Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

May 15, 2026

In reply refer to: E-4

Comment submitted via email: David.Gruen@deq.oregon.gov

Mr. David Gruen
Oregon Department of Environmental Quality
700 NE Multnomah Street, Suite 600
Portland, OR 97232

Subject: Comments to Oregon Department of Environmental Quality on the February 2026, pre-public draft Water Quality Management Plan – Columbia and Lower Snake Rivers Temperature TMDL.

Dear Mr. Gruen:

The Bonneville Power Administration (Bonneville) appreciates the opportunity to provide comments on Oregon Department of Environmental Quality's (DEQ) pre-public draft Water Quality Management Plan – Columbia and Lower Snake Rivers Temperature TMDL. Bonneville, as part of the U.S. Department of Energy, operates as a not-for-profit federal entity, selling cost-based electrical power and transmission services to benefit the Pacific Northwest, especially the public bodies and cooperatives that serve domestic and rural consumers. In providing these services, Bonneville must balance multiple public duties and purposes, including: assuring the Pacific Northwest has an adequate, efficient, economical and reliable power supply; promoting energy conservation and the use of renewable resources; and, acting consistent with the program developed by the Northwest Power and Conservation Council by protecting, mitigating, and enhancing fish and wildlife in the Columbia River basin that are affected by the development and operations of the federal facilities from which Bonneville markets power.[1]

[1] 16 U.S.C. § 839. Unlike most federal agencies, Bonneville does not receive annual congressional appropriations; instead, the agency is self-financed from revenues received from the sale of power and transmission services. Bonneville utilizes this revenue to not only pay for the continuing costs associated with its programs (including power, transmission, and fish and wildlife investments and maintenance) but also to repay the United States Treasury for the power share of the original federal investment used to construct the Federal Columbia River Power System. The Bonneville Administrator must operate the agency in a manner that allows it to recover its costs "in accordance with sound business principles." 16 U.S.C. § 839e(a)(1).This includes the objectives of setting the lowest possible rates for Bonneville services, while enabling Bonneville to make timely repayments to the United States Treasury and simultaneously fulfilling multiple public purposes for the benefit of the Pacific Northwest.

As a member of the Columbia River Temperature Water Quality Management Plan (WQMP) Local Advisory Group, Bonneville provides the following comments to DEQ to help revise the pre-public draft of the WQMP. Bonneville closely coordinates with the U.S. Army Corps of Engineers (Corps) on hydropower generation at Bonneville, The Dalles, John Day and McNary dams on the lower Columbia River. While the Corps is congressionally authorized to operate these dams for multiple purposes, Bonneville is the federal agency Congress authorized to market and distribute the hydropower generated at these dams. Based on review of the WQMP, Bonneville provides these four comments, which describe our primary concerns. Please note that omission of comments should not be taken as agreement with WQMP statements and approaches.

1. DEQ's coordination with Washington Department of Ecology (Ecology) to conduct system-wide temperature modeling (Local Advisory Group Meeting #2).

Bonneville is concerned with DEQ's and Ecology's intention to conduct system-wide temperature modeling for implementation of Environmental Protection Agency's (EPA) Columbia and Lower Snake Rivers Temperature Total Maximum Daily Load (TMDL). As Ecology has not provided details on their proposed approach to system-wide modeling, our comments and questions are high-level at this time. Bonneville's understanding from Ecology and DEQ is they plan to use a slightly modified version of the RBM10 model that EPA used for the TMDL. Bonneville provided comments to EPA during the development of the TMDL, which included our concerns RBM10 is not an appropriate model for complex river systems given its limited one-dimensional modeling capability. As discussed in our comments, one-dimensional models are inadequate for representing the temperature profile of the Columbia River system (see attachment). Without additional details on the proposed modeling approach and release of a modeling quality assurance plan, Bonneville is concerned DEQ (and Ecology) are prematurely selecting an inappropriate model for TMDL implementation.

2. DEQ's apparent extension of its authority outside Oregon waterbodies.

In reviewing the WQMP, Bonneville noted several examples where DEQ is attempting to involve dams, which are located on waterbodies outside of DEQ's jurisdiction, in WQMP implementation.[2] Bonneville requests that DEQ cite specific legal authority that allows DEQ to involve facilities that are outside of Oregon waterbodies in the next version of the WQMP. Otherwise, Bonneville requests that DEQ revise statements to remove involvement of dams that are not within DEQ's jurisdiction.

3. DEQ's mention of actions that are outside the scope of the TMDL.

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[2] See e.g., Pre-public draft WQMP § 2.1 Nonpoint source dam management strategies (List of potential management strategies includes, "coordination with upstream mainstem Columbia River dams to reduce water temperature flowing into dam reservoirs"); *Id.* § 4.2 Timelines for attaining temperature water quality standards ("DEQ anticipates the need for temperature reduction actions to be modeled, evaluated for feasibility, and then implemented across the TMDL extent to address the cumulative impacts of the mainstem dams"; *Id.* § 5.3.1 Management strategies ("DEQ expects designated management agencies to detail coordination activities undertaken by upstream mainstem dams in the TMDL geographic area…").

Boneville requests DEQ remove mention of dam breaching as a temperature management strategy.[3] EPA repeatedly stated in Columbia and Lower Snake Rivers Temperature TMDL Responses to Public Comments that dam breaching is outside of the scope of the TMDL. Additionally, DEQ does not have the authority to order the Corps to study dam breach or operational changes such as reservoir drawdown or lowering minimum operating pool elevations that have no linkage to attaining the load allocation. EPA's acknowledgement of the scope of TMDL, which expressly excludes dam breach, coupled with DEQ's lack of any rationale to support studying drastic operational changes means DEQ should remove these items from its plan.

