Northwest RIVERPARTNERS
Hydropower for a better Northwest

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Mr. Andrew Wheeler
Administrator
Environmental Protection Agency
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# RE: EPA Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers

Dear Administrator Wheeler:

Thank you for the opportunity to comment on behalf of Northwest RiverPartners ("RiverPartners") regarding the *Total Maximum Daily Load for Temperatures for the Columbia and Lower Snake Rivers* ("CLSRT TMDL").

RiverPartners represents not-for-profit, community-owned utilities across Washington, Oregon, Idaho, Montana, Wyoming, and Nevada. We also proudly represent supporters of clean energy, low-carbon transportation, and agricultural jobs.

Our mission is to lead the charge for the Pacific Northwest to realize its clean energy potential using hydroelectricity as the cornerstone. Our goals are to help fight climate change and restore healthy fish populations, while being inclusive of vulnerable communities and maintaining an affordable, dependable electric grid.

Addressing issues related to climate change and social equity is central to our organizational mission. In the Northwest, the hydropower system is critical to both efforts. The Northwest hydropower system is part of the least carbon-intensive electric service territory in the country. It also provides the most affordable clean energy of any region in the nation. This status means that clean energy in the Pacific Northwest is not just available to affluent communities, but to historically underrepresented communities as well.

In that light, we would like to begin by expressing our support for the comments provided by one of RiverPartners' member organizations, PNGC Power, during the comment period for the National Pollution Discharge Elimination System permits issued for dams on the lower Columbia and lower Snake rivers.

PNGC Power, in its comments submitted to the Environmental Protection Agency ("EPA") on 5/1/2020, wrote,

> *At a time when our country is fighting to contain a coronavirus that is seriously threatening human health and the economy, policymakers must be particularly cautious about the imposition of potentially*

*costly new regulatory requirements. To the extent regulations are warranted, conditions imposed must be carefully calibrated to address risk and result in demonstrable benefits. As you know, our region's carbon-free federal hydropower supply sourced from the CRS [Columbia River System], is the engine of the Pacific Northwest's economic prosperity and environmental sustainability. We ask EPA to partner with us to enhance the security it provides.*

The remaining focus of our letter is to suggest that EPA's approach to developing the CLSRT TMDL for the Columbia and lower Snake rivers warrants significant revisions. If these revisions are not made, the TMDL, as written, needlessly threatens the vitality of the Federal Columbia River Power System and the multiple purposes for the system as established by the United States Congress.

## HISTORY OF COLUMBIA-SNAKE RIVER TEMPERATURES

RiverPartners recognizes that river temperatures are a serious environmental concern, especially pertaining to salmonid survival. That said, while there have been occurrences of spikes in temperature in the lower Snake and lower Columbia rivers due to soaring air temperatures during heat waves, these events are outliers, not the norm.

When considering the effect of dams on river temperatures, it is also important to recognize that damaging water temperatures are not unique to the impounded rivers. For example, in 1994, due to record high water temperatures, approximately 466,000 adult fish perished in the undammed Fraser River before reaching their spawning grounds.[1]

More recently, record breaking temperatures in Alaska led to die-offs in several undammed rivers. One event in particular, originally reported by NPR, highlighted the problem. An official estimate was not released, but biologists believe as many as 200,000 to 300,000 fish were in the river during the extreme heat event.[2]

In 2002, a team of researchers conducted a water temperature study on behalf of the US Army Corps of Engineers ("USACE"). The team compared pre-lower Snake River dam measurements of water temperature from 1955-1958 to measurements taken after the lower Snake River dams were constructed. The research found no evidence that river temperatures had increased as a result of the dams, and instead appeared to have remained unchanged or slightly lower. The team identified air temperature and flow levels as the biggest influences on temperatures in the river.[3]

Air temperatures in the Columbia River Basin have trended upward significantly since 1955. Data available through the University of Washington's climate change tools show that the average air temperature recorded near Kennewick, Washington, has increased at a rate of 0.37 degrees Fahrenheit

