMDL should discuss this potential for error in the modeling. Review of the remainder of the section indicates that much of this modeling work was completed with little or no field observations to substantiate model assumptions, a major limitation that was not listed in this extensive list.

Response: Uncertainty is accounted for through the TMDL margin of safety. DEQ uses the best information available. Data used for building and calibrating the model is presented in Appendix A.

PC#92: Suggested Change ID #359

Description: Modeling - sensitivity analysis

Comment: Comment A.2, page A-2, eighth bullet - The Draft TMDL states: "Heat Source breaks the stream into 50-meter segments. Inputs (vegetation, channel morphology, etc.) are averaged for each 50-meter segment, which means that the simulation may not account for some of the real world variability. For example, isolated pools or riffles within a 50 meter reach will not be included as unique features." Was any sensitivity analysis completed on this assumption and the 50-meter reach length?

Response: No.

PC#93: Suggested Change ID #360

Description: Modeling - Month 2 simulation Klamath tribs

Comment: Comment A.3, page A-2, 9th bullet - The Draft TMDL states: "For the tributaries to the Klamath and Lost Rivers, Heat Source simulations were performed for at most a two month period during a single summer, which was intended to represent a critical condition for aquatic life. Stream temperatures will react differently to effective shade under other flow regimes and climactic conditions." The results presented in the Draft TMDL do not indicate more than approximately 1 month of simulation for Klamath River tributaries; what happened to modeling results from the second month?

Response: We revised this text to say "..Heat Source simulations were performed for a two to three week period during the months of July or August…".

PC#94: Suggested Change ID #361

Description: Modeling - clarify flow estimates

Comment: Comment A.4, page A-3, 3rd bullet - The Draft TMDL states: "Stream velocities and depths were calculated by Heat Source for the "natural" flow conditions based on measured channel dimensions and substrate composition. These estimated velocities and depths for the "natural" flows may have some error associated with them since they have not been verified through field measurements." This seems to indicate that flows and depths are estimated (simulated?), but measured channel dimensions and substrate composition do not seem to be based on any actual field observations or field visits. The Draft TMDL needs to clarify how these estimates were made or simulations were conducted.

Response: Flows and depths are simulated with the model. Inputs to Heat Source are channel dimensions, not water depth. Flow is specified at boundary conditions but not internally to the model domain reaches and are therefore simulated. Channel width was derived through GIS and other model inputs like width to depth ratio were used where data were available, typically at locations where instream flow measurements were made. This information was added to Appendix A.

PC#95: Suggested Change ID #362

Description: Modeling - field verification

Comment: Comment A.5, page A-9, 2nd paragraph The Draft TMDL states: "Step 3. Compared sampled channel width and ground level measurements. TTools sampled channel widths were then compared to ground level measurements for verification purposes." Where are the field measurements documented (e.g., how many field measurements were used for comparison and where were they located)? The assumption is that a "ground level measurement" includes a field visit yet the Draft TMDL does not provide the information about such visits.

Response: References to the data and data sources have been added to Appendix A. There are measurements of channel width at flow measurement sites.

PC#96: Suggested Change ID #363

Description: Modeling - dimensions & substrate Jenny Creek

Comment: Comment A.6, General The Draft TMDL indicates that the Heat Source Model was used to simulate temperatures for the Draft TMDL's analysis of Jenny Creek (along with Spencer Creek and

Miller Creek). Based on information presented in Appendix A of the Draft TMDL and the Heat Source Model spreadsheet, PacifiCorp notes the following issues with Heat Source Model

assumptions: <U+F0B7> The Draft TMDL indicates that stream velocities and depths calculated by Heat Source for the "natural" flow conditions were based on measured channel dimensions and substrate composition. Please specify the source of the measured channel dimensions and substrate composition for Jenny Creek.

Response: Reference to this information as been added to Appendix A.

PC#97: Suggested Change ID #364

Description: Modeling - Heat Source model uncertainty

Comment: Comment A.6, General The Draft TMDL indicates that the Heat Source Model was used to simulate temperatures for the Draft TMDL's analysis of Jenny Creek (along with Spencer Creek and Miller Creek). Based on information presented in Appendix A of the Draft TMDL and the Heat Source Model spreadsheet, PacifiCorp notes the following issues with Heat Source Model assumptions:

The Draft TMDL indicates that "the uncertainty related to allocations is accounted for in the Margin of Safety"; however, in the Heat Source Model, uncertainty is not quantified or discussed.

Response: Uncertainty is accounted for through the TMDL margin of safety. Limitations in the technical methodology for tributaries are discussed in Appendix A.

PC#98: Suggested Change ID #365

Description: Modeling - channel geometry

Comment: Comment A.6, General The Draft TMDL indicates that the Heat Source Model was used to simulate temperatures for the Draft TMDL's analysis of Jenny Creek (along with Spencer Creek and Miller Creek). Based on information presented in Appendix A of the Draft TMDL and the Heat Source Model spreadsheet, PacifiCorp notes the following issues with Heat Source Model assumptions:

The Draft TMDL indicates that channel geometry and dimensions in the Heat Source Model were determined through model calibration. Channel geometry is not a normal calibration parameter. Accurate channel geometry is crucial for simulated temperature under different flow conditions, and should be based on empirical data and information. This statement may also contradict the previous statement made about measured channel dimensions, which presumably would provide some information on channel geometry.

Response: DEQ uses the best information available. Channel geometry was a calibration parameter where we did not have data. Channel width was derived through GIS and channel geometry was used where data were available, typically at locations where instream flow measurements were made. This information was added to Appendix A.

PC#99: Suggested Change ID #366

Description: Allocations - DEQ does not have the authority to establish TMDLs at Stateline based on standards for California/also a temperature measurement of 0.04 deg C is not possible

Comment: Section 2.6.4, page 52. The Draft TMDL states: "The warming above the monthly average does not exceed 0.04 °C - a temperature considered not measureable with field instrumentation that attains California's requirements." See comment 2.1 above on Section 2, page 1, paragraph 1 that DEQ does not have the authority to establish TMDLs at Stateline based on standards for California. See comment 2.14 above on Section 2.1.2.4, page 18, paragraph 2 that a temperature measurement of 0.04°C is not possible with typical water-quality monitors and is unreasonable to assume.

Response: It is the policy of Oregon DEQ to achieve water quality standards established by neighboring states in interstate waters. We agree that a change in temperature of 0.04 degrees Celsius is not measurable with standard temperature monitoring equipment.

PC#100: Suggested Change ID #367

Description: Modeling - Mannings N values

Comment: Comment A.6, General The Draft TMDL indicates that the Heat Source Model was used to simulate temperatures for the Draft TMDL's analysis of Jenny Creek (along with Spencer Creek and Miller Creek). Based on information presented in Appendix A of the Draft TMDL and the Heat Source Model spreadsheet, PacifiCorp notes the following issues with Heat Source Model assumptions:

The Draft TMDL indicates that "Manning's n" values were iteratively altered so that Heat Source Model temperatures approximately reproduced measured temperatures. However, the model's assumed Manning's N values of 0.1 to 0.5 are inconsistent with field values reported in the literature. It appears that the Heat Source Model's Manning's n values were altered to make up for the model's lack of hydraulic capabilities, wherein travel times can only be attained through erroneously high roughness values. It also appears that the Manning's n values were altered to modify depth and create a uniform width-to-depth ratio, which is constant for over 90 percent of the stream at a ratio of approximately 8. Such constant ratios are not typical of streams like Jenny Creek with variable longitudinal velocity regimes. The Draft TMDL does not provide any justification for the reason these alterations were made or the affect they may have on the relationship between the model and reality.

Response: Manning's n values are often outside of literature values in 1D models.

PC#101: Suggested Change ID #368

Description: Modeling - simulated velocity

Comment: Comment A.6, General The Draft TMDL indicates that the Heat Source Model was used to simulate temperatures for the Draft TMDL's analysis of Jenny Creek (along with Spencer Creek and Miller Creek). Based on information presented in Appendix A of the Draft TMDL and the Heat Source Model spreadsheet, PacifiCorp notes the following issues with Heat Source Model assumptions:

The Heat Source Model's simulated velocity results are not presented in the Draft TMDL. Modeled velocities show longitudinal variation that is based only on manufactured or "calibrated" cross sections and may not realistically represent actual physical conditions.

Response: Velocity results are not presented but not because the cross sections are “manufactured” which implies we made it up. We used the best available information at the time of modeling to support the model development. The model channel geometry is based on channel widths derived using a GIS and aerial imagery with review and comparison to observed values where we had them. In this case mostly at locations where flow was measured.

PC#102: Suggested Change ID #369

Description: Allocations - should be based on the applicable water quality standards established in OR and not based on standards for CA

Comment: Section 3.1.2.4, page 67 The Draft TMDL states: “allocations established in the Jenny Creek Watershed and other Watersheds in Oregon’s TMDL must also achieve the water quality standards and numeric targets established in California.” PacifiCorp respectfully disagrees. The waterbodies addressed by the Draft TMDL are waterbodies in the Upper Klamath and Lost River Subbasins of Oregon. The Draft TMDL WLA and LA must be based on the applicable water quality standards in those subbasins. DEQ does not have the authority to establish TMDLs at Stateline based on standards for California.

Response: It is the policy of the Oregon DEQ to achieve water quality standards established by neighboring states in interstate waters.

PC#103: Suggested Change ID #370

Description: Water Quality Standards - Draft TMDL should clarify that not all controllable water quality factors are regulated under a TMDL

Comment: Section 3.1.2.4, page 67 The Draft TMDL quotes an unknown source in stating that “Controllable water quality factors are those actions, conditions, or circumstances resulting from human activities that may influence the quality of the waters of the state and that may be reasonably controlled.” The Draft TMDL should clarify that not all controllable water quality factors are regulated under a TMDL. For example, PacifiCorp’s only activity with respect to Jenny Creek and Spring Creek is to divert water from Spring Creek (which flows into Jenny Creek). This diverted water eventually ends up in PacifiCorp’s Fall Creek Project in California. This activity may not be regulated under a TMDL because it does not add any thermal or other load to Spring or Jenny Creek. No heat is added to the creeks, and the diversion does not increase solar radiation to the creeks. Although the diversion may affect the temperatures of the creeks (e.g., by reducing flow and volume), this is not a thermal load to which a TMDL may be addressed. See 33 U.S.C. § 1313(d)(1)(D); 40 C.F.R. 130.2(e) (defining “load” or “loading” as “[a]n amount of matter or thermal energy that is introduced into a receiving water”); OAR 340-042-0040(4)(d), (e), (h).

Response: DEQ views the temperature increases in Spring Creek and Jenny Creek to be from heat pollution as a direct result from the practice of flow diversion in Spring Creek. The source of warming and heat input is from the practice of diverting water out of Spring Creek which facilitates rapid temperature warming because of the loss in loading capacity due directly to the practice of said diversions. OAR 340-042-0030(12) defines a pollutant “Source” to mean “any process, practice, activity or resulting condition that causes or may cause pollution or the introduction of pollutants to a waterbody”. The diversion of water is a practice that causes the existing heat loading to be heat pollution. The heat pollution results in a condition that contributes to the exceedance of the temperature criteria. We have identified the Spring Creek diversion as a source of warming and provided heat allocations accordingly.

PC#104: Suggested Change ID #371

Description: Editorial - terminology - text update requested

Comment: Section 3.2.1, page 69 The Draft TMDL states: "The portion of the Upper Klamath River upstream of Keno Dam to the mouth of Link River (a segment of the Klamath River), including Lake Ewauna, approximately river miles 231 to 252, is referred as the "Keno impoundment." However, this portion of the upper Klamath River is most commonly referred to as "Keno Reservoir."

Response: This language has been removed from Section 3.2.1 because the Klamath River TMDLs are presented in Chapter 2. Language has been added to Chapter 2 that the Keno impoundment is also commonly known as the Keno Reservoir.

PC#105: Suggested Change ID #372

Description: Modeling - Klamath River miles

Comment: Comment C.1, General River Kilometer (RKM) as used in the Draft TMDL is not defined and is inconsistent with the typical River Mile (RM) or RKM metric used in river systems, including in the Klamath River basin, which extend from RM 0 at the mouth and increasing upstream to RM 254 at Link River Dam. In the Draft TMDL, locations for specific model results are given as an RKM location without a defined starting point. For example, in Table C-11, RKM 10.91 is listed as the location of maximum excess temperature, but this cannot be the typical RKM, which would be about 11 kilometers from the ocean. The Draft TMDL should be revised to present the results in Appendix C in a manner consistent with common use of RM and RKM.

Response: We have added information into the TMDL Appendix to describe the geographic extent of each model. Additional maps have been added to clarify the modeling extent. Appendix C has been updated to include captions for the longitudinal plots and explain the spatial extent shown.

PC#106: Suggested Change ID #373

Description: Modeling - solar radiation reductions

Comment: Comment C.2, General The Draft TMDL's Klamath River temperature modeling includes erroneous reductions in solar radiation of 20 percent in certain modeled river reaches and scenarios. As a result of this modeling error, the Draft TMDL overestimates the maximum temperature effects of Keno and J.C. Boyle dams, resulting in calculations of excessive temperature offsets for the dams. The reservoir reaches are modeled with 100 percent of solar radiation (no reduction). For example, where J.C. Boyle Reservoirs is included in an analysis, 100 percent solar radiation is applied. For the same reaches under a no-dams analysis, 80 percent solar radiation is applied. This results in a bias in which the downstream temperature effects of the reservoirs and their required offsets are overstated. The TMDL model should be corrected with consistent solar radiation applied to all reaches, and temperature offsets in the Draft TMDL should be updated accordingly. This issue is discussed in greater detail in "Attachment B."

Response: This assertion has been shown to be incorrect and there is no bias (see response to comments during 2010 (DEQ, 2010)). The Draft TMDL relies on a comprehensive water quality model of the Klamath River that was originally developed by PacifiCorp's consultant, Watercourse Engineering,

Inc. Upon running the model and evaluating the results it was found that PacifiCorp's model over predicted temperatures in the reach between JC Boyle Dam and Copco reservoir. Tetra Tech investigated and found that the PacifiCorp model was using unadjusted RMA-11 predicted solar radiation which was approximately 20% higher than the solar radiation data for a site nearby. To maintain consistent solar radiation inputs between models and to correct for RMA-11's over prediction of solar radiation, Tetra Tech adjusted the RMA-11 solar radiation downward by 20%.

The solar radiation DEQ used in the different scenarios is in much closer agreement than using 100% of the RMA predicted solar radiation. (See figure contained in DEQ's response PacifiCorp 63 from DEQ, 2010). When using the RMA at the same location i.e. along JC Boyle it is necessary to use the adjusted solar radiation since the RMA predicted values are quite high (please see Figure). Additionally, DEQ's solar radiation inputs are in closer agreement with predictions from Heat Source at the mouth of Spencer Creek which was presented in Appendix A of the draft TMDL. Given the history of using CE-QUAL-W2 and Heat Source for temperature TMDLs in Oregon, DEQ has more confidence in these solar radiation predictions than RMA without adjustments. The comparison of measured temperatures to model results shows the model is appropriately calibrated and can be used to derive allocations (see Appendix B of the TMDL).

Oregon Department of Environmental Quality (DEQ). 2010. Response to Comments - Upper Klamath and Lost River Subbasins - TMDL & WQMP. December 2010

PC#107: Suggested Change ID #374

Description: Editorial - text update clarification requested about PacifiCorp water right to divert from Spring Creek

Comment: The Draft TMDL states: "PacifiCorp has a water right to divert up to 16.5 cubic feet per second from Spring Creek (PacifiCorp 2004a)." The Draft TMDL further states: "Apparently, there were water right disputes between PacifiCorp and a landowner, and PacifiCorp did not divert water from Spring Creek from 1990 to April 2003 (PacifiCorp 2004b and L. Prendergast pers. comm. 2009)." The Draft TMDL should also indicate that the Oregon Water Resources Department ultimately determined that PacifiCorp did in fact have the right to this water (PacifiCorp 2004b – as cited in the TMDL).

