UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 155
Seattle, WA 98101-3123

OFFICE OF
WATER AND
WATERSHEDS

September 3, 2020

EPA has compiled the public comments we received on the Columbia and lower Snake River Temperature TMDL from May 18 through August 20, 2020. Comments received from over 60 organizations, listed below, are followed by comments received from almost 1900 individuals. If you click on the names, below, you can view the comments from that organization or from the individual commenters.

American Fisheries Association
The American Waterways Operators
Benton Rural Electric Association
Big Bend Electric Cooperative, Inc.
Blachly-Lane Electric Cooperative
Bonneville Power Administration
Bureau of Reclamation
City of Clarkston, WA
City of Camas, WA
City of Gresham, OR
City of Portland, OR
City of Washougal, WA
Clearwater Paper Corporation
Clearwater Power
Columbia River Inter-Tribal Fish Commission
Columbia Riverkeeper, on behalf of 23 organizations
Enclosures (6):

- Paul Pickett, *Technical Comments on Columbia/Snake TMDL* (2020)
- Affiliated Tribes of Northwest Indians, *Resolution #2020-25*.
- Northwest Environmental Advocates, *Comments on EPA's Draft Columbia River Cold Water Refuges Report* (2019).
- Fish Passage Center, *Requested data summaries and actions regarding sockeye adult fish passage and water temperature issues in the Columbia and Snake rivers* (2015).
- Fish Passage Center, *Review of April 2016 Draft of NOAA Fisheries'* 2015 Sockeye Salmon Passage Report (2016).
- Columbia Riverkeeper *et al.*, *Comments on the CRSO Draft Environmental Impact Statement* (2020).

Confederated Tribes and Bands of the Yakama Nation
Confederated Tribes of the Umatilla Indian Reservation
Consumers Power, Inc
Cowlitz Indian Tribe
Discovery Clean Water Alliance & City of Vancouver

Eugene Water & Electric Board
Fall River Electric Cooperative
Idaho Conservation League
Idaho Wildlife Federation
Inland Power & Light
Methow Valley Citizens Council
National Hydropower Association Northwest
Hydroelectric Association (NWHA)
Northwest RiverPartners
Orca Conservancy
Oregon Association of Clean Water Agencies
Pacific Fishery Management Council
Pacific Northwest Waterways Association
PNGC Power
Port of Clarkston
Enclosures:

- Information from John McKern, including "Summary Review of State and Federal Temperature Standards, Lower Snake River," June 2020; declaration of John McKern (September 24, 1999); and temperature data and slides.

Port of Whitman County Commissioners
Enclosure:

- "Summary Review of State and Federal Temperature Standards, Lower Snake River." John McKern. June 2020.

Public Power Council
Public Utility District of Benton County
Public Utility District No. 1 of Chelan County
Public Utility Districts of Chelan, Grant and Douglas County
Public Utility District of Douglas County
Public Utility District of Franklin
Public Utility District of Grant County
Public Utility District of Grays Harbor
Public Utility District of Lewis County
Public Utility District No. 1 of Mason County
Public Utility District No. 1 of Okanogan County
Public Utility District No. 1 of Skamania County
Raft River Electric Cooperative
Seattle City Light
State of Oregon Dept of Environmental Quality
State of Oregon Dept of Fish & Wildlife
State of Idaho Dept of Environmental Quality
Upper Snake River Tribes Foundation
U.S. Army Corps of Engineers
USDA Forest Service
Upper Snake River Tribes Foundation
WA Association of Sewer & Water Districts

Washington Department of Ecology
Washington Wheat Growers Association
Yakima County Farm Bureau
Yakima County Farm Bureau - addendum

Comments from Individuals

American Fisheries Society
Western Division

President Dan Dauwalter, President-Elect Todd Pearsons, Vice-President Dan Brauch, Secretary-Treasurer Travis Rehm, Past-President Jackie Watson, Student Representative Emily Chen

July 16, 2020

U.S. Environmental Protection Agency, Region 10
Attn: Columbia and Lower Snake River Temperature TMDL
1200 Sixth Avenue, Suite 155
Seattle, WA 98101-3188

Dear Sir or Madam:

On behalf of the 3,000 members of the Western Division of the American Fisheries Society (WDAFS), we respectfully submit the following comments, drafted by a subcommittee of the WDAFS Resource Policy and Environmental Concerns Committee, in response to the draft Columbia and Lower Snake Rivers Temperature Total Maximum Daily Load (TMDL).