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[1] Foreman, M & B. James, C & C. Quick, M & Hollemans, Peter & Wiebe, Edward. (1997). Flow and Temperature Models for the Fraser and Thompson Rivers. Atmosphere-ocean
US Army Corps of Engineers - Lower Snake River Dams

[2] NPR - Why Are Salmon Being Found Dead In Rivers Across Western Alaska?
NOAA - Alaska had its hottest month on record in July,
Juneau Empire - Warm waters across Alaska cause salmon die-offs

[3] Water Temperatures and Passage of Adult Salmon and Steelhead in the Lower Snake River

per decade. (Appendix 1 of this document includes a graph of air temperatures provided through the University of Washington's Pacific Northwest Temperature, Precipitation, and Snow Water Equivalent Trend Analysis Tool.)

These conditions would suggest higher water temperatures in the lower Snake River over time, but as noted above, lower Snake river temperatures have remained unchanged or slightly lower.

As will be discussed later, we *strongly* encourage that the EPA test the veracity of its TMDL against these real-world temperature comparisons before and after the lower Snake River dams were constructed.

If the TMDL model cannot replicate the actual outcomes, then the model needs to be recalibrated or redesigned before it can suitably guide Northwest regional energy policy.

## COLUMBIA AND LOWER SNAKE RIVER TEMPERATURE TMDL BACKGROUND

According to page one of the CLSRT TMDL released on May 18, 2020, the document establishes a total maximum daily load for temperature for the Columbia and lower Snake Rivers as required by Section 303(d) of the Clean Water Act (CWA) and its implementing regulations at Title 40 of the Code of Federal Regulations (CFR) Section 130.7.

The CLSRT TMDL explains that the TMDL is required because:

> *…the States of Washington and Oregon have identified portions of the Columbia and lower Snake Rivers as impaired because of temperatures that exceed the numeric criteria portion of the States' water quality standards (WQS).*[4]

The CLSRT TMDL also describes the parameters of its TMDL assessment in the following statement:

> *The geographic scope of this temperature TMDL includes State waters within the mainstem of the Columbia River from the Canadian border (River Mile [RM] 745) to the Pacific Ocean; and within the mainstem of the lower Snake River in Washington from its confluence with the Clearwater River at the Idaho border (RM 139) to its confluence with the Columbia River.*[5]

## APPLICATION AND IMPLICATIONS OF RELYING ON TMDL

### Application

While EPA is not suggesting a particular application of the CLSRT TMDL, it is clear that the states of Washington and Oregon intend to use the TMDL to regulate river temperatures. Washington state's Department of Ecology ("Ecology") has specifically required[6] through its 401 Water Quality permitting process that the following National Pollutant Discharge Elimination System ("NPDES") permits include a requirement to meet the load allocations in the TMDL, once finalized:

[4] Columbia and Lower Snake River Temperature Total Maximum Daily Load. 5/18/2020. US EPA, p 1.
[5] Columbia and Lower Snake River Temperature Total Maximum Daily Load. 5/18/2020. US EPA, pp 2-3.
[6] State of Washington Department of Ecology letter "Clean Water Act Section 401 Final Certification EPA National Pollutant Discharge Elimination System" to Susan Poulsom at US EPA Region 10. 5/7/2020.

- Lower Granite Lock and Dam, NPDES Permit No. WA0026794
- Little Goose Lock and Dam, NPDES Permit No. WA0026786
- Lower Monumental Lock and Dam, NPDES Permit No. WA0026808
- Ice Harbor Lock and Dam, NPDES Permit No. WA0026816
- McNary Lock and Dam, NPDES Permit No. WA0026824
- John Day Project, NPDES Permit No. WA0026832
- The Dalles Lock and Dam, NPDES Permit No. WA0026701
- Bonneville Project, NPDES Permit No. WA0026778

Similarly, the Oregon Department of Environmental Quality ("DEQ") requested that EPA incorporate into the NPDES permits the CLSRT TMDL.[7]

## Implications

As the CLSRT TMDL notes, the water temperatures entering Washington state from Canada and from Idaho often significantly exceed Ecology's water quality standards during the peak summer months:

> *As illustrated in Figure 6-1 through Figure 6-3, the water temperatures as the rivers cross the upstream boundaries of the TMDL study area (Canadian border and the Washington/Idaho border) exceed the Washington water quality criteria* ***by a substantial margin*** *from July through September.* [8] (**Emphasis added**)

These upstream temperature exceedances mean that even if the dams located in Washington state and Oregon did not exist, the state's water quality standards would regularly go unmet.