Response: Section 3.2.6 has been updated to indicate that "The Oregon Water Resources Department ultimately determined that PacifiCorp did in fact have the right to this water (PacifiCorp 2004b)."

PC#108: Suggested Change ID #375

Description: Modeling - Keno Dam outfall temperature

Comment: Comment C.3, General Related to the temperature offsets for Keno Reservoir reported in the Draft TMDL, PacifiCorp believes the Draft TMDL model has an important defect that affects Keno Dam "outfall" temperature predictions. Model inspection by Watercourse Engineering has determined that questionable temperature simulation output was produced in the last segment of the model's computational grid for Keno Reservoir. Predicted temperatures from this last segment were found to diverge sharply between model scenarios. This issue is discussed in greater detail in Appendix A of Hemstreet (2010). Before the Draft TMDL's model results for this location are used to set allocations, this issue should be resolved.

Response: Based on our review DEQ does not find an error. There is only a result that PacifiCorp cannot explain and supposes to be an error. We believe the difference is due to using a depth average for calculating the temperature. The temperatures at Keno Dam outlet are used as a compliance point because this is the most upstream location where the human use allowance must be achieved.

The comment that Keno Dam should not have an adverse effect on temperature is not supported based on model results.

PC#109: Suggested Change ID #376

Description: Modeling - A/D natural sources

Comment: Comment C.4, page C-4 The Draft TMDL states: "This scenario involved running a version of the Klamath River Model that includes no dams, with the exception of Link Dam at the upper boundary to the model. All the point sources and derived accretion/depletion flows for flow balance in the existing model were removed in this scenario." Accretion and depletion flows in Keno impoundment that were necessary for reproducing water surface elevations in the current condition model were removed for the natural conditions model. Accretion and depletion (A/D) are surrogates for ungauged flow that could come from agricultural returns, groundwater, spring flows, etc. The A/D coming from "natural" sources, such as groundwater and spring flows, should be retained in the model, and not removed.

Response: Derived accretion/depletion flows for flow balance in the existing model were removed. Over the course of the year, the accretion/depletion flows average to near zero, so they likely do not represent an ungaged groundwater input. On shorter time scales, the accretion flows can be significant enough to alter the instream concentrations depending on assumptions about their temperature/concentrations. Out of concern that the accretion flows might influence allocations to point and nonpoint sources, they were removed in the scenarios. This assumption has also been included in the list of assumptions for the scenarios in Appendix C.

PC#110: Suggested Change ID #377

Description: Modeling - KSD LRDC temp/flow

Comment: Comment C.5, page C-4, 3rd para The Draft TMDL states: "In the updated T1BSR scenario i.e. the T1BSR2 scenario, the boundary temperature data were set such that they match the hourly temperature of the upstream segments. Specifically, in the Lake Ewauna W2 model, temperatures from segment 19 and segment 71 were used to configure LRDC and KSD respectively. This has the same effect of eliminating the LRDC and KSD impact without disrupting the complicated flow patterns. All other key assumptions/configuration were set to be same as the T1BSR scenario documented in the Modeling Scenario Memo from December 2009. The Lake Ewauna model was run twice to establish the boundaries for LRDC and KSD, since both tributaries input at different locations. The LRDC boundaries were first configured using the segments 19 temperatures and then the model was run using the updated LRDC boundaries. The model was then re-run with the updated LRDC boundaries to extract the temperatures for KSD, which is located downstream of LRDC. Finally, the model was run again with the updated boundaries for LRDC and KSD. The updated LRDC and KSD temperature time series used in the T1BSR2 scenario along with the UKL temperature time series used previously to configure the model are shown below in Figure C-1." (emphasis added)

Setting the LRDC and KSD to the temperature of the river does not have the same effect as eliminating them. Retaining the inflows (a) adds a thermal load that would be absent if the flows were actually

eliminated, and (b) changes the volume and flow rate of the river downstream of each of these two points, which in turn changes the travel time and rate of heating. Further, in the 2010 TMDL the KSD flows enter the river cooler than the Klamath River (DEQ 2010). KSD flows are often cooler than the river because, by relative comparison, the drain is narrow and deep, while the river is wide and shallow. By assigning KSD temperatures to be the same as the river erroneously adds a thermal load to the KSD inflows, overstating the impact of these inflows on the Klamath River and Keno Reservoir.

Response: While KSD and LRDC are essentially constructed canals, they take advantage and were constructed where water naturally used to flow. DEQ considers KSD and LRDC to be waterbodies (i.e. waters of the state) with an associated loading capacity and beneficial uses. We treat them in the model similar to how we treat tributaries. It is not appropriate to remove a tributary. Given the modifications that have occurred it is difficult to establish what the natural temperature of these waterbodies should be. Given they historically used to mix with Klamath River water, we set the temperatures to be the same as the Klamath River one segment upstream. In addition keeping LRDC and KSD flows in the Klamath River Model makes it possible to evaluate dam impacts directly (i.e., by representing a similar flow condition between the with-dam and without-dam conditions).

PC#111: Suggested Change ID #378

Description: Modeling - Keno HUA

Comment: Comment C.6, page C-18, para 1 How was the "cumulative HUA at Keno Dam outlet due to Keno Dam and Reservoir" determined to be 0.12°C?

Response: The cumulative warming at Keno Dam outlet presented in Table 2-15 of the draft TMDL is not based on the sum of the individual allocations, it is based on model results which isolate the warming from points sources separately from water management districts (e.g. KSD and LRDC). As described in Appendix C the warming from points sources was determined from the difference between TOD2RN2 and T1BSR2 scenarios.

The analysis DEQ used to arrive at the allocated portion of warming downstream of Keno Dam is described in Appendix C.4.1. and Section 2.7. Briefly, the allocated portion of warming assigned to sources upstream of Keno Dam were determined though iterative modeling using the difference between model scenarios TOD2RN3 and T1BSR2. We started with allocations to each point source and various water management districts (LRDC and KSD) equal to 0.075 deg-C. DEQ found these allocations did not meet all criteria including the CA targets established at Stateline. DEQ reduced the portion assigned to each source and remodeled until the model results demonstrated achievement of all criteria. DEQ has revised the allocations in the final TMDL but we followed the same approach. Based on the revised allocations, the cumulative impact at Keno outlet June 1- Sept 30 is 0.06 deg-C from points sources and 0.08 deg-C from LRDC and KSD (assigned to water management districts). 0.02 deg-C is allocated to two other water management districts. Zero is allocated to land management DMAs (see Section 2.4.2 for rationale).

PC#112: Suggested Change ID #379

Description: Modeling - effects of increased temperature

Comment: Comment C.7, page C-19, Table C-19 No cumulative impact due to anthropogenic sources is allowed at the Oregon/California border (Draft TMDL, page C-21), presumably to meet the California TMDL requirements. As stated elsewhere in these comments, implementing California TMDL

requirements in TMDLs for Oregon waterbodies exceeds DEQ's TMDL authority. But, assuming that it were appropriate to implement California requirements, the Draft TMDL should discuss the actual impact if these minor (0.1°C or less) increases in water temperature occur when the numeric temperature criterion to protect designated fish and aquatic life uses (20oC) is not exceeded. Table C-19 and Figure C-9, both reproduced below, indicate that these occur in March, April, and November, when water temperatures are well below 20oC. These modeled changes in water temperature are meaningless from a biological or ecological point of view and do not adversely affect the beneficial uses of the Klamath River. They are presented as an issue because the California TMDL requirements purportedly do not allow any change even though (as noted in Appendix E of the Draft TMDL) "The natural receiving water temperature of intrastate waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Water Board that such alteration in temperature does not adversely affect beneficial uses." Even if it were appropriate to address the California TMDL requirements, the Draft TMDL should be updated to include an analysis of the effects, if any, such a change has on beneficial uses.

Response: Thank you for your comment. Note that it is the policy of Oregon DEQ to achieve water quality standards established by neighboring states in interstate waters. This language has been added to the TMDL report in Tables 2-1, 3-1, and 4-1. The Klamath River model was re-run to accommodate changes to the allocations and to allow for seasonal allocations. The allocations will be seasonal corresponding to the critical period for Oregon's criteria (June 1 - Sept 30) and the period where allocations are only established to achieve CA's criteria (Oct 1 - May 31). The impact at the state line due to dams occurs in April, July, August, and September. See changes to Appendix C.

PC#113: Suggested Change ID #380

Description: Figures - description of model results

Comment: Comment C.8, App C.5 C-22 to C-41, all paragraphs, all tables & figures Several figures in the appendix lack titles describing what they are and some legends are incomplete or incorrect. The reader has to guess where the (undefined) reaches start and stop in several cases. The y-axis is water temperature or excess heat load and the x-axis is distance, but the date is not stated (which month of the year are these?). Overall, these graphs do not allow effective interpretation of model results. For example, on page C-25 there are two figures titled J.C. Boyle – Existing Conditions which are followed on C-26 and C-27 by some labeled Full Flow – Existing Conditions. There is no text or explanation of what these figures mean, how they were created, the assumptions that went in to them, or any other information that would help the reader understand the water temperature implications.

Response: Appendix C has been updated to include a note describing the longitudinal plots and how they were calculated. Additionally a Figure caption is included for the longitudinal plots with a description of plot. Minor legend and y-axis descriptions have been fixed.

PC#114: Suggested Change ID #381

Description: Targets - CA targets

Comment: Comment E.1, page 3, Item 6

The Draft TMDL states: "On the Klamath River, the natural receiving water temperatures at the California Oregon boundary were determined as output from the T1BSR model scenario of the Klamath TMDL model and described in Tetra Tech, December 23, 2009 Modeling Scenarios: Klamath River

Model for TMDL Development. Natural temperatures for the mainstem Klamath River, expressed as monthly averages, at the CA-OR Stateline are listed in Table 5.3 of the 2010 TMDL.

Considering the data and models from several years (versus a single year: 2000) that were (and are) available, only one year was employed in setting the targets listed above. Using only a single year as a basis for load allocations, the TMDL analysis provides no information on inter-annual variability – a considerable omission in a system with the size and complexity of the Klamath River. Different meteorology and hydrology from other years will yield different, and likely lower and higher, load allocations, thus creating loading allocations that not only offset conservative assumptions, but in certain years will be unachievable.

Response: DEQ understands the temperature conditions in the Klamath River will vary from year to year. We do not agree that modeling multiple years is a necessary precondition to establishing the TMDL allocations. The TMDL allocations are set at a level necessary to achieve the temperature criteria. The temperatures that attain the criteria (e.g. 20 degrees Celsius plus 0.3 degrees for human sources) does not change from year to year. In turn the establishment of the allocation to attain the criteria is less reliant on the year to year variability.

Application and configuration of TMDL models were guided by an EPA-approved Quality Assurance Project Plan (QAPP). Modeling QAPPs and associated technical memoranda or addendums identify quality expectations for steps in the modeling process such as data acquisition, model selection, domain configuration, training or calibration, scenario prediction, and reporting. Such quality expectations serve multiple objectives, including requirements under 40 CFR 130.7(c)(1) that TMDLs shall account for critical conditions. We have added a new section into Chapter 2 (Section 2.3 - Water Quality Modeling Overview) which provides an overview of the modeling and the flow conditions during the model period.

DEQ evaluated the impact of allocations on source warming in the Klamath River using flow and temperature data collected from 2013-2018. Based on this analysis the largest reductions are in winter months. The analysis has been added to the TMDL as Appendix I.

PC#115: Suggested Change ID #382

Description: Source Characterization - text update requested for effects to Spring Creek from Project Operations based on latest accurate information

Comment: Section 3.2.6, page 77 The Draft TMDL states: “U.S. Bureau of Land Management reports that the Fall Creek Hydroelectric Project impacts to Spring Creek warm the waters of Jenny Creek by up to 3.1 °C (5.4 °F) for 1-3 miles downstream of the confluence (BLM 2004).” The Draft TMDL should refer to PacifiCorp 2016 for the latest accurate information on effects to Spring Creek from Project operations. Also see the following comment (number 3.6) regarding the diversion of water as it relates to addition of thermal load.

Response: We added the most recent information regarding Spring Creek to the TMDL per your comments.

PC#116: Suggested Change ID #383

Description: Allocations - PacifiCorp's Fall Creek Project cannot be regulated under a TMDL

Comment: Section 3.2.6, page 77 PacifiCorp's only activity with respect to Jenny Creek and Spring Creek is to divert water from Spring Creek (which flows into Jenny Creek) to PacifiCorp's Fall Creek Project in California. This activity may not be regulated under a TMDL because it does not add any thermal or other load to Spring or Jenny creeks. No heat is added to the creeks, and the diversion does not increase solar radiation to the creeks.

Although the diversion may affect the temperatures of the creeks (e.g., by reducing flow and volume), this is not a thermal load to which a TMDL may be addressed. See 33 U.S.C. § 1313(d)(1)(D); 40 C.F.R. 130.2(e)(defining "load" or "loading" as "[a]n amount of matter or thermal energy that is introduced into a receiving water"); OAR 340-042-0040(4)(d), (e), (h).

Section 3.7.1, page 119 Table 3-30 specifies HUA allocations to anthropogenic sources in the Jenny Creek Watershed including PacifiCorp's diversion for the Fall Creek Hydroelectric Project. As previously stated, PacifiCorp's Fall Creek Project diversion from Jenny Creek may not be regulated under a TMDL because it does not add any thermal or other load to Spring or Jenny Creek. No heat is added to the creeks, and the diversion does not increase solar radiation to the creeks. Although the diversion may affect the temperatures of the creeks (e.g., by reducing flow and volume), this is not a thermal load to which a TMDL may be addressed. See 33 U.S.C. § 1313(d)(1)(D); 40 C.F.R. 130.2(e)(defining "load" or "loading" as "[a]n amount of matter or thermal energy that is introduced into a receiving water"); OAR 340-042-0040(4)(d), (e), (h).

Response: DEQ views the temperature increases in Spring Creek and Jenny Creek to be from heat pollution as a direct result from the practice of flow diversion in Spring Creek. The source of warming and heat input is from the practice of diverting water out of the Spring Creek which facilitates rapid temperature warming because of the loss in loading capacity due directly to the practice of said diversions. OAR 340-042-0030(12) defines a pollutant "Source" to mean "any process, practice, activity or resulting condition that causes or may cause pollution or the introduction of pollutants to a waterbody". The diversion of water is a practice that causes the existing heat loading to be heat pollution. The heat pollution results in a condition that contributes to the exceedance of the temperature criteria. We have identified the Spring Creek diversion as a source of warming and provided allocations accordingly.

It is PacfiCorp's responsibility to evaluate their operations in Spring Creek and propose management strategies in their TMDL implementation plan that will show achievement of allocations and temperature criteria.

PC#117: Suggested Change ID #384

Description: Figures - Figure update/clarification requested for Figures 3-11 to 3-19

Comment: Section 3.2.7, pages 78-83, Figures 3-11 to 3-19 There are no dates specified for data used in these plots. Are these the same data from the 2010 TMDL, or have the original data sets been updated with additional information? In addition, box plots are only really useful to depict variability in data sets with numerous individual points. The Draft TMDL should include the sample size for each of these plots.

Response: Additional language and tables have been added to Section 3.2.7 Temperature Data to identify additional information such as data source, period of record, and number of observations.

PC#118: Suggested Change ID #385

Description: Nonpoint Sources - text should be revised to accurately present comparison with Mattole River studies

Comment: Section 3.4.2.2, page 88 Regarding application of the Mattole River studies to the Cascade geology and hydrology, the Mattole River is a coastal, lower-gradient stream in the study area mentioned, with considerable alluvium flowing through redwood and Douglas Fir forests. Jenny Creek is a higher-gradient stream with snowmelt and spring hydrology flowing through volcanic terrain. The Draft TMDL should be revised to more accurately present the comparison of these two systems.

Response: Language has been added to Section 3.4.2.2 stating that "The Mattole River is a coastal, lower-gradient stream, with considerable alluvium flowing through redwood and Douglas Fir forests as opposed to the tributaries in the Upper Klamath subbasin that are higher-gradient streams with snowmelt and spring hydrology flowing through volcanic terrain".