WDAFS represents scientists and natural resource managers from the states of Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming; Mexico; U.S. associated entities in the West Pacific Ocean; the Province of British Columbia; and the Yukon Territory in Canada. Our mission is to improve the conservation and sustainability of fishery resources and aquatic ecosystems by advancing fisheries and aquatic science and promoting the development of fisheries professionals. Our members represent a tremendous array of fisheries experts involved in all aspects of the fisheries profession and are employed in academia, government agencies, nongovernmental organizations, and private consulting.

WDAFS understands that the TMDL addresses the difficult task of specifying the maximum amount of additional heat pollution (expressed as temperature) that the Columbia and Lower Snake Rivers can receive given that they currently exceed water quality standards. WDAFS' comments focus on the fisheries and aquatic science contained in the draft TMDL, particularly as it relates to the sustainability of fisheries and, in particular, socially and economically important anadromous fisheries. Our review outlines what we deem as useful and noteworthy content, concerns, and questions we wish to see addressed in the final version of the TMDL.

Useful and Noteworthy Content:

First, the WDAFS commends the USEPA for drafting a TMDL that contains six very useful components:

1. It is relatively timely given that the 2019 Biological Opinion on the continued operation of the Federal Columbia River Power System (FCRPS) failed to consider the thermal effects of its dams and reservoirs in a rigorous manner (NMFS 2019).

2. The TMDL offers a fairly thorough assessment of the widespread and severe impairments (Figure 1.1 and Table 3.5) and other thermal concerns on the Columbia and Lower Snake Rivers in the states of Oregon and Washington.
3. Its Appendix G documents the thermal effects of climate change in the FCRPS since the 1970s.
4. By documenting the thermal effects of the FCRPS, it indicates that additional management alternatives need to be strongly considered together to improve the likelihood of survival for salmon and steelhead populations such as irrigation withdrawals, harvest, dam removal, reservoir releases, tributary restoration, and thermal point source management.
5. The TMDL maps the discrepancies in temperature criteria for salmon between Oregon and Washington on the Lower Columbia River, as well as between those two states and Idaho on the Snake River.
6. It lists and maps the major coldwater refuges on the lower Columbia River.

Concerns:

Although we recognize that the TMDL contains many useful elements, the WDAFS also has several major concerns. We provide a comprehensive list of these concerns below, and while we think all of them are important we think the first 7 are the most important:

1. The effects of climate change should be integrated more throughout the TMDL. The climate projections suggest huge challenges of meeting the TMDL with local solutions. Not only will the mainstems (Columbia and Lower Snake Rivers) be affected, but the tributaries and the CWRs currently acknowledged will also be affected by this warming. Although the climate information is presented in Appendix G, the TMDL should better integrate and highlight those risks for management agencies, policy makers and the general public throughout the document.

2. The TMDL omits discussion of other tributary impairments, anthropogenic versus natural heating of tributaries, tributary TMDLs, Cold Water Refuge (CWR) impairments, and corrective actions. Instead, the TMDL focuses narrowly on the mainstem Columbia and Lower Snake Rivers, thereby ignoring the fundamental relationship between mainstem rivers and their entire drainage basins (Colvin et al., 2019).

   The Idaho cold water criteria in the Snake River are a daily maximum (DM) of 22ºC and an average daily maximum (ADM) of 19ºC versus a Washington DM of 19-20ºC and ADMs of 16-17.5ºC and an Oregon DM and ADM of 20ºC. It seems irrational for EPA to allow such wide discrepancies in rivers that cross or share state boundaries, share the same salmon and steelhead populations and life histories, and have similar use designations for salmon and steelhead migration, spawning and rearing. The connection between mainstem rivers and their entire drainage basins needs to be clearly reflected in the final TMDL if temperatures are to be reduced to achieve restoration of sustainable and harvestable wild salmon and steelhead populations in these rivers.