NWRP recognizes that river temperatures are a serious environmental concern, especially pertaining to salmonid survival.

***However***, the shortcomings of the TMDL model (described below) combined with very aggressive water quality standards established by Ecology and DEQ, mean that the FCRPS could be placed in an untenable position--unfairly penalized and bearing the responsibility for upstream river conditions.

EPA's own comments in the CLSRT TMDL indicate its understanding of this confounding situation. EPA notes, "The current water quality conditions present a significant challenge to achieving downstream water quality standards in Washington and Oregon."[9]

EPA notes this situation is serious enough to warrant the following consideration:

> *One option for addressing the conflict created by the inability to achieve applicable water quality criteria at all times and all places is for the States to make changes to their applicable designated uses. The federal regulation at 40 CFR 131.10(g) provides requirements for*

[7] State of Oregon Department of Environmental Quality letter "Notification to US Environmental Protection Agency Pursuant to section 401(1)(2) for Bonneville Project, WA0026778; The Dalles Lock and Dam, WA0026701; John Day Project, WA0026832; and McNary Lock and Dam, WA0026824" to Chris Hladick, Regional Administrator, US EPA Region 10. 5/15/2020.

[8] Columbia and Lower Snake River Temperature Total Maximum Daily Load. 5/18/2020. US EPA, p 42.

[9] Columbia and Lower Snake River Temperature Total Maximum Daily Load. 5/18/2020. US EPA, p 42.

> *establishing, modifying, and removing designated uses. A state may designate a use or remove a use that is not an existing use, if the state conducts a "use attainability analysis" that demonstrates that attaining the use is not feasible because of one of the six factors listed in 40 CFR 131.10(g). A use attainability analysis is a structured scientific assessment of the factors affecting the attainment of the use which may include physical, chemical, biological, and economic factors as described in section 131.10(g). If a state adopts a new or revised water quality standard based on a required use attainability analysis, the state also must adopt the highest attainable use. The decision to modify or remove a designated use rests with the state.* [10]

It is worthwhile noting that some interest groups have already called for the breaching of the four lower Snake River dams as a result of EPA's CLSRT TMDL report.[11] This call is very alarming, and exemplifies the extreme consequences that could result from finalizing a TMDL that does not accurately capture the temperature contribution of the dams, and makes the dams responsible for upstream river conditions.

The region's dependence on the lower Snake River dams should not be underestimated. The 2020 Columbia River System Operations Draft Environmental Impact Statement shows that breaching the four lower Snake River dams could:

- More than double the risk of region-wide blackouts[12]
- Add 3 million metric tons of carbon to the atmosphere each year from electricity production[13]
- Cost up to $1 billion a year in additional power costs and raise Bonneville Power Administration ("BPA") power costs rates by 50%[14]
- Harm the regional economy in the amount of $740 million a year in lost goods and services sold[15]
- Result in the loss of 4,900 jobs as a result of higher electricity rates[16]
- Reduce our ability to safely add new wind and solar power to the grid[17]
- Cost $458 million in social welfare from the loss of irrigated land and jobs for farm laborers[18]
- Add 79,000 semi-trucks to the road each year[19]
- Provide very minimal benefits for salmonids populations.[20]

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[10] Columbia and Lower Snake River Temperature Total Maximum Daily Load. 5/18/2020. US EPA, p 2.

[11] *EPA issues report analyzing heat pollution in Columbia, Snake rivers*, Capital Press, June 2, 2020

[12] 2020 CRSO DEIS Executive Summary page 25

[13] 2020 CRSO DEIS Executive Summary page 27 (Figure assumes that LSRD would be replaced by natural gas-fueled generation.) 3 million metric tons equates to a 10% increase in the NW electricity sector's entire carbon output.