PC#119: Suggested Change ID #386

Description: Modeling Analysis - Jenny Creek channel widening scenario

Comment: Section 3.4.2.2, page 88 A 50 percent reduction in stream to width ratio (from 8 to 4) as presented in the Draft TMDL may be overly optimistic for the Spring Creek system. At a minimum, there is a need for sensitivity analysis in these simulations to identify the potential range of restored conditions. For example, set the stream width depth ratio to intermediate values (e.g., 6 versus 4) and determine potential impacts.

Response: DEQ did not find it was necessary to evaluate multiple width to depth ratios to establish allocations. Additional model scenarios may be completed to evaluate implementation options.

PC#120: Suggested Change ID #387

Description: Editorial - text update requested for repeated text regarding Spring Creek diversion

Comment: Section 3.4.2.3.2, page 92 The Draft TMDL states: "PacifiCorp has a water right to divert up to 16.5 cubic feet per second from Spring Creek (PacifiCorp 2004a)." The Draft TMDL further states: "Apparently, there were water right disputes between PacifiCorp and a landowner, and PacifiCorp did not divert water from Spring Creek from 1990 to April 2003 (PacifiCorp 2004b and L. Prendergast pers. comm. 2009)." This is repeating text that is identical to the comment (number 3.4) above pertaining to Section 3.2.6, page 77, paragraph 2 and can be deleted.

Response: The repeated language in section 3.4.2.3.2 has been deleted.

PC#121: Suggested Change ID #388

Description: Figure 3-26 - metric and time of year is unclear

Comment: The Draft TMDL states: "Assuming PacifiCorp withdraws 5 [cubic feet per second] cfs from Spring Creek, warming the remaining 1.5 cfs instream temperatures by 2°C, the impacted Spring Creek

flows are expected to warm Jenny Creek by an average of 2.6°C between river km 3.35 and the OR/CA border (Figure 3-26).” Information presented in this paragraph is incomplete and inconsistent with other sections of the TMDL. The Draft TMDL should specify what metric is used (daily average or maximum temperatures, 7DADM, or another metric). The Draft TMDL also needs to indicate what time of year is being described in the text and in Figure 3-26.

Response: The plot and other information about the impact of PacifiCorp’s withdrawal on Spring Creek has been updated. The figure shows the increase is above a 7DADM.

PC#122: Suggested Change ID #389

Description: Figure - Additional clarification/edits requested for Figure 3-26

Comment: Section 3.4.2.4, page 93, Figure 3-26 On this figure, the Draft TMDL needs to indicate what time of year these data represent, if the data are modeled or actual, and what the temperature metric is that is provided.

Response: The figure has been updated and clarifies the increase is from the 7DADM. The data are modeled and reflects warming during July. This information has been included in Appendix A.

PC#123: Suggested Change ID #390

Description: Figures - Additional clarification requested for Figure 3-28

Comment: Section 3.4.2.4, page 95, Figure 3-28 What year and period of the year is this?

Response: We have updated the plot caption. The plot is based on model temperatures in July (7/4 - 7/23). As stated in the figure caption it is during the model period which is documented in Appendix A.

PC#124: Suggested Change ID #391

Description: Figures - Additional clarification requested for Figure 3-29

Comment: Section 3.4.2.4, page 96. Figure 3-29 What year and period of the year is this?

Response: The plot is based on model temperatures in July (7/4 - 7/23). As stated in the figure caption it is during the model period which is documented in Appendix A.

PC#125: Suggested Change ID #392

Description: Modeling Analysis - how were spring inflows accounted for in the modeling for Jenny Creek and Spencer Creek

Comment: Section 3.4.3, page 97

The Draft TMDL states: “On Spencer Creek, background sources warmed the stream to a maximum 7-day average daily maximum of 18.8°C. Background sources are not a source of warming above the applicable criteria.” On Jenny Creek, background sources warmed the stream to a maximum 7-day average daily maximum of 20.7°C. Excess background warming (Figure 3-30) above the applicable criterion and human use allowance is 0.37°C (thermal loading of 1.44 x 107 kilocalories per day).” There are considerable spring inflows to both of these creeks. The Draft TMDL does not present adequate information to allow the reader to understand how these sources were accounted for in the modeling.

Response: Appendix A details how springs were treated in Jenny Creek and Spencer Creek.

On Jenny Creek, springs were identified using TIR data. Table A-5, Table A-6, and Figure A-15 identify the location of where springs were included in the model, and the flow and temperatures used. Table A-9 and Table A-13 identifies the assumptions for these springs in the various modeling scenarios. See scenario 4 (TRIBS).

On Spencer Creek we did not detect springs in the TIR data like we did in Jenny Creek but we included them into the calibration as accretion flow because it improved the calibration. See Section A.4.3.4.

PC#126: Suggested Change ID #393

Description: Editorial - City of Yreka’s water supply

Comment: Section 3.2.6, page 77 The Draft TMDL should recognize that water from Spring Creek that is diverted to Fall Creek for use in the Fall Creek Hydroelectric development also contributes to water availability for the City of Yreka’s water supply.

Response: We have updated the text to recognize the Fall Creek Hydroelectric development also contributes to water availability for the City of Yreka’s water supply.

PC#127: Suggested Change ID #394

Description: Allocations - The Draft TMDL should discuss whether these allocations are reasonable if they cannot be shown to be realistically achievable

Comment: Section 3.7.1, pages 119, 120, and 121

Tables 3-30, 3-31, and 3-32 specify HUA allocations to the various Upper Klamath Subbasin tributaries. For 28 of the 31 sources listed in these tables, the allocation is 0.0°C, which equates to no allowed thermal loading whatsoever. For two of the remaining three sources, the allocation is only 0.04 °C. The Draft TMDL in effect disallows any amount of thermal loading from actions, conditions, or circumstances caused from these numerous designated sources. The Draft TMDL should discuss whether these allocations are reasonable if they cannot be shown to be realistically achievable (e.g., because the allocations are technically or economically impracticable). The federal Clean Water Act anticipated situations where water quality standards or a TMDL would not be achievable by including processes such as Use Attainability Analyses (UAA) or development of site-specific water quality criteria. In fact, use of the UAA process is the first recommendation by the National Research Council (NRC 2001) on improving the TMDL program, whereby “States should develop appropriate use designations for waterbodies in advance of assessment and refine these use designations prior to TMDL development.”

Response: We provide extensive discussion in Chapter 5 on reasonable assurance. It is not within the scope of a TMDL to determine if allocations are reasonable from a social or economic viewpoint. TMDLs must be based on the current water quality standards and set allocations such that they add up to the Loading Capacity defined in OAR 340-042-0040(4)(d) and 40 CFR 130.2(f) as the amount of a pollutant or pollutants that a waterbody can receive and still meet water quality standards. We have provided allocations that add up to the Loading Capacity and will attain the current water quality standards.

Section 1.3 of the Monitoring Strategy to Support Implementation of the Upper Klamath and Lost River Subbasins Temperature Total Maximum Daily Load states that "in some cases, modeling indicates that even with the removal of known, quantifiable sources, the water quality criteria will not be attained. In these cases, DEQ assigns a heat load reduction to background and unidentified anthropogenic sources in order to meet the criteria". We have clarified in the TMDL that DEQ will prioritize reductions from known sources first. In the case that the removal of known quantifiable sources still does not result in meeting the applicable water quality criteria, system response studies will be initiated by DEQ for segments that do not meet water temperature criteria within 10 years of EPA's approval of the Upper Klamath and Lost subbains TMDLs. Additional heat budget and system response information will be collected to identify remaining anthropogenic sources of heat. If DEQ determines all anthropogenic sources of warming have been addressed, DEQ may consider a change in standards (inducing site specific criteria) or UAA.

PC#128: Suggested Change ID #395

Description: Implementation - effective shade curves additional explanation requested

Comment: Section 3.7.3.4.2, page 126 The Draft TMDL states: "This TMDL recognizes that unpredictable natural disturbances may result in effective shade well below the levels presented in the effective shade curves." How is this recognition incorporated into the TMDL analysis?

Response: Natural disturbance is not modeled and included in the shade curves because shade curves are site specific and intended to be applied at a specific site. DEQ can estimate the types of vegetation and their effective shade based on site specific conditions but not where natural disturbance will occur. We incorporate natural disturbance into implementation of the TMDL by acknowledging in the TMDL that it can occur.

PC#129: Suggested Change ID #396

Description: Implementation - shade targets may be overstated in comparision to what is actually possible for Spencer and Jenny

Comment: Section 3.9, page 130.

The Draft TMDL states: "Effective shade targets (and resulting shade estimates) do not explicitly account for natural disturbances (Appendix A). These estimates result in higher estimates for restored shade and set a higher bar to meet the surrogate measures. In reality, natural disturbances will create a variety of tree heights and densities and the natural disturbance processes are generally beneficial to overall salmonid habitat as they may result in pools and refugia. The effective shade targets are not the only implementation strategy available to meet the TMDL; however, it is important to meeting the TMDL." In systems that are at or near equilibrium water temperature, shade is remarkably effective. Overstating shade targets in comparison to what is actually possible in any given stream, may be thought of as a conservative assumption to address uncertainty in the Draft TMDL, but may also create an unattainable

condition. Further, in streams like Spencer and Jenny creeks, there may be limited other means (other than shade) to meet TMDL requirements in certain reaches.

Response: Comment noted.

PC#130: Suggested Change ID #397

Description: Modeling Analysis - modeled temperatures at Lost River Gift Rd and at Stateline do not appear realistic

Comment: The "observed" daily maximum water temperatures exceeding criteria for the Lost River at Gift Road (Maximum with flow of 10.1 cfs) is listed as 39.47°C and the Lost River at Stateline Road (Maximum with flow of 19.0 cfs) is listed as 37.61°C. The "observed" daily maximum values in the third column are not observations, but rather model-simulated temperatures for the specified flow exceedances (see page D-3, paragraph 1, and Page D-5, Table D-1, in Appendix D [Lost River Temperature Modeling Scenarios] of Draft TMDL). The TMDL should be revised to reflect the actual source of this information.

More importantly, these temperatures that are 39.47°F and 37.61°C do not appear realistic for these locations and flow conditions, but rather, seem a relic of the model mischaracterizing actual field conditions (e.g., channel geometry, herbaceous vegetation shade). Review of the Appendix F Lost River Model for TMDL Development from the 2010 TMDL (available online at https://www.oregon.gov/deq/FilterDocs/LostRiverModelforTMDLDevelopmentAppendixF.pdf), identifies no field observations in the calibration years of 1999 and 2004 that exceed 30°C, and generally maximum annual values temperatures are in the 25°C range. Given that the observed data for 1999 (which was used in the TMDL model) does not come close to the modeled maximum water temperatures, there appears to be a significant issue with the model. Additional calibration work, updated modeling approaches, and focused field visits and monitoring should be performed to confirm modeled results when simulated values are far out of the range of calibration and typically observed conditions. This comment applies to both Lost River at Gift Road and at Stateline Road.

Response: Like any dynamic water quality model, the Lost River TMDL models were developed based on assumptions, and therefore have inherent limitations and uncertainty. Application and configuration of the models were guided by an EPA-approved Quality Assurance Project Plan (QAPP). Modeling QAPPs and associated technical memoranda or addendums identify quality expectations for steps in the modeling process such as data acquisition, model selection, domain configuration, training or calibration, scenario prediction, and reporting. Such quality expectations serve multiple objectives, including requirements under 40 CFR 130.7(c)(1) that TMDLs shall account for critical conditions. In addition the models went through multiple rounds of peer review. Staff with modeling expertise from DEQ, NCRWQCB, and EPA worked as a team with Tetra Tech reviewing and advising on model development and application for calibration and validation. The Lost River models were also reviewed by Dr. Scott Wells of Portland State University following which the model was further improved.

Trends in the observed data and cause-effect relationships between various parameters were replicated with the model, although precise values at each and every point in time may not because the precise timing of all physical, chemical, and biological phenomenon are likely not perfect in a model. The simulated temperatures in the model are calculated based on heat flux routines built into the W2 model which take into account all available sources of heat into the model and reflect the conditions using best available data at the time of model development for the year 1999 (and 2004). The maximum increases during June through August occur at Stateline and Gift Road, not at locations of monitoring data. The temperatures below Malone Dam and Anderson Rose Dam reflect the conditions and heat fluxes being specified. The model uses observed air temperature from the Klamath Falls Airport in the model. The observed minimum temperatures at KFLO can go quite low during the month of August. In 1999 the air

temperatures ranged from 3.52 deg C to 14.15 deg C. Also the diurnal range (max minus min) of the air temperature noted from the KFLO station ranged from 23.5 to 9.5 deg C in the month of August (1999). During the summer irrigation period the flows below Anderson Rose Dam can be very low (close to zero) making the river very shallow (with no other input into the system) and the resulting predicted water temperatures and diurnal variations during this period are essentially an artifact of the observed air temperatures specified as meteorological forcing in the model. The Anderson Rose Spill was calibrated in the model using observed flows coming out of the dam and had a reasonable calibration with RMSE of 0.62 cms and AME of 0.45 cms (the calibration plot can be found in the appendix of the modeling report under Figure A_1999-4 Anderson Rose Spill (1999).

PC#131: Suggested Change ID #398

Description: Reasonable Assurance - additional detail requested as it does not appear that the components of reasonable assurance are assessed and described

Comment: Section 5, page 221 The Draft TMDL states: "Where a TMDL is developed for waters impaired by both point and nonpoint sources, in the State's and EPA's best professional judgment, determinations of reasonable assurance that the TMDL's LAs will be achieved could include whether practices capable of reducing the specified pollutant load: (1) exist; (2) are technically feasible at a level required to meet allocations; and (3) have a high likelihood of implementation." It does not appear that these three components of reasonable assurance are assessed and described in the TMDL, including for allocations as assigned to PacifiCorp's Project facilities.

Response: Section 6.3.3 of the Water Quality Management Plan (WQMP) (Section 6 of the TMDL) provides examples of management strategies for various heat sources. Table 6-2 has been updated to include additional management strategies for all known heat sources in the subbasins. These management strategies and the existing programs outlined in the WQMP provide reasonable assurance that the allocations will be met through regulatory or voluntary actions.

PC#132: Suggested Change ID #399

Description: Reasonable Assurance - the TMDL lacks any details or recommendations as to the specific actions and practices that are available and feasible to be implemented

Comment: Section 5.2, page 222 The Draft TMDL states: "The TMDL provides reasonable assurances that nonpoint source control measures will achieve the expected load allocation and reductions." However, the TMDL's discussion of reasonable assurances consists principally of descriptions of applicable regulatory programs and generic descriptions of an "accountability framework," "monitoring framework," and "adaptive management process." While these elements of reasonable assurances might represent an appropriate conceptual scope of actions, the TMDL lacks any details or recommendations as to the specific actions and practices that are available and feasible to be implemented. Without these additional details or recommendations, the TMDL falls short of providing the reasonable assurances required in this section.

Response: The WQMP includes a list of management strategies which is defined in OAR 340-042-0030(6) to mean "measures to control the addition of pollutants to waters of the state and includes application of pollutant control practices, technologies, processes, siting criteria, operating methods, best management practices or other alternatives". These management strategies are effective at control of pollutants when implemented. DEQ has updated the WQMP to provide estimates on the amount of vegetation related management strategies that need to be implemented on Jenny and Spencer Creeks to achieve the effective shade targets on those streams. You are correct that the TMDL and WQMP does not include details or recommendations as to the specific actions that are feasible to be implemented. It is responsibility of DMAs or responsible persons to evaluate their operations and propose in their TMDL implementation plan what specific management strategies they deem feasible to achieve the load allocations. DEQ will review these plans. This process is part of the reasonable assurance.