4. Oregon's request for commitments to implement specific management strategies.

Bonneville suggests including realistic expectations in contrast to "commitment to implementation of specific actions to achieve implementation of specified management strategies on a reasonable timeline."[4] Given the complexity of dam operations, this phrase sets misleading expectations that the Corps will commit to implementing specific management strategies within their implementation plan, which is due to DEQ within eighteen months of WQMP issuance. Bonneville suggests revising this language to capture the complex nature of the Corps' evaluation processes for the strategies, which likely involves consideration of impacts to the multiple, congressionally authorized purposes, fit within existing commitments, including Endangered Species Act, National Environmental Policy Act and other legal commitments, and identification of funding sources. It is unlikely that a specified management strategy can be identified within eighteen months.

Bonneville welcomes the opportunity to discuss our comments with DEQ. Please contact me if you have any questions on these comments.

Sincerely,

BENJAMIN ZELINSKY

Digitally signed by BENJAMIN ZELINSKY
Date: 2026.05.15 09:00:57 -07'00'

Benjamin D. Zelinsky
Acting Executive Vice President of Environment, Fish and Wildlife
Bonneville Power Administration

Attachment:
BPA_TEMP_TMDL_Comment_Ltr_7_17_2020_Final

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[3] *Id.* § 2.1, Nonpoint source dam management strategies (List of potential management strategies includes, "reservoir drawdown or dam breach").

[4] *See e.g., Id.* § 5.3.2, Timeline and schedule ("Each implementation plan must include commitment to implementation of specific actions to achieve implementation of specified management strategies on a reasonable timeline, which includes a schedule specified for meeting measurable milestones to document progress.").

Department of Energy

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POWER SERVICES

July 17, 2020

In reply refer to: PGA-6

Comment submitted via email: Opalski.Dan@epa.gov and ColumbiaRiverTMDL@epa.gov

Dan Opalski
EPA Region 10
1200 6th Avenue, Suite 155 (19-CO4)
Seattle, WA 98101

Subject: Comments to the United States Environmental Protection Agency Region 10 on the May 18, 2020, issued Total Maximum Daily Load for temperature on the Columbia and Lower Snake Rivers.

Dear Mr. Opalski:

The Bonneville Power Administration (Bonneville) appreciates the opportunity to provide comments on the United States Environmental Protection Agency's (EPA) Total Maximum Daily Load (TMDL) for temperature on the Columbia and Lower Snake Rivers. The TMDL addresses portions of the Columbia and lower Snake Rivers that have been identified by the states of Washington and Oregon as impaired due to temperatures that exceed those states' water quality standards. This TMDL examines sources of temperature impairments on the Columbia River, from the Canadian border to the Pacific Ocean; and on the lower Snake River in Washington, from its confluence with the Clearwater River at the Idaho border at Anatone, Washington, to its confluence with the Columbia River.

Bonneville recognizes EPA's early efforts and time to inform us on the approach and methodology EPA used in developing the TMDL. However, Bonneville continues to have concerns and comments that focus on the analysis presented in the TMDL document and appendices. Bonneville also provides recommendations for clarification where language is ambiguous or inaccurate.

The sources of temperature impairment that EPA examined in this TMDL include the following ten federal dams: Grand Coulee on the Columbia River operated by the U.S. Bureau of Reclamation (Reclamation), and nine dams operated by the U.S. Army Corps of Engineers (Corps): Chief Joseph, McNary, John Day, The Dalles and Bonneville dams on the Columbia River; and Lower Granite, Little Goose, Lower Monumental and Ice Harbor dams on the Snake

River. Bonneville's comments focus on these ten federal dams, including the point and non-point portions of these dams.

As background, the Corps and Reclamation operate and maintain these ten federal dams for multiple congressionally authorized purposes including flood risk management, navigation, hydropower generation, fish and wildlife conservation, irrigation, recreation, water quality, and municipal and industrial water supply though not every dam is authorized for all purpose. While the Corps and Reclamation are congressionally authorized to operate these dams in the Northwest for multiple purposes, Bonneville is the federal agency Congress authorized to market and distribute the power generated at these dams. In return, Bonneville is required to pay, either directly to the Corps and Reclamation, or as a reimbursement to the U.S. Treasury, (1) all costs associated with power-specific operations and assets (e.g. turbines); and (2) a share of "joint costs," which benefit or mitigate, for all purposes of the facility (e.g. fish mitigation, water quality). For the facilities funded using the Corps' Columbia River Fish Mitigation program (CRFM), which includes the four lower Snake and four lower Columbia River facilities (and not Chief Joseph Dam), the Northwest ratepayers' (Bonneville's customers) share of joint costs totals 83% for capital investments and 82% for operations and maintenance expenses. Any additional costs applied to these federal dams as a result of the temperature TMDL will increase Bonneville's costs, which in turn will impact Bonneville ratepayers throughout the Northwest.

Bonneville markets and distributes the hydropower generated at these ten federal dams. Bonneville, as part of the U.S. Department of Energy, operates as a not-for-profit federal entity, selling cost-based electrical power and transmission services to benefit the Pacific Northwest, especially the public bodies and cooperatives that serve domestic and rural consumers. In providing these services, Bonneville must balance multiple public duties and purposes, including: assuring the Pacific Northwest has an adequate, efficient, economical and reliable power supply; promoting energy conservation and the use of renewable resources; and, acting consistent with the program developed by the Northwest Power and Conservation Council by protecting, mitigating, and enhancing fish and wildlife in the Columbia River basin that are affected by the development and operations of the federal facilities from which Bonneville markets power.[1]

[1] 16 U.S.C. § 839. Unlike most federal agencies, Bonneville does not receive annual congressional appropriations; instead, the agency is self-financed from revenues received from the sale of power and transmission services. Bonneville utilizes this revenue to not only pay for the continuing costs associated with its programs (including power, transmission, and fish and wildlife investments and maintenance) but also to repay the United States Treasury for the power share of the original federal investment used to construct the Federal Columbia River Power System. The Bonneville Administrator must operate the agency in a manner that allows it to recover its costs "in accordance with sound business principles." 16 U.S.C. § 839e(a)(1).This includes the objectives of setting the lowest possible rates for Bonneville services, while enabling Bonneville to make timely repayments to the Treasury and simultaneously fulfilling multiple public purposes for the benefit of the Pacific Northwest.