[14] 2020 CRSO DEIS Executive Summary page 26-27 (Figure assumes the dams' full capabilities are replaced with another carbon-free portfolio).

[15] 2020 CRSO DEIS Chapter 3, lines 28236-28238 (In the scenarios with limited or no coal generation in the region, the economic harm would be significantly higher than this figure.)

[16] 2020 CRSO DEIS Chapter 3, lines 28236-28238 (In the scenarios with limited or no coal generation in the region, the number of jobs lost would likely be substantially higher than this figure.)

[17] 2020 CRSO DEIS Executive Summary page 26. The DEIS notes that, "…replacing the full flexibility and capability of the lower Snake River dams with zero-carbon resources would require substantially more resources, such as additional dispatchable battery technology, than estimated in the base case analysis".

[18] 2020 CRSO DEIS Executive Summary page 28

[19] 2020 CRSO DEIS Chapter 3 lines 33556-33558

In short, **the stakes around the CLSRT TMDL's precision are *extremely* high**, given the possibility that the model could be used to justify extreme measures that would be especially burdensome to the region's most vulnerable residents.

# METHODOLOGY

## TMDL Modeling Approach

According to section 4.1 of the CLSRT TMLD, the EPA utilized the following approach to modeling the Columbia and lower Snake rivers.

> *In order to support TMDL development, EPA used the RBM10 water quality model to replicate and predict the temperature fluctuations in the Columbia and lower Snake Rivers. RBM10 is a one-dimensional mathematical temperature model that simulates the thermal energy budget of the mainstem Columbia and lower Snake Rivers.*[21]

It is important to note that, while we recognize that the one-dimensional model allows for faster run-times, its relatively simplistic nature lacks the ability to solve for complex problems that a multi-dimensional model could.

## Critiques of TMDL Modeling Approach to the Columbia-Snake Rivers

**Lacking a Basin-Wide Framework**

The typical methodology for a TMDL for temperature would approach river temperature modeling on a basin-wide scale. However, according to the CLSRT TMDL, the geographic scope of this TMDL begins at the mainstem of the Columbia River at the US-Canadian border (River Mile 745) and within the mainstem of the lower Snake River in Washington, from its confluence with the Clearwater River at the Idaho border (RM 139).[22]

While RiverPartners' recognizes the inherent complexity of modeling a river system the size of the Columbia-Snake system, policymakers are left with a very incomplete view of the causes of river temperatures exceedances if confined to river temperatures at the Washington state border.

If the RBM10 model is incapable of modeling the entire Columbia-Snake system, then it may speak to the model's inadequacy for providing a TMDL that is suitable to be the basis of regional energy policy decisions.

**Assumptions Leading to Unintended Bias in the Model**

Additionally, in its CLSRT TMDL, EPA arbitrarily kept some dams in and left others out of its estimation of temperatures in a hypothetical "free-flowing" river. This decision, as an unintended consequence, led the RBM10 model to incorrectly attribute increased temperatures to downstream dams.

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[20] 2020 CRSO DEIS Executive Summary page 25. According to the NOAA Fisheries Science Center's Life Cycle Model, salmonids would only see a 14% increase in smolt-to-adult returns as a result of dam breaching, despite the extreme societal costs.

[21] Columbia and Lower Snake River Temperature Total Maximum Daily Load. 5/18/2020. US EPA, p 29.

[22] Columbia and Lower Snake River Temperature Total Maximum Daily Load. 5/18/2020. US EPA, p 2.

To elaborate, the CLSRT TMDL demonstrates that the hottest water in the modeled river system occurs on the Snake River at Anatone, WA (River Mile 167), upstream of the Snake's confluence with the Clearwater. The annual maximum river temperature at Anatone is 24.2 degrees Celsius.[23]

The CLSRT TMDL also shows that river temperatures upstream of Dworshak Dam on the Clearwater River are significantly higher (by roughly 4.5 degrees Celsius) than the water released from Dworshak Dam,[24] due to that dam's ability to draw water from its cooler depths.