PC#133: Suggested Change ID #400

Description: Reasonable Assurance - Text needs to be updated per additional details about PacifiCorp's agreed upon TMDL implementation plans for the Klamath as per Amended KHSA

Comment: Section 5.2.1.7 The Draft TMDL identifies PacifiCorp as responsible for developing source-specific TMDL implementation plans to address load allocations associated with J.C. Boyle Dam and Keno Dam. PacifiCorp has agreed per the Amended KHSA to implement the Klamath River TMDL as provided in the Amended KHSA. Per the Amended KHSA, PacifiCorp has agreed to prepare TMDL implementation plans that include a timeline for implementing management strategies and that incorporate water quality-related measures in the Non-ICP Interim Measures set forth in Amended KHSA. Facilities Removal as set forth in the Amended KHSA will be the final measure in the timeline. Finally, Link River Dam is a U.S. Bureau of Reclamation facility that PacifiCorp operates, and, therefore, Link River Dam will not be transferred per the Amended KHSA. The Draft TMDL should be revised to reflect this.

Response: Language has been added to section 5.2.1.7 indicating that Link River Dam is a U.S. Bureau of Reclamation facility that PacifiCorp operates.

PC#134: Suggested Change ID #401

Description: WQMP - more details need to be included pertaining to PacifiCorp's facilities guidance measures to be included in the implementation plan

Comment: Section 6.3.3, page 240. The Draft TMDL discusses sources other than the WWTPs and those permitted under general or minor National Pollutant Discharge Elimination System permits, and provides a list of management categories designed (Table 6-2) as guidance for designated management agencies and Responsible Persons in selecting management measures to be included in their Implementation Plans. However, this list does not include anything that mentions or pertains to PacifiCorp or PacifiCorp's facilities beyond the generic riparian area management and erosion control measures.

Response: DEQ added the following dam and reservoir operation management strategies to the water quality management plan: dam removal, temperature control structures, flow augmentation, and flow storage.

PC#135: Suggested Change ID #402

Description: WQMP - TMDL lacks any details or recommendations as to the specific actions and practices that are available and feasible to be implemented

Comment: Section 6.3.3, page 240, Table 6-2.

The Draft TMDL indicates that the information given in Table 6-2 is intended as guidance for selecting management measures to be included in Implementation Plans. The information in Table 6-2 and discussed otherwise in Section 6.3.3 represents only generalized conceptual-level categories of potential measures. Therefore, the TMDL lacks any details or recommendations as to the specific actions and practices that are available and feasible to be implemented. Without these additional details or recommendations, the TMDL falls short of providing the guidance as indicated in this section.

Response: The list of management strategies are effective at control of pollutants when implemented. DEQ has updated the WQMP to provide estimates on the amount of vegetation related management strategies that need to be implemented on Jenny and Spencer Creeks to achieve the effective shade targets on those streams. You are correct that the TMDL and WQMP does not include details or recommendations as to the specific actions that are feasible to be implemented. It is responsibility of DMAs or responsible persons to evaluate their operations and propose in their TMDL implementation plan what specific management strategies they deem feasible to achieve the load allocations. DEQ will review these plans. This process is part of the reasonable assurance.

PC#136: Suggested Change ID #403

Description: WQMP - Table 6-4 does not include J.C.Boyle

Comment: Section 6.3.6, page 244, Table 6-4. The text of the Draft TMDL in multiple places indicates that PacifiCorp is responsible for TMDL compliance at the J.C. Boyle Development and in Keno Reservoir, yet this table does not include J.C. Boyle.

Response: J.C. Boyle. was added to the Table.

PC#137: Suggested Change ID #404

Description: Editorial - text update requested in WQMP

Comment: Section 6.3.7.3, page 249.

The Draft TMDL states “PacifiCorp is designated as a Responsible Person for developing a source-specific implementation plan to address the dissolved oxygen allocations associated with JC Boyle and Keno Dams.” We assume that DEQ meant to state “water temperature” rather than “dissolved oxygen” in this sentence.

Response: Correct. “dissolved oxygen” has been changed to “water temperature”.

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14. Comments from: Quartz Valley Indian Reservation

QVIR#1: Suggested Change ID #1

Description: Implementation Activities - NPS pollution reductions not effective

Comment: Non-Point Source Pollution Reductions: Activity Does Not Necessarily Result in Success Reducing the impacts of agricultural activities on private lands offers perhaps the most important opportunity for the improvement of water quality in the entire Klamath Basin, and thus is a critically important issue for TMDL implementation.

The Draft TMDL and WQMP proposes that the water quality effects of agricultural activities on private lands be addressed through the development of Agricultural Water Quality Management Area Plans (AgWQMAPs) to be implemented by Local Area Advisory Committees (LACs). AgWQMAPs for the Klamath Headwaters and Lost River have been in place since 2004 and 2002, respectively. The LACs have issued status reports summarizing their activities implementing the AgWQMAPs. It is clear that positive activities such as riparian fencing and the development of conservation plans are occurring and we encourage these efforts; however, we note that evidence of activity is not evidence of success, or even measurable progress. Restoration activities must be strategically planned, then implemented with enough scope and magnitude that they actually begin to result in measurable improvements to water quality and habitat complexity.

Restoration efforts in other areas have often focused on activities that are easy to implement, but which fail to address the core stressors to aquatic habitat. For example, in the Shasta and Scott river valleys of California, much commendable effort has gone into activities such as riparian planting, riparian fencing, and screening agricultural diversions. These activities have resulted in some minor improvements; however, comparatively little effort has gone into reducing surface water diversions and groundwater pumping (pumping has actually increased). In some cases, inappropriate projects such as agricultural wells were funded with “restoration” or “water conservation” money, actually causing further impairment of instream flows. Thus, fish populations in those valleys have continued to decline as these rivers and their tributary streams have become progressively more and more de-watered.

We encourage ODEQ to do whatever it can to ensure that grant funds (and other incentives) intended to improve water quality go in fact to the highest-priority projects that will result in the most water quality and habitat benefits, rather than be spent opportunistically with a haphazard approach.

Response: DEQ will continue to participate in a coordinated effort for implementation and restoration activities. The goal of the TMDL is to ensure EPA and DEQ are meeting the standards proposed to protect beneficial uses. DEQ has a implementation strategy based on a good faith effort to get the most benefit without the regulatory nexus. However, should the need arise DEQ will use the regulatory backdrop to ensure egregious acts of impairment and environmental harm are addressed.

QVIR#2: Suggested Change ID #2

Description: Implementation Activities - Adaptive Management Process

Comment: 1.1 TMDL Definition and Regulatory Context 1.1.5 Adaptive Management Process Page 7 states: “The implementation of TMDLs and the associated TMDL Implementation Plans are generally

enforceable by DEQ, other state agencies, and local government. However, sufficient initiative likely exists to achieve water quality goals with minimal enforcement." This is an overly optimistic view of the chances of achieving water quality goals. Achieving water quality goals will take more than initiative, it will take substantial resources and a combination of approaches including enforcement for those not unwilling to make good faith efforts.

Response: DEQ acknowledges the challenges for water quality restoration in the Upper Klamath and Lost Subbasins and that considerable time, effort, and resources are needed for restoring water quality.

QVIR#3: Suggested Change ID #7

Description: Editorial - text update requested for incomplete excerpt of OAR 340-041-0028(4)(e) in Chapter 2, 3, 4

Comment: -Chapter 2: Mainstem Klamath River Temperature TMDLs In Table 2-1 on page 11, the section regarding the Redband or Lahontan Cutthroat Trout Use is an incomplete excerpt of OAR 340-041-0028(4)(e) and is missing the important second half of the sentence. It currently reads "The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or Redband trout use". It should be revised to "The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or Redband trout use may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit)." -Chapter 3: Upper Klamath Subbasin Tributaries Temperature TMDLs In Table 3-1 on page 62, the section regarding the Redband or Lahontan Cutthroat Trout Use is an incomplete excerpt of OAR 340-041-0028(4)(e) and is missing the important second half of the sentence. It currently reads "The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or Redband trout use". It should be revised to "The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or Redband trout use may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit)." -Chapter 4: Lost Subbasin Temperature TMDLs In Table 4-1 on page 135, the section regarding the Redband or Lahontan Cutthroat Trout Use is an incomplete excerpt of OAR 340-041-0028(4)(e) and is missing the important second half of the sentence. It currently reads "The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or Redband trout use". It should be revised to "The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or Redband trout use may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit)."

Response: The language "may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit)" has been added to Tables 2-1, 3-1, and 4-1.

QVIR#4: Suggested Change ID #10

Description: Editorial - Additional text requested and text change Figure 2-8, Table 2-11

Comment: 2.5 Excess Load Figure 2-8 and Table 2-11 on pages 34 and 25 present temperature data summaries but do not mention the data source, years, or season in which the data were collected. Without such information it is difficult to place the data in context. We recommend adding a short paragraph with this information, similar to the text in section 4.2.7 for the Lost River subbasin.

Response: Table 2-11 has been updated to include data sources and period of record and a summary paragraph has been added to Section 2.5.

QVIR#5: Suggested Change ID #12

Description: Editorial - text update requested Table 2-12, 2-13, and 2-14

Comment: Section 2.5 Excess Load

It is unclear if the temperature data in Tables 2-12, 2-13, and 2-14 on pages 36 through 38 is measured or modeled. We recommend revising the captions to clarify.

Response: The caption for Tables 2-12, 2-13, and 2-14 have been updated to indicate that the temperatures are modeled.

QVIR#6: Suggested Change ID #15

Description: Editorial - Identify data source for Figures 3-11 through 3-19

Comment: 3.2.7 Temperature Data This section, including Figures 3-11 through 3-19 on pages 79 through 83, presents temperature data but do not mention the data source or years in which the data were collected. Without such information it is difficult to place the data in context. We recommend adding a short paragraph with this information, similar to the text in section 4.2.7 for the Lost River subbasin.

Response: The data source and period of record has been added to Figures 3-12 through 3-19, a paragraph discussing the sources of the data was added to section 3.2.7, and table 3-6 was added, which summarizes the available data.

QVIR#7: Suggested Change ID #32

Description: Spring Creek Diversion in Jenny Creek - Additional Description Needed

Comment: 3.4 Existing Pollution Sources 3.4.2.3 Hydromodification: Dams and Diversions and 3.4.2.4 Hydromodification: Water Rights The description of how the issue of the PacifiCorp diversion of Spring Creek (tributary to Jenny Creek) is addressed is somewhat confusing. The results in Figure 3-28 does not seem to match with Figure 3-26. Figure 3-28 shows less than 1.5 °C difference in lower Jenny Creek temperatures due to diversions while Figure 3-26 shows that the Spring Creek diversion increases lower Jenny Creek temperatures about 3 °C. We recommend revising the text to explain the reason for this discrepancy.

3.6 Excess Load It is unclear how the Spring Creek diversion is handled in Figure 3-32 (excess 7-day average daily maximum stream temperatures on Jenny Creek) on page 107. We recommend revising the text to explain.

3.7 Allocations It is unclear how the Spring Creek diversion is handled in Table 3-23 (Jenny Creek sector allocations at point of maximum impact) and Table 3-24 (Jenny Creek sector allocations at OR/CA stateline) on page 107. We recommend revising the text to explain. Can the TMDL be met with the existing Spring Creek diversion in place?

Response: We included the wrong plot. The correct plot has been added and we have updated the text. This should reconcile differences between the excess loads and other figures. The TMDL allocations for Jenny Creek watershed have been updated to reflect concerns about cumulative warming form other

commenters. The final TMDL provides zero human use allowance to all anthropogenic sources including PacficCorp which diverts water from Spring Creek.

QVIR#8: Suggested Change ID #52

Description: Reasonable Assurance - Stewardship Agreement Plan review requested to ensure Tribal involvement

Comment: Chapter 5: Reasonable Assurance 5.2 Programs to Achieve Nonpoint Source Reductions Load 5.2.1 DMAs, Responsible persons, Management Strategies, and Implementation Actions 5.2.1.4 Federal Irrigation Project Page 226 notes that "DEQ and the NCWQCB have been working with BOR, USFWS, and the Klamath Water Users Association to draft a Stewardship Agreement Plan that will cover source specific implementation planning in Oregon and California." We are interested to know if there is a plan for public or Tribal involvement in that process, given that: 1) DEQ, NCWQCB, BOR, and USFWS are public agencies, and 2) the content of the Stewardship Agreement Plan has important implications for the future of water quality in the Klamath River upon which Tribes depend. We would appreciate an opportunity to review and provide input on the draft Stewardship Agreement Plan before it is finalized.

Response: There will be an opportunity to review the draft plan when a draft is completed. The Stewardship Agreement team has not met since February 6, 2018 and will start working on an outline and draft as soon as the Upper Klamath and Lost River Sub-basin TMDL's are completed and issued.

QVIR#9: Suggested Change ID #53

Description: Editorial - Suggested Text change in Chapter 6 WQMP page 242

Comment: 6.3 Water Quality Management and Implementation Plan Guidance 6.3.4 Timeline for Implementing Management Strategies

On page 242, it is stated that "DEQ recognizes that there has been and continues to be much progress towards improving water quality in the Upper Klamath and Lost River Subbasins." We are not aware of any data showing that in-river water quality conditions in the Upper Klamath or Lost River are getting better, especially for water temperature. It is true that some efforts are being made, but factors such as climate change that are detrimental to water quality are also progressing. As we noted above, activity and effort is different than progress or actual improvement. This may seem to be an issue of minor semantics, but actually it is important to distinguish between the two; thus, we suggest that "progress" in the passage above be changed to "effort"

Response: DEQ revised "progress" to "effort".

QVIR#10: Suggested Change ID #55

Description: Monitoring Strategy - Add a map

Comment: Monitoring Strategy

Add a map showing the proposed monitoring locations.

Response: Two figures were added to Section 6.3.10.1 of the WQMP chapter showing the locations of proposed status monitoring stations for the Upper Klamath and Lost River subbasins.

QVIR#11: Suggested Change ID #56

Description: Monitoring Strategy - Inventory and Compile Existing Data

Comment: Suggestions regarding the monitoring strategy:

Inventory and compile existing data, both from previous short-term studies as well as ongoing long-term monitoring efforts. This would be beneficial because re-occupying previous stations would leverage previous data. The KBMP monitoring map (http://www.kbmp.net/maps-and-data/monitoring-locations) is a good place to start. Riverbend Sciences is currently working on a project for the Klamath Tribal Water Quality Consortium to analyze a large dataset of temperature data collected by multiple entities in the Klamath River and tributaries downstream of Keno Dam, including data from the BLM's Klamath Falls and Medford offices collected in the Jenny and Spencer creek watersheds and the mainstem Klamath River downstream of JC Boyle Dam.

Response: We agree monitoring at existing sites is beneficial and would like to coordinate with the Tribes as much as possible on implementing the monitoring strategy.

QVIR#12: Suggested Change ID #57

Description: Monitoring Strategy - Suggestion for Tiered approach for monitoring

Comment: The scope of the draft monitoring strategy seems overly ambitious, unless ODEQ can bring significant resources to the project. For example, the draft strategy proposes a list of 62 sites, including at least one site in each water quality limited segment (WQLS) that should be monitored for a minimum 10 years. That would no doubt generate a large quantity of useful data, but it may be more than necessary or possible. It may be more achievable to develop a tiered approach in which the 62 sites are monitored for a few years to provide information on the spatial patterns, and then the monitoring network is scaled back to a smaller subset of sites for long-term trend monitoring.

Response: The monitoring plan may seem ambitious and resource intensive but to some degree monitoring is already being conducted throughout the watershed. In addition, a stewardship agreement approach will most likely be in place incorporating the BOR, USFWS, KWUA, and Irrigation Districts to pool resources for meeting the monitoring needs. Furthermore, the monitoring strategy is a stand alone document subject to change through adaptive management. We will consider these and other comments through the adaptive management process as the strategy is scaled to available resources in relation to the goals and objectives.

QVIR#13: Suggested Change ID #214

Description: TMDL Analysis generally sound

Comment: Overall the technical analyses presented in the Draft TMDL and WQMP are sound and provide a solid diagnosis of the causes of water temperature impairment. We appreciate the diligent

efforts of ODEQ and the other members (NCRWQCB, U.S. Environmental Protection Agency, and Tetra Tech) of the Klamath and Lost River TMDL development team.

Response: Thank you for your comment.