As the principal funding entity for the ten federal dams identified in the TMDL, Bonneville respectfully submits the following comments:

1. EPA's TMDL unreasonably and inappropriately assigns responsibility for temperature impacts upstream of the boundary condition set in the TMDL from Canada and Idaho to the ten federal dams operating on the Columbia and Snake rivers.

Bonneville has significant concern with EPA's TMDL methodology, which disregards the holistic, basin-wide nature of the temperature impacts in the Columbia and Snake rivers. EPA essentially assigns the entire burden of attaining the temperature allocations to the ten Columbia and Snake River federal dams and ignores the upstream temperature sources outside the TMDL boundary. These ignored sources include the Columbia River upstream of the Canadian border, the Snake River upstream of Anatone, and all tributaries draining into the mainstem Columbia and Snake Rivers. This inaccuracy is compounded by the fact that upstream of the boundary, in both Canada and Idaho, the water quality standards for the Columbia and Snake Rivers are 2°C higher than downstream in Washington.

As EPA knows, the temperature standards in Washington and Oregon for the Columbia and Snake rivers are more stringent than upstream river temperature standards in Canada and Idaho. In fact, Idaho Department of Environmental Quality (DEQ) has questioned the appropriateness of a 20°C numeric standard for the Snake River for protection of cold water species "due to reservations as to its attainability":

> "DEQ and EPA do not agree on acceptable criteria for temperature for Idaho water bodies. At issue is a balance between temperature that is protective of cold water-dependent species yet attainable in most water bodies. Numerous studies and investigations have been conducted by DEQ and others to determine the impact of temperature on aquatic life in various water bodies. In April 2003, EPA Region 10 issued guidance to states and tribes in the Pacific Northwest on temperature criteria to protect endangered salmonids. Idaho participated in developing this guidance but in the end dissented on most of the recommended criteria due to reservations as to their attainability. These reservations persist to this day."[2]

[2] Idaho Department of Environmental Quality, Temperature, https://www.deq.idaho.gov/water-quality/surface-water/temperature/.

Without upstream temperature reductions or alignment of state temperature standards, efforts to reduce temperature under this TMDL will be not achieve their intent. EPA's TMDL approach to boundary conditions is flawed because it fails to account equitably and holistically for heat added from all sources basin-wide (upstream of the boundary conditions and tributary inputs), and prejudicial because the burden is almost entirely on the ten federal dams to remedy the problem.

Bonneville recognizes the need for the efficiencies on EPA's part to develop this TMDL, however, an undertaking of this importance demands thorough examination of all aspects of the temperature sources in the Columbia River basin holistically. For example, EPA's Columbia and Snake rivers temperature TMDL technical analysis should be linked to and be incorporated into the upcoming temperature TMDL on the mainstem Snake River which is due for completion in December of 2026.[3] Linking these two TMDLs and having temperature standard continuity between states and boundaries will provide a more holistic approach for TMDL implementation and allow for a broad understanding of how upstream sources impact this Snake River and Columbia River temperature TMDL. Figure 20 in Appendix B of the TMDL shows that Snake River temperatures upstream of Anatone are above both Washington's 20°C and Idaho's 22°C standards. Bonneville requests that the TMDL include a discussion about the frequency and magnitude of these temperature standard exceedances above the TMDL boundary, and discuss how this TMDL relates to the upcoming Snake River Hells Canyon TMDL.

More specifically, Bonneville recommends that EPA recalculate the temperature allocation tables (Tables 6-6 to 6-9) with all Columbia River Basin's heat sources accounted for in a holistic basin-wide approach to attain water quality standards, or identify an alternative attainable temperature standard that will protect beneficial uses for the mainstem Columbia and Snake rivers basin wide, and then assign temperature reduction targets more equitably across the entire Columbia River Basin.

In addition, Bonneville recommends that the Canadian standards also be presented in the TMDL main document and in Appendix A.

Lastly, in TMDL Section 6.7, EPA discusses numerous sources of warming that contribute to excess temperature in this TMDL. However, EPA does not mention that temperature standards upstream of the boundary are warmer than within the TMDL study area. Bonneville recommends EPA add a third bullet stating that the temperature criteria upstream of the boundaries in Idaho and Canada both have cold water numeric standards that are 2°C higher than Washington's downstream temperature standard.

[3] According to EPA's Oregon TMDL lead, under the court ordered TMDL schedule for Oregon, the temperature TMDL for Oregon's Snake/Hells Canyon TMDL should be submitted to EPA on or before December 4, 2026.

2. There are significant limitations on how the ten federal dams are modeled in the TMDL.

Bonneville has significant concerns with the limitations of EPA's RBM-10 model used in the TMDL. The one-dimensional nature of EPA's RBM-10 model means that it cannot simulate dam operations which pass water downstream from a particular depth within the water column, and is too simplistic to simulate other riverine effects.

Additionally, EPA's analysis allows for large data gaps between measured monitoring sites, leaving large portions of the river to model interpolation. The model segments representing impounded reaches are very large, in some cases over 20 miles. The impact of assuming constant width and depth for such large reaches does not appear to have been explored. An accurate representation of the river's surface area over a varying depth is important for ensuring the appropriate amount of solar heating occurs, Bonneville recommends that this discussion be added to the TMDL.