   Similarly, the TMDL is limited only to Oregon and Washington; however, most of the Columbia and Snake River flows and thermal loads originate in British Columbia and Idaho. As in Oregon and Washington, much of the thermal loading that occurs in Idaho and British Columbia results from land and water uses and the TMDL should not ignore these upstream sources.

3. We are concerned about further relaxing temperature standards. The TMDL suggests that Washington and Oregon should develop Use Attainability Analyses (UAAs) that would potentially result in injurious designated uses and thermal criteria for salmon and steelhead for at least the Columbia and Lower Snake Rivers. Those UAAs would further lower the likelihood of sustaining, let alone rehabilitating, viable and harvestable salmon and steelhead populations in the basin.

4. We are concerned about the interpretation of the 0.3°C aggregate load allocation being misinterpreted. Different people that reviewed the document had different interpretations of what this aggregate allocation meant. Some thought is was, for example, a per dam allowance, which could result in a cumulative 4.5°C allocation across all dams in the system, which is substantial and doesn't even include the other NPDES and tributary allocations (Table 6-3). The aggregate load allocation should be defined clearly in the front of the TMDL and be periodically repeated in the document as needed to minimize misunderstanding its meaning.

5. No model was provided for estimating the natural, background temperature conditions of the Columbia and Lower Snake Rivers and waters flowing into them. This is a serious oversight given that current temperatures are driven by natural conditions as well as by anthropogenic climate change, land uses, and dams/reservoirs throughout the basin. The rationale for not including a natural condition provision (pg. 11) is not well substantiated. It seems useful to have a reasonable estimate of background (i.e., natural, reference conditions) for temperatures for use as a baseline and an effort should be made to develop one since one does not exist (Hughes et al. 1986; McAllister 2008; Angradi et al. 2009).

6. It is not clear from the information provided that the TMDL presents a heat loading scheme, the negative impacts of which can overcome the limited refuge habitat available. There are 12 primary coldwater refuges that constitute 97% of total CWR habitat in the Lower Columbia River. Of these, 6 are on the Washington side of the Columbia River mainstem and 6 are on the Oregon side. Information provided in the TMDL attests to steelhead seeking CWR habitat when river temperatures exceed 20ºC and fall Chinook when water temperatures exceed 20-21ºC. In the temperature range 20-25º, in addition to the need to seek cold refuge and recover from migration stress, adult salmon encounter incipient lethal temperatures at 21-22ºC (Sockeye and Chinook, respectively). In addition, incipient lethal temperatures occur for juvenile salmonids at 25ºC, and impaired reproductive capacity, bioenergetic depletion, and increased disease-related mortality of adults and juveniles occur at those temperatures as well (McCullough 1999, McCullough et al. 2003). Residence times in refuges can be prolonged because of high migration temperatures. It is helpful to have as much CWR habitat in the system as possible, especially when Columbia River temperatures reach 23ºC during migration. However, it is not clear from information provided that the TMDL presents a heat loading scheme wherein negative impacts can be overcome by the limited refuge habitat available. To use the CWR available during upstream migration, adults must cross the mainstem repeatedly to use them as stepping stones. The spacing of CWRs in relation to travel rates and times between CWRs could easily result in adult body temperatures exceeding safe levels and also result in bioenergetic depletion.

7. The DART monitoring sites at the dams (and therefore the RBM10 model estimates) provide unrepresentative measurements of total river conditions, including nearshore,

dam forebays, and adult fish ladders that salmon must pass through. Water at these river locations is not well mixed and is often much warmer than ambient river temperatures in the summer (Caudill et al. 2013). If temperatures in the mixed and aerated waters near the monitoring sites below dams are not the same as those in surface and slowly flowing waters where many salmon and steelhead migrate, the model may significantly underestimate threats to the fish (Caudill et al. 2013; Keefer and Caudill 2016).

8. Exposure of juveniles to high surface water temperatures was not referenced in the TMDL, but average river temperatures have often resulted in high incidence of disease-caused mortality of juveniles (Maule et al. 1996; McCullough 1999).