QVIR#14: Suggested Change ID #215

Description: WQMP likely to be ineffective

Comment: We strongly support the water temperature improvements proposed in the Draft TMDL and WQMP: however, we have serious concerns that the proposed water quality management plan is unlikely to be effective for that purpose. A primary reason is that Oregon's laws and regulations regarding environmental protections are relatively weak. For example, the strategy proposed to address the effects of private land forestry is to rely upon the implementation of Oregon's existing Forest Practices Act rules, which were found to be inadequate to protect coldwater fish resources by National Marine Fisheries Service (NMFS 1998) and an Independent Multidisciplinary Science Team (IMST 1999) convened by the State of Oregon.

Response: We appreciate your comment and concern on the implementation strategies outlined in the WQMP. As stated in a previous comment DEQ will work through the processes of a good faith effort for implementation and adaptive management. If inadequacies exist in any given plan we will work with that entity to ensure the water quality goals and objectives are being met.

QVIR#15: Suggested Change ID #216

Description: WQMP - must enable DEQ to track progress

Comment: Aspects of the water quality restoration plan look good on paper, such as requirements for Designated Management Agencies to develop implementation management plans, yet it remains to be seen how effective such efforts will actually be in practice. We encourage ODEQ to be proactive and aggressive in implementing the water quality management plan, and to move the process forward as quickly as possible.

Many efforts are already underway in the Upper Klamath Basin to improve water quality. We applaud such efforts; however, to our knowledge, these efforts have yet to result in measurable instream improvements. ODEQ and other regulatory agencies must not confuse activity and effort with real evidence of success. Restoration activities must be strategically planned and then implemented with enough scope and magnitude that they actually begin to result in measurable improvements to water temperature. To restore water quality in the Klamath River, real and substantive changes in land and water management will be necessary.

Response: Thank you for your comment and DEQ along with our partners will work diligently to address all WQ issues in the coverage area of this TMDL. The Stewardship Planning process will begin when this TMDL is issued and the WQMP becomes effective. We will reach out to your organization for feedback on the stewardship plan when it is in draft form.

QVIR#16: Suggested Change ID #217

Description: Designated Uses - Mainstem Klamath River Between Link and Keno Dams Should be Changed to Protect Salmonids

Comment: The reach of the mainstem Klamath River from Keno Dam downstream to the Oregon/California border is currently designated as Redband or Lahontan Cutthroat Trout Use, with a relatively protective water temperature standard of 20 °C seven-day average of daily maximum temperature (7DADM). The next reach of the mainstem Klamath River upstream, spanning between Keno dam up to Link Dam, is currently designated as Cool Water Species use, with a weaker water temperature standard of 28 °C daily maximum water temperature. We are concerned that the 28 °C daily maximum water temperature standard based on the Cool Water Species designation is not sufficiently protective of salmonids in the mainstem Klamath River, especially once the lower dams are removed and anadromous fish passage to the Upper Basin is restored. We do not disagree that 28 °C is protective of suckers, or that suckers are an appropriate species upon which to set a Cool Water Species temperature standard. We also recognize that the public comment period on a draft TMDL with a court-ordered deadline for approval is not the optimal time to request major changes. However, we request that after the TMDL is approved ODEQ should change the designated use for this reach to something more appropriate such as Cold-Water Aquatic Life, Migration Corridors, or Redband or Lahontan Cutthroat Trout Use. During the portion of the year with tolerable water quality conditions, redband Trout occur in both Link River and Keno Reservoir and have been detected moving upstream through the fish ladders at Link Dam and Keno Dam (Starcevich et al. 2006). A substantial number of redband trout overwinter between Keno Dam and Link Dam and then migrate to Spencer Creek for springtime spawning (Starcevich et al. 2006). Given the presence of redband trout, we believe that this reach merits a more protective designation than Cool Water Species and that the justification for re-designation will become even stronger once anadromous fish passage has been restored to the Upper Basin. Maintaining suitable water temperatures in the spring and fall for salmon migration through Keno Reservoir will be a critically important for re¬establishing salmon populations upstream of Upper Klamath Lake.

Response: Thank you for your comment. TMDLs are not the regulatory vehicle through which water quality standards may be changed. TMDLs are used to determine appropriate pollutant load allocations for point and nonpoint sources to meet existing water quality criteria. The existing water quality standards identify cool water species as the designated fish use for the reach upstream of Keno. To change the fish use from cool to cold water species requires a revision to standards and fish use designations accomplished through a rule making process.

Even though cool water species is the designated fish use and the target is 28 deg-C upstream of Keno, it is not the only target the TMDL has established. The TMDL also provides allocations to all anthropogenic sources in the Klamath River such that their cumulative warming is limited to less than 0.3 deg-C (even upstream of Keno) with no measurable warming at the California/Oregon Stateline. These warming limits will help protect salmonid populations in addition to cool water species.

QVIR#17: Suggested Change ID #220

Description: Editorial - Fix caption Figure 3-6

Comment: 3.2 Subbasin Characterization 3.2.4 Climate The caption to Figure 3-6 on page 74 reads “Climate summary — Klamath Falls, Oregon (KLMO 1999-2017).” Should it be KFLO not KLMO?

Response: The climate station in the caption for Figure 3-6 has been changed from KLMO to KFLO.

QVIR#18: Suggested Change ID #221

Description: Editorial - Figure 4-6 caption

Comment: 4.2 Subbasin Characterization 4.2.4 Climate The caption to Figure 4-6 on page 149 reads "Climate summary — Klamath Falls, Oregon (KLMO 1999-2017)." Should it be KFLO not KLMO?

Response: The climate station in the caption for Figure 4-6 has been changed from KLMO to KFLO.

QVIR#19: Suggested Change ID #223

Description: Editorial - Update URL

Comment: 6.3.7 Identification of Sector-Specific Implementation Plans

On page 245, the URL listed for ODEQ's guidance for developing Implementation Plans (http://www.deq.state.or.us/wq/tmdls/docs/impl/07wq004tmdlimplplan.pdf) is no longer active.

Response: The URL was updated to: https://www.oregon.gov/deq/wq/tmdls/Pages/TMDLs-Implementation.aspx

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QVIR#20: Suggested Change ID #224

Description: Editorial - add explanation

Comment: A.3 Derived Data and Sampled Parameters A.3.2.2 Vegetation — Mapping, Classification and Sampling

Page A-10 notes that "Variable vegetation conditions in the Klamath River Basin require a higher resolution than currently available GIS data sources. To meet this need, DEQ has mapped vegetation for most streams using Digital Orthophoto Quads (DOQs) at a 1:5,000 map scale. On the Lost River, LiDAR data was used to characterize vegetation." LiDAR for Spencer Creek is available from the National Map (https://viewer.nationalmap.gov/advanced-viewer/). We recommend that a brief explanation be added about the pros/cons of characterizing vegetation with manual digitization versus LiDAR, and why LiDAR was used for Lost River but not Spencer Creek.

Response: We added a section into Appendix A discussing LiDAR. In addition to the Lost River, LiDAR was used to update ground elevations, topographic shade, and verify the vegetation heights for the Miller Creek model. This was not apparent in Appendix A so we added additional language to clarify.

In Jenny Creek and Spencer Creek, DEQ chose not to update the models with LiDAR.

The temperature data, TIR data, flow data, and vegetation/habitat information used in the modeling in Jenny Creek and Spencer Creek were collected in year 2001. LiDAR and aerial imagery is useful for characterizing current vegetation conditions. LiDAR is also useful for characterizing ground elevations which are inputs used in the model. DEQ considered updating the model to incorporate vegetation and ground elevation data from the more recent LiDAR but decided against it. Updating to LiDAR would have required DEQ to either 1) collect new temperature, TIR, and flow data that centered closer to the year the LiDAR was collected in order to accurately represent the vegetation conditions at that time, or 2) reconcile differences in the vegetation between the two years and modify the LiDAR DSM so it more

closely represents vegetation conditions in the year 2001. In addition, updating the model with LiDAR data would require a significant reconfiguration of the model. Given the scale of work and the number of changes that needed to occur in order to incorporate LiDAR DEQ did not believe it was feasible given the time and resources devoted to the project. In the Lost River and Miller Creek we felt it was appropriate to utilize LiDAR because the vegetation conditions when LiDAR was collected do not significantly differ from the model year. There was also no prior vegetation assessment on the Lost River so starting with LiDAR made the most sense.

QVIR#21: Suggested Change ID #248

Description: Monitoring Strategy - Prioritize known sources for implementation

Comment: Page 4 of the draft monitoring strategy notes that "In some cases, modeling indicates that even with the removal of known, quantifiable sources, the water quality criteria will not be attained. In these cases, DEQ assigns a heat load reduction to background and unidentified anthropogenic sources in order to meet the criteria" and "additional heat budget and system response information may be needed for three waters (i.e., mainstem of the Klamath River, Jenny Creek, and Miller Creek) to effectively reduce unidentified anthropogenic sources of heat or heat related processes. System response studies will be initiated by DEQ for segments of Miller Creek or Klamath River that do not meet water temperature criteria within 10 years of EPA's approval of the KLR TMDL." We disagree with this approach. The priority for implementation should be to focus on addressing the issues known to adversely affect temperatures (i.e., shade and flow), rather than searching for additional sources that might affect temperatures. If by some miracle we collectively succeed at thoroughly addressing all the known sources (which would likely take several decades of intensive effort), then it would be appropriate to search for additional sources, but to do it before then would be a waste of effort.

Response: Thank you for your comment. DEQ agrees that implementation should focus on known causes of increased temperature. We have updated the narrative to clarify. DEQ still plans to complete system response studies which serve to identify previously unknown sources, but also to quantify progress made on reducing known sources and assist in further implementation.

QVIR#22: Suggested Change ID #249

Description: Monitoring Strategy - drop additional modeling

Comment: Monitoring Strategy - Section '1.5.6 - 8 System Response and Heat Source Characterization' proposes additional modeling for Klamath River, Jenny Creek, and Miller Creek. We disagree that this is necessary and suggest that this be dropped from the monitoring strategy (see previous comment [Monitoring Strategy - Prioritize known sources for implementation] for reasons).

Response: Thank you for your comment. DEQ agrees that implementation should focus on known causes of increased temperature. We have clarified in the WQMP that priority for implementation should be on addressing known sources first. DEQ still plans to complete system response studies which serve to identify previously unknown sources, but they also serve to quantify progress made on reducing known sources and assist in further implementation. System response studies will only occur for the portions of Jenny Creek, Miller Creek, and the Klamath River that are not making progress toward meeting the TMDL targets within 10 years.

QVIR#23: Suggested Change ID #250

Description: Monitoring Strategy - Include Photo Monitoring

Comment: The draft monitoring strategy does not mention photos. While quantitative data is useful, it is can also be expensive and time-intensive to collect and thus DMAs may be resistant. Photo-monitoring is an easy and powerful tool for documenting and tracking both habitat conditions (including riparian vegetation) and restoration projects. Therefore, we recommend photo monitoring be included as an integral component of the monitoring strategy.

Response: This is a great suggestion and DEQ will work to incorporate photo monitoring into the overall monitoring strategy document.

QVIR#24: Suggested Change ID #251

Description: Monitoring Strategy - DMA monitoring data should be publicly available

Comment: We agree with the draft monitoring strategy's call for the DMA's data management systems to "facilitate timely uploads to state (AWQMS) or federal (WQX) databases." In addition, we recommend that the monitoring strategy require that all data collected by the DMAs be made available to the public in electronic form in its full level of detail, not just summaries.

Response: The monitoring strategy itself is not a regulatory document. Requirements for DMAs and other responsible persons are identified in the TMDL Water Quality Management Plan (WQMP) - Chapter 6. In the WQMP, DEQ has required certain DMAs and responsible persons develop an implementation plan for DEQ's approval. The implementation plan will include a monitoring plan which should in part support aspects of the monitoring strategy. The WQMP also requires certain DMAs and responsible persons to submit an annual report to DEQ which will include the results of any monitoring.

It is DEQ's intention that any water quality monitoring data submitted to DEQ will be uploaded into DEQ's AWQMS database. Data in AWQMS is available for download by the public at https://www.oregon.gov/deq/wq/Pages/WQdata.aspx. AWQMS includes both continuous observations as well as the daily summaries. Both are available for download.

QVIR#25: Suggested Change ID #325

Description: Implementation Activities - Focus on the Klamath River at its Tributaries Rather than the Lost River

Comment: Pages 17 of comments: VI. TMDL Implementation Should Focus on the Klamath River at its Tributaries Rather than the Lost River

Given the level of alteration, restoring water quality and habitat in the Lost River subbasin would be a monumental task requiring conversion of thousands or tens of thousands of acres of farmland back to wetlands. This would require large amounts of money and political will which is unlikely to materialize. Therefore, we recommend that restoration efforts focus on the Klamath River and its tributaries [12]. The problems of the Lost River can be addressed through a combination of minimizing discharges into the Klamath River and by treating the effluent prior to discharge into the Klamath River.

12 Klamath Tribal Water Quality Consortium, Upper Klamath Basin Nonpoint Source Pollution Assessment and Management Program Plan, 78 (2018), available at https://klamathwaterquality.com/documents/KlamConsortium_NPS_Plan_20180918_finalweb.pdf

Response: We have noted your recommendation to prioritize TMDL implementation on the Klamath River and it's tributaries. We agree that restoration of water quality in the Lost River will be a challenging task and support the Tribes prioritization to focus on the Klamath River and it's tributaries.

In terms of the level of effort required in the Lost River. We recognize that historically the Lost River was tied to series of expansive wetlands and that these conditions supported a healthy population of Suckers. DEQ does not oppose an attempt to restore the Lost River and it's surrounding wetlands but DEQ is also not proposing that TMDL implementation be an attempt to go back to that condition if an alternative set of actions will achieve the same water quality goal. We don't agree that the only way to achieve the temperature targets and other water quality standards in the Lost River would require converting thousands of acres of farmland back to wetlands. The temperature TMDL analysis shows that the Lost River as it generally exists today can achieve the temperature standard with improvement to shade and with implementation of strategies to address thermal loading that is a result from a lack of instream flow. We estimate that less than 100 acres along the Lost River need to be restored to increase shade. While this may not restore the Lost River to it's historical condition DEQ believes this is an achievable objective and will lead to improvements in water quality.

QVIR#26: Suggested Change ID #329

Description: Forest Practice Rules are Are Not Protective

Comment: Forest Practice Rules for Private Lands Are Not Protective of Water Temperature

The water quality effects of timber harvest and roads on private lands are an important issue generally in the Klamath River Basin, but play a particularly critical role in the impairment of coldwater tributaries. For example, Spencer Creek is a Klamath River tributary that currently drains into J.C. Boyle reservoir. It contains low-gradient stream habitat that is rare in tributaries of the Middle Klamath Basin. Following the likely removal of J.C. Boyle, Copco, and Iron Gate dams, a restored Spencer Creek could provide excellent habitat for coho salmon. The Draft TMDL and WQMP found that current riparian shade in Spencer Creek is barely more than half of the estimated maximum potential shade, current water temperatures at the mouth of Spencer Creek are more than 10 ºC warmer than its natural thermal potential, and that a substantial portion of this warming is due to the lack of vegetative shade. Examination of aerial photographs of the Spencer Creek watershed and the surrounding areas in 2005 shows more bare ground than trees, with the forest confined to narrow strips (Figure 1), a powerful illustration of the poor condition of private timber lands in the Oregon portion of the Klamath Basin. Since 2005, additional harvests the proceeded to target the few remaining riparian areas in Spencer Creek's middle (Figure 2) and lower reaches.

The Draft TMDL and WQMP relies on the Oregon Department of Forestry's ongoing implementation of Oregon's Forest Practices Act (FPA) to ensure that private land forestry activities do not result in water quality impairment. Unfortunately, these regulations have long been recognized as inadequate for the protection salmonid habitat and water quality. For example, the Independent Multidisciplinary Science Team [13] ("IMST") was convened by the State of Oregon to assess whether the FPA rules were sufficiently protective to restore wild salmonids in Oregon. The IMST found that the existing rules were not adequate on several bases, including water quality issues such as sedimentation resulting from landslides and roads.