Bonneville's specific concern is the inability of EPA's RBM-10 model to simulate diurnal temperature fluctuations which are important in determining the impact of the ten federal dams on exceedances of Oregon and Washington temperature criteria which are based on daily maximum and 7-day average of the daily maximum (7-DADM) water temperature values. Therefore, the TMDL cannot fully represent the influence of the dams on water temperatures. This may overstate the impact of the dams relative to a "No Dams" scenario resulting in a misrepresentation of the impacts the ten federal dams have on river temperatures. Additionally, the RBM-10 model may not be able to represent actions (e.g. different dam operations) taken during TMDL implementation that may result in lower river temperatures.

Additionally, Appendix C of the TMDL provides plots of simulated and observed flows but limited statistical comparisons. While overall model data agreement for flow appears to be good, the figures show the model generally under predicts low flows and over predicts high flows. The Appendix states that "in general, the model captures the trends and magnitudes of flows with high correlation coefficients typically above 0.9 during most periods excepting the months of September and October when the correlation coefficient is 0.4." A correlation coefficient of 0.4 for two of the critical months is inadequate flow calibration and causes Bonneville concern that the model is less reliable for these months. The issues with the flow calibration may contribute to the model also tending to over predict high temperatures and under predict low temperatures. Bonneville is concerned that over prediction of the high temperatures under current conditions may lead to overestimation of temperature impact from the ten federal dams.

3. The TMDL compares current conditions with dams to a "free-flowing Columbia and Snake Rivers" without dams, but yet includes Dworshak dam operations and existence in both the current conditions and "free-flowing" TMDL scenario.

EPA's RBM-10 analysis of the free-flowing scenario is not a free-flowing scenario because it arbitrarily includes Dworshak Dam cold water operations in both the current conditions and free-flowing TMDL scenarios. This analysis is used in developing allocations, which inaccurately represents the ten federal dam system because the ten federal dams construction and operation is removed under the free-flowing simulation. This inconsistent application of the status of the ten federal dams in EPA's model and TMDL is not reasonable and does not provide the federal agencies with any temperature cooling credit from the Dworshak dam operation.

EPA's RBM-10 model analysis of current conditions relies on impacts from the existence of the ten federal dams themselves, including their construction. It is important for EPA to recognize that the operational limitations necessary to achieve the congressionally authorized purposes of these federal dams should not be subject to the TMDL and TMDL Implementation Plans. The federal dams provide significant regional benefits, such as carbon free energy, navigation and irrigation. The TMDL fails to recognize that the federal dams' ability to achieve temperature targets is limited by their operational constraints and combines the dams' existence and operational impacts together.

Bonneville recommends that EPA recalculate the temperature allocations presented in the cumulative excess dam impacts tables (Tables 6-6 to 6-9) with the dams in place rather than removing dams in the "free-flowing" scenario.

4. The TMDL presents and relies on a different temperature metric than the standards for which the TMDL is designed to ensure attainment, for example 7-DADM versus monthly average for the TMDL.

The EPA RBM-10 model as applied in the TMDL uses daily average values for model inputs such as flow, temperature boundary conditions and meteorology and produces daily average outputs. The daily average model output is compared with the Washington and Oregon temperature standards which are based on daily maximum of 7-DADM temperatures. This is conservative since the daily maximum water temperature is typically 0.1-0.4 degrees warmer than the daily average water temperature (USEPA 2020, Appendix H), with the larger differences occurring during the summer months. Moreover, the TMDL only compares daily

average model results when evaluating exceedances of the standard, even where the standard is based on the 7-DADM. Appendix H of the TMDL provides a justification for this—for the Columbia River, the daily maximum and 7-DADM temperatures are rarely different by more than 0.2 degrees, though occasionally the difference can be larger, up to 0.6 degrees. This was also evaluated for the Snake River.

While it is true that the daily maximum and 7-DADM temperatures are similar, there is no reason that the TMDL could not have considered both daily maximum and 7-DADM modeled temperatures to the appropriate standards. This would aid federal dam operators and others in TMDL implementation efforts with Oregon and Washington since those states will be relying on the 7-DADM. Moreover, the model is also unable to simulate any reduction in diurnal fluctuations that occur in impounded reaches. Since the TMDL focuses substantially on comparisons between "Dams" and "No Dams" scenarios, this is a significant limitation.

Additionally, the data presented in the TMDL make it difficult to compare results between tables due to lack of standardization of table metrics. For example, Table 3-2 has month average and month maximum observed temperatures, and Table 6-22 shows a single minimum and maximum value for the model run (for each month), presumably to show the range of model results. The lack of standardization between tables can lead to confusion and misinterpretation of the analysis.

Thus, Bonneville recommends that the TMDL be recalculated and the data tables be presented as the 7-DADM and daily maximum, so they are comparable to the temperature criteria set by the states of Oregon and Washington.

5. EPA misrepresented Oregon's 13°C criteria in the TMDL, and does not reflect the use that is occurring during the specified temporal period.

The TMDL and several tables and graphics misrepresent Oregon's salmon and steelhead spawning through fry emergence 13°C 7-DADM site specific criteria that applies to below Bonneville Dam, River Mile 143.5-141.5. EPA inappropriately modeled and presented the entire October 31 day period in its tables and graphics instead of splitting October into two periods as stated in Table 2-1 "Summary of temperature criteria and aquatic life uses for the Columbia and lower Snake Rivers":

- October 1-14 when Oregon's and Washington's 20°C criteria
- October 15-31 when Oregon's 13°C 7-DADM applies and Washington's 20°C criteria

This misapplication of Oregon's October 13°C criteria puts additional burden on the ten federal dams because there are 14 days where the criteria is 20°C and those values were used to average over a 31 day period and compared to the 13°C criteria.