Because the releases from Dworshak Dam are unseasonable cold in the summer, temperatures downstream of Dworshak will immediately start to warm toward the equilibrium created by the ambient air temperatures. However, the RBM10 model mistakenly attributes this warming to the downstream dams, instead of the ambient temperatures.

This same challenge regarding the RBM10 model was submitted in comments to EPA Region 10, dated February 8, 2019. In this case, the comments pertain to the effect of Grand Coulee Dam instead of Dworshak Dam, but the underlying issue is the same. The commenter noted:

> *It is clear and well understood that Grand Coulee Dam releases unseasonably cold water in the early summer and unseasonably warm water in the late summer and fall. Consequently, temperatures downstream of Grand Coulee Dam will respond in the direction towards equilibrium with atmospheric conditions and the magnitude of this response will be proportional to the difference from natural or 'free-flowing' conditions. This has the effect of showing large temperature 'impacts' in the river closest to Grand Coulee Dam.*

Again, RiverPartners sincerely respects the challenges of trying to model a river system as complex as the Columbia-Snake system. However, because the CLSRT TMDL is intended to be used by the states of Washington and Oregon to develop energy and environmental policy, a known shortcoming in the RBM10 model, as described above, indicates the model may not be suitable for its purposes.

Whatever model is ultimately utilized by EPA for its TMDL should be consistent in the inclusion/exclusion of all dams in its free-flowing scenario.

## Alternative Approaches

A 2002 peer-reviewed study from Pacific Northwest National Laboratory showed that dams within the Columbia River and Snake River basins tend to moderate extreme water temperatures. The PNNL paper states:

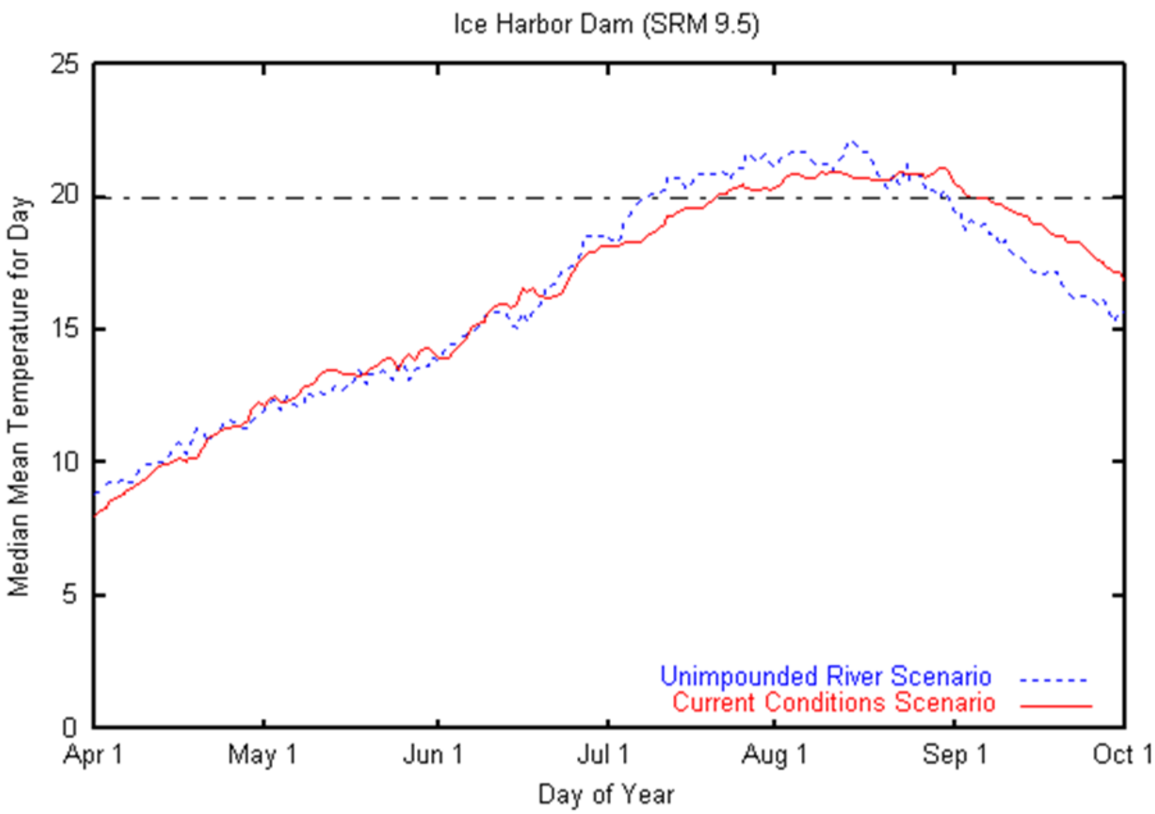
> *…the reservoirs decrease the water temperature variability. The reservoirs also create a thermal inertia effect that tends to keep water cooler later into the spring and warmer later into the fall compared to the un-impounded river condition.* [25]