We are not aware of any significant improvements to the Oregon FPA rules to address the shortcomings identified by the IMST. The National Marine Fisheries Service has also recognized the shortcomings of the FPA rules and has made recommendations to the State of Oregon [14], but these recommendations have not yet been implemented. In the Oregon Coast Range west of the Klamath Basin, Oregon did recently increase riparian protections in response to research showing that previous rules did not adequately protect water temperatures [15]; however, rules were not changed for areas outside the Coast Range. We realized that ODEQ's authority to resolve the situation is limited due to existing laws, regulation, and politics; however, we feel compelled to note the approach outline in the Draft TMDL and WQMP to address the water quality impacts of forestry on private lands is unlikely to succeed.

Figure 2. Satellite images from May 2016 and June 2019 from Planet.com showing of a 1.5 mile long reach in the middle portion of Spencer Creek which runs from northwest corner to southeast corner of the images. The white dashed oval indicates areas where timber harvests specifically targeted trees within riparian buffers. The road crossing (labeled on some topographic maps as Spencer Creek Hook Up Road) in the upper left of the photo is located at latitude 42.224576° north, longitude -122.098926° west.

13 Independent Multidisciplinary Science Team (IMST), Recovery of Wild Salmonids in Western Oregon Forests: Oregon Forest Practices Act Rules and the Measures in the Oregon Plan for Salmon and Watersheds. Technical Report 1999-1 to the Oregon Plan for Salmon and Watersheds, Governor's Natural Resources Office, Salem, Oregon, 94 (1999).

14 National Marine Fisheries Service (NMFS), A Draft Proposal Concerning Oregon Forest Practices. Submitted by NMFS to the Oregon Board of Forestry and the Office of the Governor, 110 plus Appendices (1998).

15 Groom, J.D., L. Dent, and L.J. Madsen, Stream Temperature Change Detection for State and Private Forests in the Oregon Coast Range, Water Resources Research 47:W01501. doi: 10.1029/2009WR009061 (2011).

Response: Thank you for you comment. DEQ agrees that in certain situations, the Oregon Forest Practices Act rules minimum riparian requirements may not be sufficient to achieve the TMDL shade allocations. DEQ has communicated this concern to ODF and the Board of Forestry. DEQ and the Oregon Environmental Quality Commission are working closely with the ODF and the Board of Forestry on this issue.

QVIR#27: Suggested Change ID #333

Description: Monitoring Strategy

Comment: Monitoring Strategy

We reviewed the Monitoring Strategy to Support Implementation of Water Temperature Total Maximum Daily Loads for the Upper Klamath and Lost Subbasins. We agree with the concept of developing and implementing a monitoring strategy.

Response: Thank you for the feedback.

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15. Comments from: Yurok Tribe

YT#1: Suggested Change ID #1

Description: Implementation Activities - NPS pollution reductions not effective

Comment: Non-Point Source Pollution Reductions: Activity Does Not Necessarily Result in Success Reducing the impacts of agricultural activities on private lands offers perhaps the most important opportunity for the improvement of water quality in the entire Klamath Basin, and thus is a critically important issue for TMDL implementation.

The Draft TMDL and WQMP proposes that the water quality effects of agricultural activities on private lands be addressed through the development of Agricultural Water Quality Management Area Plans (AgWQMAPs) to be implemented by Local Area Advisory Committees (LACs). AgWQMAPs for the Klamath Headwaters and Lost River have been in place since 2004 and 2002, respectively. The LACs have issued status reports summarizing their activities implementing the AgWQMAPs. It is clear that positive activities such as riparian fencing and the development of conservation plans are occurring and we encourage these efforts; however, we note that evidence of activity is not evidence of success, or even measurable progress. Restoration activities must be strategically planned, then implemented with enough scope and magnitude that they actually begin to result in measurable improvements to water quality and habitat complexity.

Restoration efforts in other areas have often focused on activities that are easy to implement, but which fail to address the core stressors to aquatic habitat. For example, in the Shasta and Scott river valleys of California, much commendable effort has gone into activities such as riparian planting, riparian fencing, and screening agricultural diversions. These activities have resulted in some minor improvements; however, comparatively little effort has gone into reducing surface water diversions and groundwater pumping (pumping has actually increased). In some cases, inappropriate projects such as agricultural wells were funded with “restoration” or “water conservation” money, actually causing further impairment of instream flows. Thus, fish populations in those valleys have continued to decline as these rivers and their tributary streams have become progressively more and more de-watered.

We encourage ODEQ to do whatever it can to ensure that grant funds (and other incentives) intended to improve water quality go in fact to the highest-priority projects that will result in the most water quality and habitat benefits, rather than be spent opportunistically with a haphazard approach.

Response: DEQ will continue to participate in a coordinated effort for implementation and restoration activities. The goal of the TMDL is to ensure EPA and DEQ are meeting the standards proposed to protect beneficial uses. DEQ has a implementation strategy based on a good faith effort to get the most benefit without the regulatory nexus. However, should the need arise DEQ will use the regulatory backdrop to ensure egregious acts of impairment and environmental harm are addressed.

YT#2: Suggested Change ID #2

Description: Implementation Activities - Adaptive Management Process

Comment: 1.1 TMDL Definition and Regulatory Context 1.1.5 Adaptive Management Process Page 7 states: “The implementation of TMDLs and the associated TMDL Implementation Plans are generally enforceable by DEQ, other state agencies, and local government. However, sufficient initiative likely exists to achieve water quality goals with minimal enforcement.” This is an overly optimistic view of the chances of achieving water quality goals. Achieving water quality goals will take more than initiative, it

will take substantial resources and a combination of approaches including enforcement for those not unwilling to make good faith efforts.

Response: DEQ acknowledges the challenges for water quality restoration in the Upper Klamath and Lost Subbasins and that considerable time, effort, and resources are needed for restoring water quality.

YT#3: Suggested Change ID #7

Description: Editorial - text update requested for incomplete excerpt of OAR 340-041-0028(4)(e) in Chapter 2, 3, 4

Comment: -Chapter 2: Mainstem Klamath River Temperature TMDLs In Table 2-1 on page 11, the section regarding the Redband or Lahontan Cutthroat Trout Use is an incomplete excerpt of OAR 340-041-0028(4)(e) and is missing the important second half of the sentence. It currently reads "The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or Redband trout use". It should be revised to "The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or Redband trout use may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit)." -Chapter 3: Upper Klamath Subbasin Tributaries Temperature TMDLs In Table 3-1 on page 62, the section regarding the Redband or Lahontan Cutthroat Trout Use is an incomplete excerpt of OAR 340-041-0028(4)(e) and is missing the important second half of the sentence. It currently reads "The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or Redband trout use". It should be revised to "The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or Redband trout use may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit)." -Chapter 4: Lost Subbasin Temperature TMDLs In Table 4-1 on page 135, the section regarding the Redband or Lahontan Cutthroat Trout Use is an incomplete excerpt of OAR 340-041-0028(4)(e) and is missing the important second half of the sentence. It currently reads "The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or Redband trout use". It should be revised to "The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or Redband trout use may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit)."

Response: The language "may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit)" has been added to Tables 2-1, 3-1, and 4-1.

YT#4: Suggested Change ID #10

Description: Editorial - Additional text requested and text change Figure 2-8, Table 2-11

Comment: 2.5 Excess Load Figure 2-8 and Table 2-11 on pages 34 and 25 present temperature data summaries but do not mention the data source, years, or season in which the data were collected. Without such information it is difficult to place the data in context. We recommend adding a short paragraph with this information, similar to the text in section 4.2.7 for the Lost River subbasin.

Response: Table 2-11 has been updated to include data sources and period of record and a summary paragraph has been added to Section 2.5.

YT#5: Suggested Change ID #12

Description: Editorial - text update requested Table 2-12, 2-13, and 2-14

Comment: Section 2.5 Excess Load

It is unclear if the temperature data in Tables 2-12, 2-13, and 2-14 on pages 36 through 38 is measured or modeled. We recommend revising the captions to clarify.

Response: The caption for Tables 2-12, 2-13, and 2-14 have been updated to indicate that the temperatures are modeled.

YT#6: Suggested Change ID #15

Description: Editorial - Identify data source for Figures 3-11 through 3-19

Comment: 3.2.7 Temperature Data This section, including Figures 3-11 through 3-19 on pages 79 through 83, presents temperature data but do not mention the data source or years in which the data were collected. Without such information it is difficult to place the data in context. We recommend adding a short paragraph with this information, similar to the text in section 4.2.7 for the Lost River subbasin.

Response: The data source and period of record has been added to Figures 3-12 through 3-19, a paragraph discussing the sources of the data was added to section 3.2.7, and table 3-6 was added, which summarizes the available data.

YT#7: Suggested Change ID #32

Description: Spring Creek Diversion in Jenny Creek - Additional Description Needed

Comment: 3.4 Existing Pollution Sources 3.4.2.3 Hydromodification: Dams and Diversions and 3.4.2.4 Hydromodification: Water Rights The description of how the issue of the PacifiCorp diversion of Spring Creek (tributary to Jenny Creek) is addressed is somewhat confusing. The results in Figure 3-28 does not seem to match with Figure 3-26. Figure 3-28 shows less than 1.5 °C difference in lower Jenny Creek temperatures due to diversions while Figure 3-26 shows that the Spring Creek diversion increases lower Jenny Creek temperatures about 3 °C. We recommend revising the text to explain the reason for this discrepancy.

3.6 Excess Load It is unclear how the Spring Creek diversion is handled in Figure 3-32 (excess 7-day average daily maximum stream temperatures on Jenny Creek) on page 107. We recommend revising the text to explain.

3.7 Allocations It is unclear how the Spring Creek diversion is handled in Table 3-23 (Jenny Creek sector allocations at point of maximum impact) and Table 3-24 (Jenny Creek sector allocations at OR/CA stateline) on page 107. We recommend revising the text to explain. Can the TMDL be met with the existing Spring Creek diversion in place?

Response: We included the wrong plot. The correct plot has been added and we have updated the text. This should reconcile differences between the excess loads and other figures. The TMDL allocations for Jenny Creek watershed have been updated to reflect concerns about cumulative warming form other commenters. The final TMDL provides zero human use allowance to all anthropogenic sources including PacficCorp which diverts water from Spring Creek.

YT#8: Suggested Change ID #52

Description: Reasonable Assurance - Stewardship Agreement Plan review requested to ensure Tribal involvement

Comment: Chapter 5: Reasonable Assurance 5.2 Programs to Achieve Nonpoint Source Reductions Load 5.2.1 DMAs, Responsible persons, Management Strategies, and Implementation Actions 5.2.1.4 Federal Irrigation Project Page 226 notes that "DEQ and the NCWQCB have been working with BOR, USFWS, and the Klamath Water Users Association to draft a Stewardship Agreement Plan that will cover source specific implementation planning in Oregon and California." We are interested to know if there is a plan for public or Tribal involvement in that process, given that: 1) DEQ, NCWQCB, BOR, and USFWS are public agencies, and 2) the content of the Stewardship Agreement Plan has important implications for the future of water quality in the Klamath River upon which Tribes depend. We would appreciate an opportunity to review and provide input on the draft Stewardship Agreement Plan before it is finalized.

Response: There will be an opportunity to review the draft plan when a draft is completed. The Stewardship Agreement team has not met since February 6, 2018 and will start working on an outline and draft as soon as the Upper Klamath and Lost River Sub-basin TMDL's are completed and issued.

YT#9: Suggested Change ID #53

Description: Editorial - Suggested Text change in Chapter 6 WQMP page 242

Comment: 6.3 Water Quality Management and Implementation Plan Guidance 6.3.4 Timeline for Implementing Management Strategies

On page 242, it is stated that "DEQ recognizes that there has been and continues to be much progress towards improving water quality in the Upper Klamath and Lost River Subbasins." We are not aware of any data showing that in-river water quality conditions in the Upper Klamath or Lost River are getting better, especially for water temperature. It is true that some efforts are being made, but factors such as climate change that are detrimental to water quality are also progressing. As we noted above, activity and effort is different than progress or actual improvement. This may seem to be an issue of minor semantics, but actually it is important to distinguish between the two; thus, we suggest that "progress" in the passage above be changed to "effort"

Response: DEQ revised "progress" to "effort".

YT#10: Suggested Change ID #55

Description: Monitoring Strategy - Add a map

Comment: Monitoring Strategy

Add a map showing the proposed monitoring locations.

Response: Two figures were added to Section 6.3.10.1 of the WQMP chapter showing the locations of proposed status monitoring stations for the Upper Klamath and Lost River subbasins.

YT#11: Suggested Change ID #56

Description: Monitoring Strategy - Inventory and Compile Existing Data

Comment: Suggestions regarding the monitoring strategy:

Inventory and compile existing data, both from previous short-term studies as well as ongoing long-term monitoring efforts. This would be beneficial because re-occupying previous stations would leverage previous data. The KBMP monitoring map (http://www.kbmp.net/maps-and-data/monitoring-locations) is a good place to start. Riverbend Sciences is currently working on a project for the Klamath Tribal Water Quality Consortium to analyze a large dataset of temperature data collected by multiple entities in the Klamath River and tributaries downstream of Keno Dam, including data from the BLM's Klamath Falls and Medford offices collected in the Jenny and Spencer creek watersheds and the mainstem Klamath River downstream of JC Boyle Dam.

Response: We agree monitoring at existing sites is beneficial and would like to coordinate with the Tribes as much as possible on implementing the monitoring strategy.

YT#12: Suggested Change ID #220

Description: Editorial - Fix caption Figure 3-6

Comment: 3.2 Subbasin Characterization 3.2.4 Climate The caption to Figure 3-6 on page 74 reads "Climate summary — Klamath Falls, Oregon (KLMO 1999-2017)." Should it be KFLO not KLMO?

Response: The climate station in the caption for Figure 3-6 has been changed from KLMO to KFLO.

YT#13: Suggested Change ID #221

Description: Editorial - Figure 4-6 caption

Comment: 4.2 Subbasin Characterization 4.2.4 Climate The caption to Figure 4-6 on page 149 reads "Climate summary — Klamath Falls, Oregon (KLMO 1999-2017)." Should it be KFLO not KLMO?

Response: The climate station in the caption for Figure 4-6 has been changed from KLMO to KFLO.

YT#14: Suggested Change ID #223

Description: Editorial - Update URL

Comment: 6.3.7 Identification of Sector-Specific Implementation Plans

On page 245, the URL listed for ODEQ's guidance for developing Implementation Plans (http://www.deq.state.or.us/wq/tmdls/docs/impl/07wq004tmdlimplplan.pdf) is no longer active.

Response: The URL was updated to: https://www.oregon.gov/deq/wq/tmdls/Pages/TMDLs-Implementation.aspx

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YT#15: Suggested Change ID #224

Description: Editorial - add explanation

Comment: A.3 Derived Data and Sampled Parameters A.3.2.2 Vegetation — Mapping, Classification and Sampling

Page A-10 notes that "Variable vegetation conditions in the Klamath River Basin require a higher resolution than currently available GIS data sources. To meet this need, DEQ has mapped vegetation for most streams using Digital Orthophoto Quads (DOQs) at a 1:5,000 map scale. On the Lost River, LiDAR data was used to characterize vegetation." LiDAR for Spencer Creek is available from the National Map (https://viewer.nationalmap.gov/advanced-viewer/). We recommend that a brief explanation be added about the pros/cons of characterizing vegetation with manual digitization versus LiDAR, and why LiDAR was used for Lost River but not Spencer Creek.

Response: We added a section into Appendix A discussing LiDAR. In addition to the Lost River, LiDAR was used to update ground elevations, topographic shade, and verify the vegetation heights for the Miller Creek model. This was not apparent in Appendix A so we added additional language to clarify.

In Jenny Creek and Spencer Creek, DEQ chose not to update the models with LiDAR.