Thus, Bonneville requests that EPA redo the analysis and update the TMDL to reflect the temporal nature of Oregon's October criteria based on the actual period the criteria is in effect. Bonneville also requests EPA describe this temporal criteria change in all appropriate areas of the TMDL so that the resulting analysis breaks out the month of October into two discrete temporal periods, October 1-14 and October 15-31, for purposes of presenting data and developing allocations. These corrections should be made in the following tables, figures and associated text: Table 3-2 (pg16), Table 3-7 (pg. 21), Table 6-2 (pg. 38), Table 6-9 (pg. 50), Table 6-10 (pg. 51), Table 6-18 (pg. 62), Table 6-22 (pg. 70) and Figure 6-4 (pg. 42).

6. It does not appear that the climate change analysis was taken into account when calculating allocations for the TMDL.

The climate change analysis presented by EPA demonstrates that water temperature increases of 0.2°C – 0.4°C degrees per decade have occurred since 1960. These water temperature increases due to climate change are likely to continue over the next century in the Columbia River Basin, with some variability depending on the emissions scenario, location and month. However, it does not appear that the climate change analysis was taken into account when calculating heat load and waste load allocations for the TMDL in Section 6.5. Thus, Bonneville is concerned that an unreasonable burden will be placed on the ten federal dams to mitigate for climate change. This is especially concerning since the TMDL clearly states river temperatures have increased since the 1960s by 1.5°C ± 0.5°C[4] and will likely continue to increase.

EPA conducted a limited modeling analysis to assess the impacts of climate change for this TMDL. Given the impact air temperatures and wind speed play on climate change in the basin, the TMDL does not provide sufficient rationale for selecting weather stations used in the modeling. Additional weather station data from airports could have been utilized to supplement the TMDL analysis. At a minimum, the rationale for the selection of datasets that were used should be discussed in the TMDL.

Additionally, in Appendix E, Page 2, it appears two methodologies were combined in the 2040 and 2080 Condition Analysis – August section. It appears the TMDL climate change analysis is looking at trends over the historical record while projecting those trends into the future, while

[4] TMDL page 30: "Based on available information, the estimated increase in river temperatures since 1960 ranges from 0.2°C to 0.4°C per decade, for a total water temperature increase to date of 1.5°C ± 0.5°C."

the NorWeST analysis is based on climate models. Bonneville suggests revisiting the methodology of this analysis and reconciling them, and providing a rationale for their use in the TMDL.

Lastly, in Appendix G, Bonneville recommends deleting Section 2.4 because the described estimated trends in this section are based on modeled data using the Mantua et al. (2010) and Mohseni et al. (1998) predictions, which are simplistic and are not the best available science in this context, especially considering real time high quality observed data are available. Additionally, Section 3.1 correctly represents RMJOC-II findings, and other regional work using older IPCC-4 data. However, IPCC-4 -based work is essentially obsolete since it is now over 13 years old. Bonneville suggests EPA recalculate the climate change analysis using IPCC-5 data, which is the best available science and readily available.

7. Bonneville is concerned with EPA's modeling analysis conducted by "trial and error" to identify the approximate uniform decrease in tributary temperatures that would result in a 0.1°C decrease in mainstem Columbia and Snake River temperatures.

EPA's TMDL analysis resulted in a determination that reducing all tributary temperatures by 0.5°C produced a 0.08°C decrease in monthly average temperature for September at River Mile 42. The 0.5 °C change in tributary temperatures is consistent with the work of Fuller et. al (2018), which is presented in Appendix F of the TMDL. However, the analysis presented in Fuller et. al is likely not "feasible" given the varying land uses, owners, geography, geology, hydrology and topography of the study area.

Bonneville requests that EPA accurately represent the Fuller study in the TMDL, see Appendix F: ORD Technical Memorandum on Tributary Restoration, lines 34-36. The Fuller et. al study reports significant variability in the difference in tributary temperatures for best case shading versus current conditions. Achieving a 0.5°C average reduction in water temperature is likely to be manageable for some tributaries, but not for all tributaries identified in the TMDL. Bonneville requests EPA clarify the statement made on page 61 of the TMDL which states, "An assessment of restoration potential in Columbia River tributaries indicates that the estimated average summer impact of riparian shade loss is an average temperature increase of 0.5°C in these tributaries (Fuller et al. 2018)," and add the sentence from lines 34-36 of Appendix F to the statement on page 61 of the TMDL, "However, the feasibility of this large-scale restoration effort is not likely, so additional restoration options to cool streams should also be undertaken to help maintain stream temperatures near their current condition (Fuller et al. 2018)."

Bonneville is concerned that EPA did not acknowledge the realistic limitations of the climate change analysis and that this analysis will add an unrealistic TMDL load allocation burden onto the ten federal dams. This coarse level tributary modeling identifies a tremendous amount of

assumptions relative to conservation feasibility of meeting the stream shade criteria identified in this technical memo, such as public vs. private riparian restoration. Nonetheless, EPA stated in the TMDL that the Fuller et. al work found that average August stream temperatures would be reduced by 0.5°C under a theoretical best-case shading scenario.

To compound these limitations, the RBM-10 model can only model impacts of reduced tributary temperatures on daily average temperatures in the mainstem Columbia and Snake Rivers. Furthermore, the TMDL reports the resulting changes in mainstem temperatures on a monthly average basis. In reality, impacts of restoration on particular tributaries is likely to vary considerably even within a given month. Additionally, the impact of restoration activities may have a larger impact on daily maximum temperatures than on daily average temperatures, but this cannot be simulated using EPA's RBM-10 model.