[23] Columbia and Lower Snake River Temperature Total Maximum Daily Load. 5/18/2020. US EPA, p 16.

[24] Columbia and Lower Snake River Temperature Total Maximum Daily Load. 5/18/2020. US EPA, p 16.

[25] Summary: Regional Scale Simulation of Water Temperature in the Columbia River Basin
Richmond, et al: Regional Scale Simulation of Water Temperature and Dissolved Gas Variations in the Columbia River Basin

The chart below comes from the 2002 PNNL paper. Critically, you can see that the study showed that the river temperatures at Ice Harbor dam—the dam furthest downstream on the lower Snake River—tends to shift the heat out of the key summer months and into the autumn months where it poses less of a threat to salmonid health.




While the PNNL work also relied on a one-dimensional model for predicting river temperatures, this peer-reviewed study is more consistent with the 2002 study by USACE referenced earlier, which utilized actual air and river temperature data before and after the lower Snake River dams were built. As a reminder, those data sets showed that although air temperatures had risen after the construction of the four lower Snake River dams, river temperatures had not increased.

The fact that the PNNL study is more consistent with real world outcomes provides suitable reason to question whether the RMB10 model is the correct model to utilize for a TMDL that intends to estimate the effects of river impoundment.

## RECOMMENDATION

RiverPartners respectfully recommends that EPA revise its *Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers* and provide a Draft TMDL which addresses the concerns mentioned in these comments. Given the signaling by the states of Washington and Oregon, there is every reason to think that the TMDL will be utilized to determine the respective approach of these two states towards hydroelectric facilities on the mainstem Columbia and lower Snake rivers.

Per the *Columbia River System Operations Draft Environmental Impact Statement*, policies surrounding the lower Snake River dams can mean the difference of region-wide blackouts, the failure to be able to meet the region's climate goals, and billions of dollars of extra costs forced on Northwest families.

As a result, RiverPartners recommends the following steps:

We ask the EPA a revised Draft CLSRT TMDL, and that stakeholders are provided with the opportunity to provide comments before the draft is finalized. The draft TMDL should recognize and address the following considerations:

1) The RBM10 model is a one-dimensional model. It is not well-suited to solving for issues of the magnitude and complexity of the analysis in the TMDL, nor can it provide the precise outcomes upon which major policy decisions will rest.

2) In determining whether the TMDL should utilize the RBM10 model or a different model, EPA should rerun its RBM10 simulation for the years identified by the 2002 USACE study, which compared actual river temperature data before and after the lower Snake River dams were built. <u>If the RBM10 model is unable to accurately replicate the effects of river impoundment, then the EPA should abandon the RBM10 model in favor of a model that can more accurately match complexities that EPA is attempting to simulate.</u>

3) The RBM10 model or any replacement model selected by EPA should be consistent in its inclusion or exclusion of dams as part of the free-flowing river. EPA's arbitrary decision to include Dworshak Dam as part of the free-flowing river places an additional and unfair burden on the downstream dams in the TMDL study. This inconsistency is a known shortcoming of the TMDL analysis, which leads to predictably erroneous outcomes.