9. The TMDL provides insufficient assessment of the effects of irrigation withdrawals and returns, despite their effects on the volume of water in the mainstems and ground water, as well as how return flows could either warm or cool the mainstems, depending on how and when that water is returned. The single evaluation done on Banks Lake does not constitute a complete analysis of the impact of irrigating 6.5 million acres of land in the Columbia River basin. Groundwater pumping from aquifers bordering the mainstem (National Research Council 2004) may be significantly depleting cold water entry into the river. Current water withdrawals in July on the Columbia River average 6.8–8.6% of mean flows. Under minimum July flows, the proportion of water withdrawal climbs to 16.8%. Under proposed increases in withdrawals, this would increase to about 21% of total flow (National Research Council 2004). Given that return flows are likely much warmer during the high withdrawal periods, the lack of analysis of this impact is a major oversight.

   Burns et al. (2012) evaluated 60,000 wells in the Columbia Plateau Regional Aquifer System (CPRAS), which covers an area of about 44,000 mi^2 in Oregon, Washington, and Idaho. This study found very rapid declines in groundwater levels throughout this region, which have resulted in reduced groundwater flows toward the Columbia and Snake Rivers. This great reduction in cold groundwater inflow to the mainstems would likely impair river temperatures and eliminate river margin cold refuges. This impact was not modeled in the TMDL. WDOE’s groundwater mapping and monitoring service (https://apps.ecology.wa.gov/eim) reveals extensive pumping of groundwater from aquifers adjoining the Columbia River and in its tributary watersheds.

10. A total maximum daily load (TMDL) is expected to set load reductions of that pollutant that are needed to limit its pollution sources through wasteload allocations from point sources and load allocations from diffuse sources. The TMDL does this in a very cursory manner. Instead, it leaves allocations up to the States, which were unable to establish temperature TMDLs for the Columbia and Lower Snake Rivers in the first place—let alone waste loads. To sustain salmon and steelhead, the EPA must play a much greater role with the FCRPS because three States and British Columbia have failed to manage their thermal loadings.

11. The TMDL is exclusively focused on peak summertime temperatures. This certainly is biologically significant with respect to adult migration of sockeye, steelhead, Chinook, and downstream juvenile migration. However, pre-spawning and spawning temperatures tend to be overlooked in the TMDL.

For example, the RBM10 current temperatures for Hanford Reach is 18.76ºC, whereas the RBM10 free-flowing temperature is 17.26ºC (Appendix D, Table 3-6). It had already been noted that temperatures delivered from Canada have been elevated (3.2ºC in August, and 2.2ºC in September). Even by October when substantial numbers of fish are migrating, the average temperature in the Columbia River under current conditions is 2.68ºC warmer than under the free-flowing scenario. Fig 6-4 highlights these high fall water temperatures. This indicates that fall Chinook currently are undergoing pre-spawning and spawning at temperatures significantly exceeding free-flowing norms. Protection of the entire life cycle is critical in terms of setting standards as well as in creating a TMDL that protects the beneficial uses.

12. The purpose of a TMDL is to limit heat loads so as to meet acute impacts, not just average or chronic impacts. The draft TMDL gives very little consideration to impacts on the temporal or spatial distribution of water temperature and the probabilities of having multiple annual events in a series that could affect salmon populations through acute impacts. Probabilities of co-occurring high air temperature and low river flows would lead to variations in level of biological impact. In addition, the variations in flows and temperatures as boundary conditions should be explored for biological impact. For example, the ability of Dworshak Dam to counteract the warming that is produced in the lower Snake River seems to be taken as a constant. Alternative dam operations to counteract drought and low Dworshak Reservoir levels so as to manage river temperatures should be described. Impacts tend to be smoothed out by use of monthly averages. Management of loads to not produce acute impacts is as important as avoidance of chronic impacts. Greater frequency of acute temperatures, such as those observed in 2015 (Isaak et al. 2018), emphasizes that heat loading in the TMDL must also account for maximum temperatures and not just average conditions.