Further, water temperature data are limited in availability on some of the tributaries. Page 17 of Appendix C notes that because of this limited data, the Hood, Sandy and Kalama Rivers were assumed to have the same temperatures as the Deschutes River. Ideally, EPA should justify this decision by presenting correlations or another analysis to demonstrate that these rivers would have similar temperatures, especially since the Deschutes River temperatures, east of the Cascades are being used to represent rivers west of the Cascades. Regardless, Bonneville is concerned that this limited data and assumed tributary temperatures add a degree of uncertainty to the validity of the tributary temperature analysis resulting in unrealistic temperature reduction targets.

Due to the size of the Columbia River relative to its tributaries and because of limitations in the ability to monitor water temperatures, even substantial reductions in water temperature on the tributaries will, in some cases, have impacts on the Columbia River that are difficult to measure (e.g. < 0.1 °C). This highlights the importance of having a model that can evaluate the impacts of tributary restoration on mainstem daily maximum and 7-DADM temperatures to hundredths of degrees when evaluating the potential of specific restoration activities, this further emphasizes the limitations of the RBM-10 model for this application.

Lastly, Bonneville questions whether tributary temperature reductions will take place under this TMDL if tributary point and non-point sources are not under the jurisdiction of this TMDL and subsequent TMDL Implementation Plans. This unrealistic assumption that this TMDL will result in tributary temperature reductions that are outside of the federal agencies ability to influence, may reduce the likelihood of success at meeting existing mainstem Columbia and Snake temperature criteria and place significant additional and unrealistic burdens on the ten federal dams to meet TMDL allocations.

8. Bonneville has significant reservations with statements made by EPA on the "Draft Columbia River Cold Water Refuges Plan" during the June 16th Northwest Power and Conservation Council meeting, and the related assumptions that are proposed to be incorporated into the TMDL.

During the June 16th Northwest Power and Conservation Council Fish Committee meeting, EPA stated that the findings of the EPA's Columbia River Cold Water Refuges Plan would be incorporated into this TMDL and that they are exploring adding the Umatilla River to the TMDL's list of twelve Cold Water Refuge tributaries (Table 6-21 of the TMDL). Additionally, EPA stated that they would desire to have an aspirational engineered, man-made cold water "Herman Creek type cove" in the John Day pool reservoir area. It is important for EPA, the TMDL and EPA's Columbia River Cold Water Refuges Plan to acknowledge that the twelve currently identified cold water refuges presented in the TMDL are within watersheds originating within the Cascade Range that contribute late season runoff through reduction in high elevation snowpack. However, the John Day River and the Umatilla River both fall within the Mid-Columbia NorWeST Processing Unit and with the exception of the Deschutes River, have contributing basins of different physiography, elevation and contributory hydrology than the identified cold water refugia systems.

It would not be reasonable, purposeful, implementable, practicable, or cost effective to develop a cold water refuge in the John Day pool reservoir area or add the Umatilla River to the list of twelve identified cold water refuges presented in the TMDL. The hydro-physiographic conditions in these rivers, coupled with much different land use patterns all affect the ability for the John Day and Umatilla systems to be classified as a cold water refuge under the same conditions as the twelve tributaries that are currently identified in the TMDL.

9. The TMDL and TMDL Implementation Plans should not prevent adaptive management included in the 2019 NMFS CRS BiOp (and in any future CRS consultation documents) and not restrict the Corps' and Reclamation's ability to carry out its congressionally authorized purposes.

The 2019 NMFS CRS BiOp is currently in effect, but will be replaced by updated biological opinions that incorporate new actions and will be supported by analysis developed during the Columbia River System Operations Environmental Impact Statement National Environmental Policy Act process. To account for changing conditions over that timeframe, the new biological opinions will continue to rely upon adaptive management of the Columbia River System. If TMDL implementation plans lead to a loss of existing adaptability and a loss of existing regional collaboration and creativity to solve complex issues, that would be in direct conflict with the 2019 NMFS CRS BiOp and any future CRS Endangered Species Act (ESA) consultations.

The TMDL and TMDL Implementation Plans should not impact the adaptive management of these federal dams and future technological innovations.

10. EPA's TMDL methodology precludes the statutorily mandated consideration of authorized purposes, uses and values of the federal hydro system such as recreation, agriculture, industry and navigation because it simulates mainstem temperatures with the absence of ten federal dams.

There are limitations to the conditions and authority that may be imposed through EPA's TMDL or the states TMDL Implementation Plans. It is important that EPA and the state water quality agencies, Oregon Department of Environmental Quality (ODEQ) and Washington Department of Ecology (Ecology), who will be responsible for implementing the TMDL, recognize any conditions that are imposed by the TMDL, TMDL Implementation Plans, and NPDES permits and associated 401 certifications. Specially, EPA, ODEQ and Ecology should not interfere with the Corps' and Reclamation's ability to operate these facilities for the multiple purposes authorized by Congress. *See National Wildlife Federation v. U.S. Army Corps of Engineers*, 384 F.3d 1163 (9th Cir. 2004). Further, the language of the Clean Water Act (CWA) explicitly recognizes that the provisions of the CWA cannot be construed to affect the Corps' ability to maintain navigation. *See* 33 USC 1371(a); *In re Operation of Missouri River System Litigation*, 418 F.3d 915 (8th Cir. 2005).

In this situation, where EPA has to develop the TMDL, it would be imprudent for EPA to potentially frustrate Congress' explicit intent that the federal dams serve specific authorized purposes without a more carefully crafted discussion of how dam operations and purposes will be treated in the TMDL process, especially TMDL implementation. When Congress wrote the CWA it was fully aware of the federal dams, and could not have intended for the CWA to prevent the dams from serving their explicit statutory purposes. This is supported by (1) the fact that Congress has continually funded the dams before, during and after the CWA's 1972 reauthorization, and (2) at Section 303(c)(2)(A) of the CWA mandates consideration of a water body's use and value for recreation, agriculture, industry, navigation, and other purposes in the establishment of water quality standards. By funding federal dams while simultaneously enacting the CWA, Congress clearly intended for clean water to coexist with recreation, agriculture, industry, and navigation.