4) The RBM10 model or any subsequent model should incorporate the entirety of the Columbia and Snake river basins, instead of artificially limiting the model boundaries to the borders of Washington and Oregon. The artificial limitation doesn't allow the model to accurately account (i.e., holistically solve) for all of the sources of river temperature warming throughout the basin, such as tributary sources and sources upstream of the boundary (i.e., Canada and Anatone, WA).

## CONCLUSION

As the world struggles with the repercussions of climate change, the Pacific Northwest has been able to establish some of the most aggressive clean energy goals in the nation thanks to the region's hydropower availability. Hydropower produces roughly 90% of the Northwest's renewable energy and is essential to our ability to reliably add intermittent resources to the grid.

Despite the fact that over 50% of the region's electricity comes from renewable power, the Northwest still has some of the most affordable electricity rates in the nation due to its hydropower abundance. Maintaining the capabilities of the Northwest's hydropower system is critical at a time of a historic recession and a health crisis that has especially harmed our most vulnerable communities.

The RBM10 model used by EPA to produce its TMDL, while useful for certain purposes, represents an oversimplified view of the Columbia-Snake river system. It includes inconsistent assumptions and lacks the sophistication to holistically model the complexity of these rivers in a precise way.

The signaling provided by the states of Washington and Oregon make it apparent that they intend to use the TMDL to make significant energy policy decisions. As a result, the CLSRT TMDL potentially and unfairly threatens a resource that is critical to the climate change fight. This is a fight that we must win if we want to keep our rivers and oceans from warming.

We ask that EPA revise its analysis and issue a Draft CLSRT TMDL and that stakeholders are provided with the opportunity to provide comments before the draft is finalized.

Thank you again for the opportunity to comment. RiverPartners looks forward to working with EPA throughout this and other key regulatory processes.

Best regards,

Kurt Miller
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Northwest RiverPartners

**Appendix 1: University of Washington PNW Temperature, Precipitation, and SWE Trend Analysis Tool; Kennewick, WA, 1955-2018**

| Temperature | Precipitation | Snow Water Equivalent |
|---|---|---|

Year Range
1955 to 2019

Variable Selection
Average Temperature

Time Frame
Annual

Trend Range
Per Decade

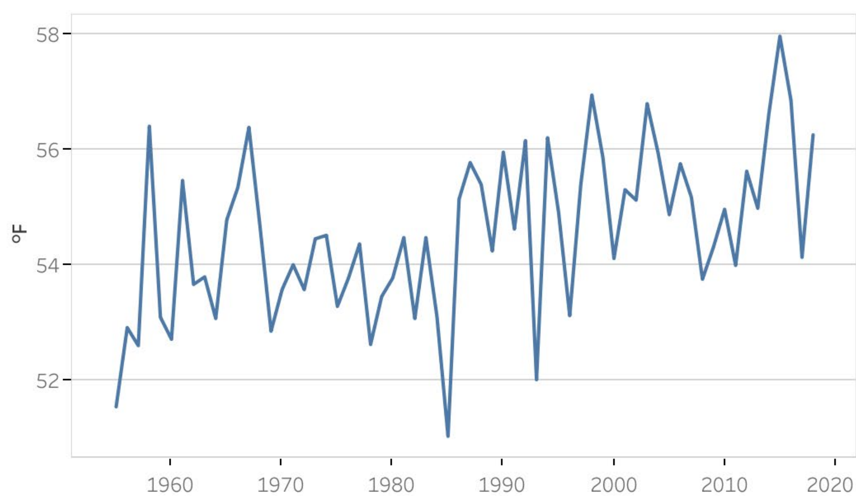
| Trend | - | 0 | + |
|---|---|---|---|
| Significant (S) | ● | | ● |
| Not Significant (NS) | ● | ○ | ● |
| Insufficient Data (I) | ● | ● | ● |

Add to Graph
- None
- Average
- Statewide Average
- Trend Line

Trend Data (°F Per Decade)

| | | | | |
|---|---|---|---|---|
| Kennewick | WA | S | + | 0.37 |


Annual Average Temperature 1955-2018




Station Data Source: NOAA's U.S. Historical Climatology Network version 2.5.5.20190405

Statewide Data Source: NOAA's US Climate Division Dataset (nClimDiv)