    Oregon promotes maintenance of the "natural thermal pattern" (NTP) in temperatures (p. 9). Oregon needs to ensure that diel thermal exposure during migration does not impair salmon migration or survival if daily minima are increasing as well as maxima. Oregon's temperature standard includes the goal of maintaining an NTP. However, the DART data for The Dalles Dam 5-day average daily (5DAD) temperature for the period 1995-2020 show a prolonged period of 5DAD temperature from July-September starting with years 2013-2019. The EPA TMDL was only based on years 2011-2016. The years 2013-2016 showed extensive periods in July and August where temperatures exceeded criteria at Bonneville Dam (Appendix B, p. 35) by 2-3ºC. If the TMDL were to include years 2017-2019, it would incorporate several years in which temperatures have been so extreme that interference with migration, metabolic stress, reproductive success, and increased incidence of disease are likely to have cause increased mortality (McCullough 1999, McCullough et al. 2003).

    It is stated in the TMDL (p. 22) that temperature exceedances decline significantly in the Lower Snake River in September, whereas criteria are exceeded virtually continuously in August. For temperatures to decline to reach appropriate spawning temperatures in the fall Chinook spawning period, it is important to follow a natural pattern of decline so that adults do not accumulate lethal temperature loads during holding and gamete maturation periods. Biologically meaningful coldwater refuges have not been identified for the Snake River in the fall Chinook spawning period area. The natural thermal regime and potential of multiple occurrences of acute temperature impacts to fish should have been included.

13. Effluents should not be assumed to be benign simply if they match an overheated ambient river temperature. It appears that the TMDL assumes that the Portland sewage treatment plant releases a constant temperature discharge all year (Table 6-12). It is not stated what the discharge temperature is in July, August, and September. Also, the ability of this discharge to heat the Columbia River during these months depends upon the temperature differential between the river and the sewage flow (gpm) and temperature. Discharging heated effluent into a river that is already overheated may not produce much additional heating, but it certainly does not provide a cooling effect. The ability of any discharge to heat the mainstem should be compared to the temperature of the river at its historical, baseline flow (i.e., compared to the temperature target for that location along the river). The effluent target temperature should be equal to the river target temperature or less. Likewise, in tributaries, point source and non-point source temperatures entering tributaries should not exceed the temperatures set as water quality standards after mixing for those stream segments and should be less so to meet water quality standards at the downstream extent of each thermal zone (e.g., 16, 18, or 20ºC).

    Oregon's Division 41 temperature standards state: "Following a temperature TMDL or other cumulative effects analysis, waste load and load allocations will restrict all NPDES point sources and nonpoint sources to a cumulative increase of no greater than 0.3 degrees Celsius (0.5 Fahrenheit) above the applicable criteria after complete mixing in the water body, and at the point of maximum impact." Temperatures already exceed criteria significantly in many locations and months. It is also conceded that dams produce cumulative temperature increases.

14. There is a small amount of topographic shading that occurs in the mid-Columbia reaches that is not accounted for. In Rocky Reach alone, Dr. Scott Wells estimated using CE-QUAL-W2 modeling that topographic shading could result in a maximum temperature impact on the Columbia River of 0.06ºC (S. Wells, Portland State University, personal communication). By ignoring this small but physical source of cooling by its use of RBM10 EPA, in effect, the TMDL reserves this as a further thermal load to be filled by heat inputs.

15. EPA (2002) showed using field data in Lake Roosevelt that "the reservoir does stratify under certain circumstances and that downstream temperatures can be affected significantly by withdrawing water from various levels of the reservoir." A different result was produced by BOR (2018) in which it claimed that despite the reservoir being deep and a "storage reservoir," it behaved more like a run-of-river reservoir and didn't produce reliable stratification. However, the BOR report notes that at times data at and below 240 feet from the forebay surface might not be available and there may be questions about the reliability of the data. This analysis also was based on only one USGS sensor. Consequently, it seems that there remain significant questions about an ability to use deep-water releases to cool the Columbia River downstream in summer.

Questions:

It would be helpful if the TMDL contained answers to the following questions to help readers interpret the document and take meaningful action to reduce thermal pollution in the Columbia and Lower Snake rivers:

1. Neither EPA nor the States have attempted to model tributary water temperature inputs after restoration of floodplains, channel width, hyporheic flows, historic channel structure (pools, LWD), or historic streamflows. Therefore, why does the TMDL suggest allowing further increases in tributary temperatures over the current criteria?