The temperature data, TIR data, flow data, and vegetation/habitat information used in the modeling in Jenny Creek and Spencer Creek were collected in year 2001. LiDAR and aerial imagery is useful for characterizing current vegetation conditions. LiDAR is also useful for characterizing ground elevations which are inputs used in the model. DEQ considered updating the model to incorporate vegetation and ground elevation data from the more recent LiDAR but decided against it. Updating to LiDAR would have required DEQ to either 1) collect new temperature, TIR, and flow data that centered closer to the year the LiDAR was collected in order to accurately represent the vegetation conditions at that time, or 2) reconcile differences in the vegetation between the two years and modify the LiDAR DSM so it more closely represents vegetation conditions in the year 2001. In addition, updating the model with LiDAR data would require a significant reconfiguration of the model. Given the scale of work and the number of changes that needed to occur in order to incorporate LiDAR DEQ did not believe it was feasible given the time and resources devoted to the project. In the Lost River and Miller Creek we felt it was appropriate to utilize LiDAR because the vegetation conditions when LiDAR was collected do not significantly differ from the model year. There was also no prior vegetation assessment on the Lost River so starting with LiDAR made the most sense.

YT#16: Suggested Change ID #248

Description: Monitoring Strategy - Prioritize known sources for implementation

Comment: Page 4 of the draft monitoring strategy notes that "In some cases, modeling indicates that even with the removal of known, quantifiable sources, the water quality criteria will not be attained. In these cases, DEQ assigns a heat load reduction to background and unidentified anthropogenic sources in order to meet the criteria" and "additional heat budget and system response information may be needed for three waters (i.e., mainstem of the Klamath River, Jenny Creek, and Miller Creek) to effectively reduce unidentified anthropogenic sources of heat or heat related processes. System response studies will

be initiated by DEQ for segments of Miller Creek or Klamath River that do not meet water temperature criteria within 10 years of EPA's approval of the KLR TMDL." We disagree with this approach. The priority for implementation should be to focus on addressing the issues known to adversely affect temperatures (i.e., shade and flow), rather than searching for additional sources that might affect temperatures. If by some miracle we collectively succeed at thoroughly addressing all the known sources (which would likely take several decades of intensive effort), then it would be appropriate to search for additional sources, but to do it before then would be a waste of effort.

Response: Thank you for your comment. DEQ agrees that implementation should focus on known causes of increased temperature. We have updated the narrative to clarify. DEQ still plans to complete system response studies which serve to identify previously unknown sources, but also to quantify progress made on reducing known sources and assist in further implementation.

YT#17: Suggested Change ID #249

Description: Monitoring Strategy - drop additional modeling

Comment: Monitoring Strategy - Section '1.5.6 - 8 System Response and Heat Source Characterization' proposes additional modeling for Klamath River, Jenny Creek, and Miller Creek. We disagree that this is necessary and suggest that this be dropped from the monitoring strategy (see previous comment [Monitoring Strategy - Prioritize known sources for implementation] for reasons).

Response: Thank you for your comment. DEQ agrees that implementation should focus on known causes of increased temperature. We have clarified in the WQMP that priority for implementation should be on addressing known sources first. DEQ still plans to complete system response studies which serve to identify previously unknown sources, but they also serve to quantify progress made on reducing known sources and assist in further implementation. System response studies will only occur for the portions of Jenny Creek, Miller Creek, and the Klamath River that are not making progress toward meeting the TMDL targets within 10 years.

YT#18: Suggested Change ID #250

Description: Monitoring Strategy - Include Photo Monitoring

Comment: The draft monitoring strategy does not mention photos. While quantitative data is useful, it is can also be expensive and time-intensive to collect and thus DMAs may be resistant. Photo-monitoring is an easy and powerful tool for documenting and tracking both habitat conditions (including riparian vegetation) and restoration projects. Therefore, we recommend photo monitoring be included as an integral component of the monitoring strategy.

Response: This is a great suggestion and DEQ will work to incorporate photo monitoring into the overall monitoring strategy document.

YT#19: Suggested Change ID #251

Description: Monitoring Strategy - DMA monitoring data should be publicly available

Comment: We agree with the draft monitoring strategy's call for the DMA's data management systems to "facilitate timely uploads to state (AWQMS) or federal (WQX) databases." In addition, we recommend that the monitoring strategy require that all data collected by the DMAs be made available to the public in electronic form in its full level of detail, not just summaries.

Response: The monitoring strategy itself is not a regulatory document. Requirements for DMAs and other responsible persons are identified in the TMDL Water Quality Management Plan (WQMP) - Chapter 6. In the WQMP, DEQ has required certain DMAs and responsible persons develop an implementation plan for DEQ's approval. The implementation plan will include a monitoring plan which should in part support aspects of the monitoring strategy. The WQMP also requires certain DMAs and responsible persons to submit an annual report to DEQ which will include the results of any monitoring.

It is DEQ's intention that any water quality monitoring data submitted to DEQ will be uploaded into DEQ's AWQMS database. Data in AWQMS is available for download by the public at https://www.oregon.gov/deq/wq/Pages/WQdata.aspx. AWQMS includes both continuous observations as well as the daily summaries. Both are available for download.

YT#20: Suggested Change ID #289

Description: General Comment - appreciate efforts

Comment: Pages 1 & 2: The Yurok Tribe hereby submits these comments on the Draft Upper Klamath and Lost Subbasins Temperature TMDL and Water Quality Management Plan ("Draft TMDL and WQMP"). The Yurok Tribe is the largest tribal nation in California with over 6,300 members. The Yurok Reservation straddles the lower 45 miles of the Klamath River, a mile on either side, from the Yurok village of Req-woi at the mouth of the River to the Yurok village of Wetichpec. The Tribe maintains a subsistence fishing, hunting, and gathering way of life in exercise of its federally reserved fishing, water, and hunting rights, as well as a conservative commercial fishery. The Tribe also enjoys jurisdiction over the lower 45 miles of the Klamath River, regulating fisheries activities, land use, water quality and other environmental matters. Accordingly, the Yurok Tribe has significant interests in water quality in the Klamath River Basin. As a co-manager of the Klamath River Basin, we appreciate the diligent efforts of ODEQ and the other members (NCRWQCB, U.S. Environmental Protection Agency, and Tetra Tech) of the Klamath and Lost River TMDL development team.

Response: Thank you for the support.

YT#21: Suggested Change ID #290

Description: General Comment - TMDL and WQMP effectiveness

Comment: We strongly support the effort to improve water temperature as proposed in the Draft TMDL and WQMP. The Tribe, however, has serious concerns regarding the effectiveness of the proposed TMDLS and WQMP.

Response: DEQ will work diligently with our partners and stakeholders, as well as, the DMA's and responsible persons to ensure the TMDL is implemented through the WQMP.

YT#22: Suggested Change ID #291

Description: Modeling Scenarios - dam removal

Comment: The Draft TMDL and WQMP assume the lower four Klamath River dams will be removed in 2020, and proceed with assumptions regarding water quality and habitat conditions accordingly. As a matter of comprehensive and diligent policy making, the draft should include an analysis of the impact on water quality of the lower four Klamath River dams staying in-river beyond 2020 in case of regulatory or construction based delay. This additional analysis is necessary to inform the ODEQ decision in the proper allocation of the temperature TMDLs in the chance of an unfortunate delay in the removal of the lower four Klamath River dams.

Response: Oregon's TMDL evaluates the existing condition temperature impact on the Klamath River from dams in Oregon (J.C. Boyle and Keno) in Chapter 2 Section 2.3.2, Section 2.6.3, and Section 2.6.4. We have added additional tables and narrative in these sections identifying the temperature impact from J.C. Boyle and Keno dam separately. The draft TMDL included tables identifying the collective impacts from both J.C. Boyle and Keno Dams. The temperature impacts from Copco 1, Copco 2, and Iron Gate are presented in California's North Coast Water Quality Control Board's Klamath River TMDL Chapter 4 Section 4.2.2. The documents are currently available at https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/klamath_river/.

We do not believe additional modeling of the dams staying in the river beyond 2020 is necessary for TMDL development and establishment of TMDL allocations. We have considered a situation where J.C. Boyle and/or Keno are not removed or their removal is delayed. In either scenario DEQ would maintain the current TMDL allocations because these allocations are set at a level needed to attain the temperature water quality standards in Oregon and California. The allocations are the same even if the dams are not removed.

YT#23: Suggested Change ID #321

Description: Beneficial Uses - Native Nations

Comment: The ODEQ has a trust responsibility to all Native Nations, including the Yurok Tribe, to ensure fisheries are protected and Native Nations have full access to their fishing and water rights as required by treaties, statutes, and executive orders. As ODEQ acknowledged in the draft TMDL, the State of Oregon has trust duties to ensure the protection of Native Nations fishing and water rights as required by treaties, statutes, and executive orders.1 These duties require the State's regulations and actions do not harm Native Nations fishing rights nor diminish the supply of available fish for tribal harvest. The Yurok Tribe, specifically, has well-established fishing rights for subsistence, ceremonial, and commercial fishing purposes reserved in the creation of the Yurok Reservation and confirmed by the Supreme Court.2 The Tribe's fishing rights are complimented by federally reserved water rights that ensure not only sufficient quantity but also quality of water to support the tribal fishery. One of the primary purposes of the executive order establishing the Yurok Reservation was to ensure the Yurok people would continue to have access in perpetuity to the once abundant Klamath fishery, thus ensuring the continuation of the Yurok people. California, Oregon, and the federal government all have the duty to ensure government actions do not diminish the supply of fish that has been guaranteed to the Yurok Tribe. Violating this duty is not only against the law, but will have severe and detrimental effects on the Yurok people.

The Yurok people's health and wellbeing are intimately connected with the health of the ecosystem and the species within them. Often self-described as salmon people, the management and reliance on traditional subsistence diet and practices are a vital part of Yurok cultural identity. Abundant and thriving salmonid populations are essential for the continuation of subsistence, cultural, and economic lifeways of

the Yurok people. Decreasing populations of salmonid and other fish species negatively impact the Yurok Tribe and our people's; access to commercial fishing income, passing of traditional ecological knowledge to children, food security, and health and well being.

The last three years highlight the connection between the health of the River, fish, and the Yurok people. The Klamath Coho and Chinook runs in 2016-2018 were the smallest in history. In response to the small runs, the Tribe, through tribal law, closed its commercial fishery in all three years. In 2016, it closed for the first time in the Tribe's history its commercial and subsistence fishery and is notably the first time - since time immemorial- the Yurok people have not fished on the Klamath River. Also, the out migrating juvenile salmon suffered extreme fish disease, C. Shasta, and over 90% of the Coho and Chinook runs were killed. Just months after the Tribal Council voted to close the subsistence fishery for conservation purposes, the Tribal Council also declared a suicide emergency on the Reservation following a string of suicides, by tribal members all under the age of 30. Our health is directly connected to the River's health.

While many factors contribute to the decline of salmonids on the Klamath, water quality, specifically high water temperature, is a major contributing factor. As discussed in more detail below, the Draft TMDL and WQMP allows for water temperatures to exceed tolerable levels for salmonids and other fish species, which causes stress, hinders, and at times destroys, the health and migration of the species necessary to maintain Native fisheries. These warm temperature levels have and will continue to diminish the supply of salmonid to the Yurok Tribe and other Native fisheries. There is urgency to improve conditions for salmonids as they are moving closer to expatriation with each returning class of fish, as was recently noted in the 2019 Klamath Biological Opinions. This is in clear violation of Oregon's trust responsibilities to the Native Nations. We strongly urge ODEQ to amend the Draft TMDL and WQMP to incorporate lower maximum temperatures as recommended below which will help revive salmonid populations.

Response: Thank you for the comment and for sharing the Yurok people's hardship during recent years.

As stated in our response your comment about revising the water quality standard, TMDLs are not the regulatory vehicle through which water quality standards may be changed. TMDLs are used to determine appropriate pollutant load allocations for point and nonpoint sources to meet existing water quality criteria. The existing water quality standards identify cool water species as the designated fish use for the reach upstream of Keno. To change the fish use from cool to cold water species requires a revision to standards and fish use designations accomplished through a rule making process.

Even though cool water species is the designated fish use and the target is 28 deg-C upstream of Keno, it is not the only target the TMDL has established. The TMDL also provides allocations to all anthropogenic sources in the Klamath River such that their cumulative warming is limited to less than 0.3 deg-C (even upstream of Keno) with no measurable warming at the California/Oregon Stateline. These warming limits will help protect salmonid populations in addition to cool water species.

YT#24: Suggested Change ID #322

Description: Targets - inappropriate WQS

Comment: Pages 5-10 of comments: II. The designated uses for all current and traditional salmonid habitats should be changed to the ideal temperature standard of below 15°C 7DADM or at the very least to the designation of Redband or Lahontan Cutthroat Trout Use to ensure the protective water temperature standard of 20°C 7DADM. The Draft TMDL and WQMP improperly designates current and traditional salmonid habitats as "Cool Water Species" with a weaker water temperature standard of 28°C 7DADM. The regulations should instead designate the temperature standard of below 15°C 7DADM as the ideal temperature for salmonids, or at the very least use the "Redband or Lahontan Cutthroat Trout Use"

designation with the relatively protective water temperature standard of 20°C 7DADM. The most egregious example of the incorrect designation is that of the mainstem Klamath River habitat spanning between Keno Dam up to Link Dam as a "Cool Water Species" designation. This designation is not sufficiently protective of salmonids, especially once the lower dams are removed and anadromous fish passage is restored to the Upper Basin. It is counterintuitive to remove the dams and restore anadromous fish passage, but set the temperature standard to a temperature that will hinder and can completely destroy the survival and fitness of those same fish.

There are set temperature "zones" that correspond to the EPA criteria for 7DADM for salmonids: the optimal zone are water temperatures <15°C where salmonids thrive; the tolerable zone are water temperatures between 15°C and 20°C; and the unsuitable or warm zone are water temperatures >20°C where the survival and fitness of adult salmonids migrating are decreased and the growth and survival of juveniles may be depressed.[4] Research shows that the very upper thermal limits to migration for adult Chinook salmon in the Klamath River basin are a mean daily temperature of 23°C and temperatures higher than this value completely blocks migration in almost all circumstances. [5]

[4] See John Palmer et. al., EPA Region 10 Guidance for Pacific Northwest state and tribal temperature water quality standards, EPA 910-B-03–002 (2003) [Attachment 3]; A. H. Fullerton et. al., Longitudinal thermal heterogeneity in rivers and refugia for coldwater species: effects of scale and climate change, Aquatic Sciences 80:3 (2018) [Attachment 4].

[5] J.S. Strange, Upper Thermal Limits to Migration in Adult Chinook Salmon: Evidence from the Klamath River Basin, Transactions of the American Fisheries Society, 139:1091–1108 (2010) [Attachment 5]; S.J. Starcevich, S.E.

Generally, human caused elevated water temperatures; 1) shrink suitable habitats for adult salmonids holding and spawning as well as juvenile rearing; 2) increase the growth of bluegreen algae and Microcystis, which releases toxins in the water and is harmful to fish, humans, and animals; and 3) stresses the salmonids, which put them at great risk of contracting Ceratanova shasta infection, a lethal disease. Thus, any temperatures above 20°C 7DADM are outside the tolerable zone and will begin to hinder and can completely destroy the survival an fitness of adult and juvenile salmonids. Ideally the best water temperature standard would be below 15°C 7DADM to support thriving habitat conditions for salmonids.

It is incorrect to assume the mainstem Klamath River spanning from the California/Oregon border to the Keno Dam is the only habitat for salmonids. As seen in the maps below, the current and traditional salmonid habitats encompass a larger area than the Draft TMDL and WQMP describes. 6 We request the ODEQ conduct additional analysis to determine the correct current and traditional habitats for salmonid species. The Draft TMDL and WQMP should be amended to apply the ideal below 15°C 7DADM temperature standard or at the very least use the "Redband or Lahontan Cutthroat Trout Use" designation with the relatively protective water temperature standard of 20°C 7DADM for all current and traditional salmonid habitats within the proposed scope of this draft TMDL. (See Figures, 2, 3, and 4 in PDF file).

Response: Thank you for your comment. TMDLs are not the appropriate regulatory vehicle through which water quality standards may be changed. TMDLs are used to determine appropriate pollutant load allocations for point and nonpoint sources, including natural sources, to meet existing water quality standards. Note that for the Upper Klamath subbasin, waterbodies that flow directly and indirectly to California are also subject to California's downstream water quality standards as it is the policy of Oregon DEQ to achieve water quality standards established by neighboring states in interstate waters.