11. Lastly, based on Bonneville's review of the TMDL and appendices, Bonneville is submitting the following technical and editorial comments that are grouped by document. These technical and editorial comments are intended to provide clarity to both the TMDL and appendices, and the resulting TMDL Implementation Plans.

Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers:

1. Page 27: See Table 3-9, Bonneville requests that EPA explain why some of these tributaries are colder in August, as compared to July (a time when temperatures are peaking). See Columbia River tributaries John Day, Deschutes, Hood and Sandy; same for Snake River tributaries Tucannon and Palouse. If this is a data gap issue, the TMDL should include this explanation. Please see Bonneville comment below for Appendix C comment #3 for Page 17: Section 2.5.2.

2. Page 28: It states, "Mathematical models, such as the RBM10 model of the Columbia and lower Snake Rivers, are commonly used by EPA and state agencies in TMDL analyses." Bonneville requests that EPA add language to this section of the TMDL acknowledging the significant model development work accomplished by the federal agencies.

3. Page 43: The TMDL and specifically Section 6.5 did not acknowledge or address other sources of non-point source temperature increases. Bonneville requests that the TMDL include a discussion on land use and other anthropogenic non-point sources of temperature, in addition to dams.

4. Page 44: Ice Harbor Dam is missing from Table 6-4, Bonneville requests it be added.

5. Page 61: It states, "EPA used the model to evaluate the relationship between tributary and mainstem temperatures; through trial-and-error". Additionally, page 4 of Appendix I states in the Refined Tributary Allocations section states "Through trial-and-error, model results indicated..." Bonneville requests that EPA explain what "trial and error" method was used and how it was applied in the TMDL.

6. Page 64: Table 6-21, Temperature targets for 12 CWR in the lower Columbia River, has a reference to Footnote 18, however there is no Footnote 18. Bonneville requests EPA add Footnote 18 to page 64.

7. Page 67-68: Bonneville requests EPA use consistent graphical plots, and update the x-axis and y-axis to represent the same axis in Figure 6-5, 6-6, 6-7 for comparison. When cross-comparing, it is hard to determine similarities when the axes are not consistent. Additionally, Bonneville requests that EPA add a line across the y-axis representing the water quality 20°C criteria.

8. Page 69: For the two bullets on this page, Bonneville recommends adding "in the free-flowing simulations" at the end of each bullet on page 69. It will assist the reader in categorizing modeled effects.

9. Page 73: It states, "The Fish and Wildlife Program includes fish passage and tributary improvements, both key areas in reducing water temperature." Columbia River Fish Mitigation funding is used for structural changes, e.g., ladder cooling water pumps at Lower Granite and Little Goose dams. However, some fish passage opportunities within tributaries (e.g., culvert replacements) are funded by Bonneville's Fish and Wildlife Program. Bonneville suggests the cited text be replaced with the following: "The Fish and Wildlife Program includes tributary improvements and the US Army Corps of Engineers' Columbia River Fish Mitigation (CRFM) Program includes passage improvements, both are key areas in reducing water temperature."

10. Page 73: It states, "Federal power agencies have maintained and are likely to continue current fixed monitoring at the tailraces and forebays of the federal dams." Bonneville requests the word "power" be removed from this sentence so it reads "Federal agencies…"

Appendix A: Temperature Water Quality Standards for the Columbia and Lower Snake Rivers:

1. Page 4: Bonneville requests that Table 1 and Appendix A include information on the Canadian standards, and that the Canadian standards also be presented in the TMDL document.

Appendix B: Temperature Data Compilation, Quality Assurance and Analysis:

1. Page 23: Table 17 shows that at Pasco river temperatures are higher as compared to Priest Rapids, but it is an unimpounded reach. Bonneville is concerned with how this reach warming is applied to dam allocations in the TMDL and requests EPA add an explanation, including whether this warming is due to natural conditions or anthropogenic sources.

2. Page 42: Top of page incorrectly states Dworshak Dam is at river mile 0.5. Bonneville requests that the river mile be corrected.

3. Page 51: Figure 28 is misleading. The figure shows temperatures at Ice Harbor, Priest Rapids and McNary. It appears to show that Snake River temperatures have a large impact on Lower Columbia temperatures at McNary Dam. However, this may not be the case because the data show that the warming occurs near the Tri-Cities downstream of Priest Rapids Dam. Bonneville requests that EPA include a discussion on warming occurring in the Tri-Cities and its impact on mainstem Columbia River temperatures.

Appendix C: RBM10 Model Development Report:

1. Page 6: Section 2.2 states "These operations only cause small changes in the water levels and therefore, the water levels can be assumed constant for temperature estimation." The federal dams are run-of-river, except for Grand Coulee. However when transitioning from Full Pool to Minimum Operating Pool or vice versa there are larger water level changes which will happen in March/April and September. Bonneville would like EPA to confirm that the model takes this into account, especially in September where it may impact the temperature TMDL simulation.

2. Page 10: In Section 2.3.1 Grand Coulee Flow Representation, Bonneville requests that EPA include a discussion on how water was routed at Grand Coulee and other reaches for the unimpounded scenario to understand how allocations were calculated.

3. Page 21: It states, "The evaporative heat flux is generally calculated as a function of the wind speed and the difference between the saturated vapor pressure at the water temperature and the vapor pressure in the overlying air." Bonneville recommends changing "water temperature" to "water surface."