2. Why was a natural condition model not developed for this TMDL as has been done for others? Page 11 states that such a functional model does not exist, and therefore one was not used. However, one could have been developed in anticipation of this TMDL, especially given the level of impairment and the importance of these rivers to socially and economically important anadromous fisheries.

3. Why does the TMDL not outline a plan for collecting much-needed temperature data moving forward? The TMDL relies heavily on modeled as opposed to *in situ* temperatures throughout both rivers, and it is unclear how representative the temperature data used in the models is given that they are associated with dams in well-mixed zones. The consequences of this are unknown. A clear temperature data collection plan is needed. Both could be outlined in the TMDL.

4. Why does the TMDL not incorporate the TMDLs of all tributaries to the Columbia and Snake rivers, including the Middle Snake River? Why are these not mentioned? Will, for example, Idaho be accountable to deliver water to Washington waters in the Snake River so that its water temperature standards are met? TMDL Table 6-20 shows that 13 of 20 of the Columbia River principal tributaries do not have TMDLs completed. This is essential if management plans are going to be able to assist in meeting mainstem Columbia River temperatures. It took 20 years for EPA to assume its role in developing a mainstem TMDL. How will EPA insure that necessary tributary TMDLs will be developed?

5. Waste Load Allocations (WLAs) were calculated based on available data, but in many cases temperatures and volumes of discharges are not known. How will this necessary information be collected in the near future and how will it be factored into revisions to the TMDL and its WLAs?

6. What options are built into the TMDL to control Columbia and Snake River temperatures for migration in the July-September period? Will a natural thermal pattern, such as that used in Oregon, be produced by reducing water temperatures in September according to a natural pattern leading to fall Chinook spawning?

7. Why was the TMDL only based on years 2011-2016, when data from the years 2017-2019 also appear to be available and include additional warm periods? Provide a stronger justification for omitting recent years.

8. Is average water temperature the right metric, or should the TMDL focus on bigger temperature differentials in smaller locations in Cold Water Refuges as stepping stones

(or both)? How often did cold water refuges not meet standards, and if this happened, were the areas still designated as CWRs? Should the TMDL suggest incentives for creating additional, spatially-distributed coldwater refuges? There is an absence of CWRs above John Day Dam, and the TMDL should provide guidance on how to develop CWRs, such as by obtaining ground water rights that would then allow greater ground water releases to the rivers.

9. Why does the draft TMDL give very little consideration to impacts on the temporal or spatial distribution of water temperature and the probabilities of having multiple annual events in a series that could affect salmon populations? Probabilities of high air temperature and low river flows would lead to variations in level of biological impact, and variations in flows and temperatures should be explored as boundary conditions. For example, the ability of Dworshak Dam to counteract the warming that is produced in the lower Snake region seems to be taken as a constant. Alternate river operations to counteract drought and low Dworshak Reservoir levels so as to manage river temperatures should be described. Impacts tend to be smoothed out by use of monthly averages. The purpose of a TMDL is to limit heat loads so as to meet acute impacts, as well as average or chronic impacts. Management of loads to not produce acute impacts is as important as avoidance of chronic impacts. Greater frequency of acute temperatures as found in 2015 (Isaak et al. 2018) emphasizes that heat loading in the TMDL must also account for maximum temperatures.