Even though cool water species is the designated fish use and the target is 28 deg-C upstream of Keno, it is not the only target the TMDL has established. The TMDL also provides allocations to all anthropogenic sources in the Klamath River such that their cumulative warming is limited to less than 0.3

deg-C (even upstream of Keno) with no measurable warming at the California/Oregon Stateline. These warming limits will help protect salmonid populations in addition to cool water species.

YT#25: Suggested Change ID #323

Description: Targets - HUA 0.3

Comment: Pages 11 & 12 of comments: III. The regulations should prohibit any anthropologic temperature increases for all point sources and nonpoint sources instead of allowing for a .3°C cumulative increase in temperature, as the draft regulations propose. Increasing the temperature of waterways puts significant stress on the species relying on natural water temperature conditions. Different species have different temperature tolerances, thus wise policy requires regulations to protect the most sensitive species in the ecosystem. For the Klamath and Lost Subbasins, salmonids are the most sensitive species and the Draft TMDL and WQMP must establish regulations to ensure salmonids can continue to live and return to thriving population numbers. The Draft TMDL and WQMP incorrectly selects .3°C as the maximum temperature increase at the point of maximum impact.

First, there is no discussion backed with the best available science explaining the ODEQ decision to set the maximum cumulative increase of water temperatures to no greater than .3°C above the applicable criterion at the point of maximum impact. The citation provided in the Draft TMDL and WQMP, OAR 340-041-0028(12)(b)(B), also does not provide any discussion or scientific support for the selection of .3°C to be the maximum cumulative increase of water temperature above the applicable criterion at the point of maximum impact. The selection of .3°C as the maximum temperature increase is an arbitrary selection and lower maximum temperature increase amounts will benefit the most sensitive uses of the Klamath and Lost Subbasins.

Second, as shown in Table 2-11 of the Draft TMDL and WQMP, each station in the Klamath mainstem has had a maximum temperature well above 23°C (the upper thermal limits of adult Chinook salmon), including temperatures of 28°C to 29.5°C. If each station was properly categorized with the ideal below 15°C 7DADM temperature standard or at the very least use the "Redband or Lahontan Cutthroat Trout Use" designation with the relatively protective water temperature standard of 20°C 7DADM, then ODEQ would have found every station exceeded the criteria standards. As discussed above, these high temperatures hinder and completely destroy the survival and fitness of adult and juvenile salmonids. The ODEQ and the Draft TMDL and WQMP should not allow for any increase in the maximum water temperature, because the water temperatures are currently exceeding acceptable water temperatures and are within the unsuitable water temperature zone for salmonids. The State of California's North Coast Regional Water Quality Control Board, when it adopted the temperature TMDL for the Klamath River, considered the temperature zones and limits of the salmonid species when taking the conservative approach of allocating no temperature increases year round to ensure the water temperatures remain in the optimal zone to support thriving salmonid conditions.[7] We request ODEQ adopt similar temperature TMDL regulations to the North Coast Regional Water Quality Control Board to establish regulations that will support a thriving salmonid population. At the minimum, we request the ODEQ adopt a maximum temperature increase allowance that will still ensure a maximum temperature standard of 20°C 7DADM will be present in all salmonid current and traditional habitat year round.

[7] Draft TMDL and WQMP section 2.1.2.4; the North Coast Regional Water Quality Control Board, Action Plan for the Klamath River TMDLs Addressing Temperature, Dissolved Oxygen, Nutrient, and Microcystin Impairments in the Klamath River in California and Lost River Implementation Plan, March 2010.

Response: The 0.3°C increase is the Human Use Allowance (HUA), which is part of Oregon's biologically based numeric criteria (BBNC) water quality standards for cold water species (OAR 340-

041-0028 (12)(b)(B)) and was established through a rulemaking process in 2003. The rule was approved by EPA and consulted on under ESA. The discussion on selection of 0.3 deg-C for the HUA is described in the November 13, 2003 Staff report to the Environmental Quality Commission from Stephanie Hallock, Director. "Agenda Item D, Rule Adoption: Water Quality Standards, Including Temperature Criteria, OAR Chapter 340, Division 41, December 4, 2003, EQC Meeting."

Here is a brief summary of the rationale provided in the staff report. In the 2003 EPA Temperature Guidance, EPA recognized the legitimacy of de minimis increases representing insignificant temperature effects on andadromous salmonids to allow some human use of Oregon Streams. The guidance recommends a de minimis discharge of no more than 0.25 Celsius. However, the precision of measuring temperature to a hundredth of a degree is not generally available. Therefore, after consulting with EPA and the federal services, DEQ reached consensus that the de minimis increase of 0.3 degrees Celsius above the applicable temperature criteria will have no adverse affect on salmonids. EPA used this same value in its proposed rule (See 68 Federal Register page 58758, October 10, 2003).

The report in full can be obtained from DEQ through a public records request if you wish to review it. Because the HUA is a numeric value adopted in rule, the TMDL is not the regulatory process by which these numeric criteria can be changed or revised.

DEQ's Temperature IMD also discusses how DEQ interprets and implements the HUA. The IMD is available at https://www.oregon.gov/deq/Filtered%20Library/IMDTemperature.pdf

We have added references to both reports in the TMDL.

The Cool Water species criterion is narrative (non numeric) and thus DEQ must set a TMDL target that protects cool water species (e.g., sucker). The HUA does not apply to the cool water criteria. The warming allowed where cool water species criterion apply is limited such that temperatures do not exceed 28 deg-C and will achieve downstream water quality criteria.

YT#26: Suggested Change ID #324

Description: Targets - HUA climate change

Comment: From comments Pages 13 & 14:IV.

The Draft TMDL and WQMP fails to adequately consider climate change and should explicitly allocate HUA to the warming climate.

It is well established that climate change is a human made crisis and is having major negative impacts on the environment and the species reliant on healthy ecosystems.[8] As discussed above, the Klamath River waters have been warming and are currently at temperatures unsuitable for the most sensitive species in the Upper Klamath and Lost Subbasins. Climate change is expected to intensify this warming trend.[9] Research shows a warming climate will degrade water quality through increasing temperatures and changes in the hydrology of the Klamath River, which will increase fishery stress, reduce salmonid habitat, increase water demands for instream ecosystems, and increase the likelihood of invasive species.[10] The warming of the waters in the Upper Klamath and Lost Subbasins from climate change can be properly considered warming from an anthropogenic source and should be explicitly accounted for in the Draft TMDL and WQMP.

We request the ODEQ amend the Draft TMDL and WQMP to not allow for any water temperature increase because climate change is currently and will in the future heat the Klamath River and Lost River waters. At the very least, the ODEQ should explicitly account for climate change in the allocation of

HUAs by reassigning the amounts allocated for "reserved capacity of future growth and new, expanded, or unidentified sources" as allocations for future warming from climate change. This reassignment would best account for all known future anthropogenic climate change sources and would prevent any new or expanded anthropogenic sources from further heating the waters.

[8] IPCC, Global Warming of 1.5 ºC: Summary for Policy Makers (2018), https://www.ipcc.ch/site/assets/uploads/2018/02/AR5_SYR_FINAL_SPM.pdf [Attachment 8].

[9] Yurok Tribe Climate Change Adaptation Plan for Water & Aquatic Resources 2014-2018 [Attachment 9].

[10] U.S. Bureau of Reclamation, Basin Report: Klamath River, available at https://www.usbr.gov/climate/secure/docs/2016secure/factsheet/KlamathRiverBasinFactSheet.pdf [Attachment 10]; National Center for Conservation Science & Policy The Climate Leadership Initiative, Preparing for Climate Change in the Klamath Basin (March 2010), available at https://www.climatewise.org/klamath-climate-preparation [Attachment 11].

Response: The current allocations do not allow warming from anthropogenic climate change. DEQ views climate change as an anthropogenic source of warming and has not provided any portion of the human use allowance to accommodate climate change. Therefore climate change sources must achieve zero temperature warming. Oregon DEQ has programs with authority to regulate sources of climate change located within Oregon.

YT#27: Suggested Change ID #325

Description: Implementation Activities - Focus on the Klamath River at its Tributaries Rather than the Lost River

Comment: Pages 17 of comments: VI. TMDL Implementation Should Focus on the Klamath River at its Tributaries Rather than the Lost River

Given the level of alteration, restoring water quality and habitat in the Lost River subbasin would be a monumental task requiring conversion of thousands or tens of thousands of acres of farmland back to wetlands. This would require large amounts of money and political will which is unlikely to materialize. Therefore, we recommend that restoration efforts focus on the Klamath River and its tributaries [12]. The problems of the Lost River can be addressed through a combination of minimizing discharges into the Klamath River and by treating the effluent prior to discharge into the Klamath River.

12 Klamath Tribal Water Quality Consortium, Upper Klamath Basin Nonpoint Source Pollution Assessment and Management Program Plan, 78 (2018), available at https://klamathwaterquality.com/documents/KlamConsortium_NPS_Plan_20180918_finalweb.pdf

Response: We have noted your recommendation to prioritize TMDL implementation on the Klamath River and it's tributaries. We agree that restoration of water quality in the Lost River will be a challenging task and support the Tribes prioritization to focus on the Klamath River and it's tributaries.

In terms of the level of effort required in the Lost River. We recognize that historically the Lost River was tied to series of expansive wetlands and that these conditions supported a healthy population of Suckers. DEQ does not oppose an attempt to restore the Lost River and it's surrounding wetlands but DEQ is also not proposing that TMDL implementation be an attempt to go back to that condition if an alternative set of actions will achieve the same water quality goal. We don't agree that the only way to achieve the temperature targets and other water quality standards in the Lost River would require converting

thousands of acres of farmland back to wetlands. The temperature TMDL analysis shows that the Lost River as it generally exists today can achieve the temperature standard with improvement to shade and with implementation of strategies to address thermal loading that is a result from a lack of instream flow. We estimate that less than 100 acres along the Lost River need to be restored to increase shade. While this may not restore the Lost River to it's historical condition DEQ believes this is an achievable objective and will lead to improvements in water quality.

YT#28: Suggested Change ID #329

Description: Forest Practice Rules are Are Not Protective

Comment: Forest Practice Rules for Private Lands Are Not Protective of Water Temperature

The water quality effects of timber harvest and roads on private lands are an important issue generally in the Klamath River Basin, but play a particularly critical role in the impairment of coldwater tributaries. For example, Spencer Creek is a Klamath River tributary that currently drains into J.C. Boyle reservoir. It contains low-gradient stream habitat that is rare in tributaries of the Middle Klamath Basin. Following the likely removal of J.C. Boyle, Copco, and Iron Gate dams, a restored Spencer Creek could provide excellent habitat for coho salmon. The Draft TMDL and WQMP found that current riparian shade in Spencer Creek is barely more than half of the estimated maximum potential shade, current water temperatures at the mouth of Spencer Creek are more than 10 ºC warmer than its natural thermal potential, and that a substantial portion of this warming is due to the lack of vegetative shade. Examination of aerial photographs of the Spencer Creek watershed and the surrounding areas in 2005 shows more bare ground than trees, with the forest confined to narrow strips (Figure 1), a powerful illustration of the poor condition of private timber lands in the Oregon portion of the Klamath Basin. Since 2005, additional harvests the proceeded to target the few remaining riparian areas in Spencer Creek's middle (Figure 2) and lower reaches.

The Draft TMDL and WQMP relies on the Oregon Department of Forestry's ongoing implementation of Oregon's Forest Practices Act (FPA) to ensure that private land forestry activities do not result in water quality impairment. Unfortunately, these regulations have long been recognized as inadequate for the protection salmonid habitat and water quality. For example, the Independent Multidisciplinary Science Team [13] ("IMST") was convened by the State of Oregon to assess whether the FPA rules were sufficiently protective to restore wild salmonids in Oregon. The IMST found that the existing rules were not adequate on several bases, including water quality issues such as sedimentation resulting from landslides and roads.

We are not aware of any significant improvements to the Oregon FPA rules to address the shortcomings identified by the IMST. The National Marine Fisheries Service has also recognized the shortcomings of the FPA rules and has made recommendations to the State of Oregon [14], but these recommendations have not yet been implemented. In the Oregon Coast Range west of the Klamath Basin, Oregon did recently increase riparian protections in response to research showing that previous rules did not adequately protect water temperatures [15]; however, rules were not changed for areas outside the Coast Range. We realized that ODEQ's authority to resolve the situation is limited due to existing laws, regulation, and politics; however, we feel compelled to note the approach outline in the Draft TMDL and WQMP to address the water quality impacts of forestry on private lands is unlikely to succeed.

Figure 2. Satellite images from May 2016 and June 2019 from Planet.com showing of a 1.5 mile long reach in the middle portion of Spencer Creek which runs from northwest corner to southeast corner of the images. The white dashed oval indicates areas where timber harvests specifically targeted trees within riparian buffers. The road crossing (labeled on some topographic maps as Spencer Creek Hook Up Road) in the upper left of the photo is located at latitude 42.224576° north, longitude -122.098926° west.

13 Independent Multidisciplinary Science Team (IMST), Recovery of Wild Salmonids in Western Oregon Forests: Oregon Forest Practices Act Rules and the Measures in the Oregon Plan for Salmon and Watersheds. Technical Report 1999-1 to the Oregon Plan for Salmon and Watersheds, Governor's Natural Resources Office, Salem, Oregon, 94 (1999).

14 National Marine Fisheries Service (NMFS), A Draft Proposal Concerning Oregon Forest Practices. Submitted by NMFS to the Oregon Board of Forestry and the Office of the Governor, 110 plus Appendices (1998).

15 Groom, J.D., L. Dent, and L.J. Madsen, Stream Temperature Change Detection for State and Private Forests in the Oregon Coast Range, Water Resources Research 47:W01501. doi: 10.1029/2009WR009061 (2011).

Response: Thank you for you comment. DEQ agrees that in certain situations, the Oregon Forest Practices Act rules minimum riparian requirements may not be sufficient to achieve the TMDL shade allocations. DEQ has communicated this concern to ODF and the Board of Forestry. DEQ and the Oregon Environmental Quality Commission are working closely with the ODF and the Board of Forestry on this issue.

YT#29: Suggested Change ID #330

Description: Tables - Table 3-1

Comment: Chapter 3: Upper Klamath Subbasin Tributaries Temperature TMDLs In Table 3-1 on page 62, the section regarding the Redband or Lahontan Cutthroat Trout Use is an incomplete excerpt of OAR 340-041-0028(4)(e) and is missing the important second half of the sentence. It currently reads "The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or Redband trout use". It should be revised to "The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or Redband trout use may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit)."

Response: Language in Table 3-1 has been changed to "The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or Redband trout use may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit)."

YT#30: Suggested Change ID #331

Description: Tables - Table 4-1

Comment: Chapter 4: Lost Subbasin Temperature TMDLs In Table 4-1 on page 135, the section regarding the Redband or Lahontan Cutthroat Trout Use is an incomplete excerpt of OAR 340-041-0028(4)(e) and is missing the important second half of the sentence. It currently reads "The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or Redband trout use". It should be revised to "The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or Redband trout use may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit)."

Response: Language in table 4-1 has been changed to "The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or Redband trout use may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit)."

YT#31: Suggested Change ID #333

Description: Monitoring Strategy

Comment: Monitoring Strategy

We reviewed the Monitoring Strategy to Support Implementation of Water Temperature Total Maximum Daily Loads for the Upper Klamath and Lost Subbasins. We agree with the concept of developing and implementing a monitoring strategy.

Response: Thank you for the feedback.

YT#32: Suggested Change ID #334

Description: General Comment - Yurok concerns

Comment: The Yurok Tribe strongly supports the effort to develop water temperature improvements proposed in the Draft TMDL and WQMP; however, we have serious concerns that the proposed water quality management plan is unlikely to be effective for that purpose for the reasons expressed above. The Tribe urges ODEQ to exercise its trust responsibility to Native Nations by making the changes recommended herein.

Response: Thank you for your comment and DEQ will continue to work with the Tribal Nations as planning for WQ improvements progress.