4. Pages 52-55: For the simulated versus observed temperature for lower Snake River dams period 2011 – 2016 figures on these pages, it appears the model is overestimating the 2013 peak temperatures in the graphic. Bonneville recommends checking the 2013 lower Snake River 2013 temperature input data to determine if the model is over estimating summer 2013 temperatures.

5. Page 68: It states, "The Grand Coulee Dam is subject to flood control operations, which result in variable flow discharges through the dam." Bonneville requests that EPA replace the sentence so it reads "The Grand Coulee Dam is subject to flood control operations, which is one of many operations, that results in variable flow discharges at Grand Coulee Dam."

6. Page A-8: It states, "Temperatures at the Columbia River upstream boundary generally varied between 3°C and 19°C." However, examining the figures it shows that temperatures were at or over 20°C during some times. Bonneville requests that the text be revised to reflect the actual temperature range at the upstream boundary.

Appendix D: RBM10 Model Scenario Report:

1. Page 3: Section 2.1 states that "the model update was conducted in two phases in 2017 and 2018." However, Appendix C states that the model updates were conducted over three phases. Bonneville requests that this discrepancy be corrected in both Appendix C and D.

2. Page 13: In regards to Figure 2-5, there is a discussion on removing outlying data points; however, there is no such discussion in Appendix C. Bonneville requests that this discussion be included in both Appendix C and D, and that the method be carried out consistently.

Appendix E: Tributary Assessment Methods and Results:

1. Page 2: Use of the words "cool off" is misleading. Tributaries do not "cool off" relative to other rivers, but warm less and slower. Bonneville recommends deleting the language "cool off" because it is inaccurate and confusing and replace it with "warm slower".

2. Page 12, Figure 8: The tributary temperatures for the 2040s bar graph indicate some tributaries are warmer than the Columbia River at their confluence than in the 2080s. This seems counter-intuitive. Bonneville recommends adding an explanation for these results.

Appendix G: Climate Change:

1. Page 1: Original text states, "The Pacific Northwest and the Columbia River have a unique set of responses to climate factors…" However the document does not identify what the "unique set of responses" are. Bonneville requests EPA identify and include a description in Appendix G of the "unique set of responses" to climate factors in the TMDL area.

2. Pages 3 and 4: The y-axis in Figures 2-1, 2-2 and 2-3 is too large resulting in smoothed out annual temperature trends. Bonneville suggests changing the y-axis to +8 to +14C so that the inter-annual variability is more accurately depicted.

3. Page 6: Table 2-1 includes sites that are outside of the TMDL study area. Bonneville suggests revising this section to include just the studies which apply to the TMDL study area, and not west side basins which have very different hydrology.

4. Page 7: Original text states, "Both rivers are wide, which minimizes the impact of shade on river temperatures, and many large impoundments are present on each river, which result in pooling and flow retention, allowing for enhanced heating due to atmospheric influences." This may be true, but if impoundments are going to be discussed, Bonneville suggests that the impacts of impoundment stratification and reservoir temperature complexity should also be included.

5. Page 7 to end of first paragraph Page 8, including Figure 2-4: Including ENSO, PDO, and sunspot cycles seem irrelevant for the TMDL and it is not clear why they were included. Bonneville suggests deleting these references.

6. Page 18: Section 3.2.1 the relative rates of change seem reasonable, but due to issues with calibration of downscaled climate data with local tributaries across the basin Bonneville cautions against using modeled data from the TMDL to compare against absolute temperature criteria. Instead, Bonneville recommends using the NorWeST data which relies upon direct in-river measurements because it has better accuracy for capturing in-river conditions across most of the region.

Appendix H: Temperature Metric Analysis:

1. Page 4: Figure 4 shows a seasonal trend in the difference between daily maximum and 7-DADM temperature (positive in the early part of the year, negative in the latter part of the year). This does not make sense as mathematically the difference between these values must pass through 0 at minimum every 7 days. Bonneville requests replacing this figure with the correct dataset.

Appendix I: Temperature Heat Loads:

1. Page 2: Original text states, "Calculated head loads for loading capacity and allocations…" replace the two instances of the word "head" with the word "heat".

In conclusion, Bonneville appreciates the work that EPA put into developing the TMDL. However, Bonneville is concerned that EPA's methods may result in a TMDL and TMDL Implementation Plans that will encourage protracted litigation. EPA's TMDL does not discuss how the federal dams' multiple congressionally authorized purposes, the federal dams' operations, or upstream sources outside of the TMDL area, including tributaries, will be acknowledged within the regulatory framework, and thus is inviting potential litigants to engage the United States in extended litigation by proposing unrealistic temperature targets (allocations) for the ten federal dams. These unrealistic temperature targets may set unprecedented implications nationally for all streams with large or medium sized dams or clusters of dams.

Given the significant regional benefits of these federal dams, including providing carbon free energy to support Northwest states' climate goals, this type of regulatory uncertainty and potential for litigation could be avoided. Bonneville appreciates that the TMDL stated that a

Use Attainability Analysis (UAA) is one potential path forward. A UAA could evaluate a change to designated uses and thus, the temperature standards so that they are reflective of climate change, a holistic basin approach, and temperature standards upstream of the TMDL boundary in Canada and Idaho.

EPA and Bonneville have had an effective and collaborative working relationship during the development of the Columbia River System Operations Environmental Impact Statement. This relationship resulted in an improved final product. It is Bonneville's intent that these TMDL comments promote that same type of collaboration into the future to develop a better final TMDL product. Thus, Bonneville looks forward to working with EPA to ensure the TMDL provides accurate analysis and data to the region. Bonneville remains committed to implementing water quality improvement actions that are reasonable, purposeful, implementable, practicable, and cost effective.

Sincerely,

KIERAN CONNOLLY

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Kieran Connolly
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