10. Why does the TMDL not suggest general guidance on actions, perhaps in a separate section, for temperature reduction in the Columbia and Lower Snake rivers and their upstream tributaries? What might these options be? Appendix F to the TMDL states that it is unlikely that tributary restoration will occur to the extent that temperature reductions will be significant. Why? It also states that additional rehabilitation and mitigation options will be required. There are, in fact, science-based temperature reducing practices such as: limit water withdrawals, implement irrigation efficiencies (e.g., reduce use of center-pivot systems that increase evaporation), and use deep-water returns that cool water as opposed to open return ditches that flow directly into receiving waters; use deep-water (versus nearshore) returns for point sources to reduce thermal plumes injurious to migrating fish; reduce upstream heat sources (British Columbia and Idaho); require tertiary treatment of all point sources, including stormwater, to reduce the non-thermal stressors to thermally stressed salmon and steelhead (Yeakley et al. 2014); revegetate tributary riparian canopies to reduce their temperatures by 0.5ºC (Gregory et al. 1991; FEMAT 1993; McAllister 2008; Fuller et al. 2018); and address non-mixed stressful or lethal temperatures at or near fish ladders, dams, and other structures. Actions could also include developing hypolimnetic release capabilities during critical migration periods for storage reservoirs (Brownlee, Dworshak, Roosevelt) as has been done for Upper Willamette River storage reservoirs. The lag times between recognizing the thermally-caused loss of salmon populations, analyzing the use of these reservoirs for thermal maintenance, building a physical structure, implementing new flow releases, and measuring population recovery are so prolonged that this TMDL should already be laying out these details. The TMDL should also provide a vehicle for summarizing the cumulative proposed outputs of tributary TMDLs, their adequacy, and missing TMDLs and types of analyses based on current knowledge.

Thank you for the opportunity to review and comment on the draft Columbia and Lower Snake Rivers Temperature Total Maximum Daily Load.

Regards,

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General Counsel & Vice President – Pacific Region

August 20, 2020

Mr. Andrew Wheeler
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RE: Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers

Dear Administrator Wheeler:

The U.S. tugboat, towboat, and barge industry is a vital segment of America's transportation system. The industry safely and efficiently moves more than 760 million tons of cargo each year, including more than 60 percent of U.S. export grain, energy sources, and other bulk commodities that are the building blocks of the U.S. economy. The fleet consists of nearly 5,500 tugboats and towboats and over 31,000 barges. These vessels transit 25,000 miles of inland and intracoastal waterways; the Great Lakes; and the Atlantic, Pacific, and Gulf coasts. Tugboats also provide essential services including ship docking, tanker escort, and bunkering in ports and harbors around the country.

AWO members operate tugboats and barges on the Columbia-Snake River System (CSRS) engaging in barge transportation of commodities and providing critical ship assist and marine services for deep-draft vessels calling the lower river. The CSRS is responsible for the movement of $21 billion in agricultural products annually. It is the number one gateway for U.S. wheat exports and second only to the Mississippi River in corn and soy exports. It is also the most important waterway for West Coast wood, energy, and mineral exports and is a critical port of entry for automobile imports and exports. Each typical four-barge tow on the river removes 538 trucks from our nation's highways, reducing pollution, congestion, and traffic fatalities. Towing vessels provide significant environmental, economic, and social benefits in moving bulk commodities. Towing vessels have low energy demands and are nearly 40 percent more fuel-efficient than freight trains and 270 percent more fuel efficient than semi-trucks.

Eliminating CSRS barge transportation would increase diesel fuel consumption by nearly five million gallons per year, generating 1,251,000 tons of carbon emissions from additional rail cars and trucks. Additional road traffic – if added to regional highways – would increase air emissions, traffic fatalities and add costly congestion. Agricultural producers in the region rely on all modes of freight transportation to move commodities to global markets. Between 50 and 60 million tons of cargo are transported annually on the CSRS, a system that has significantly lower infrastructure costs than other modes.

AWO recognizes the importance of the careful development of the TDML to ensure long-term river health and to protect the many vital authorized uses of the CSRS. AWO acknowledges the impacts of CSRS rising temperatures and urges EPA to consider the environmental benefits of navigation as it develops the TDML.

AWO is concerned that the TDML, if improperly developed, could prioritize certain authorized uses like fish and wildlife habitat over other equally important authorized uses like navigation and contribute to growing pressures to breach dams and navigation locks on the system. Specifically, interest groups may try to leverage the TDML to call for the breaching of CSRS dams on the grounds that dam breaching is the only way to restore lower river temperatures and recover endangered salmon species. AWO contends that barging on the river is a vital tool in reducing emission and greenhouse gas impacts of freight transportation and must be carefully considered as EPA develops its TDML. **AWO is concerned that without careful consideration of all federally authorized uses, the TMDL could threaten the viability of environmentally beneficial navigation on the CSRS.**

Recognizing the impacts that the TMDL will have on Congressionally authorized uses of the CSRS, it is imperative that EPA remains highly sensitive to impacts on navigation. AWO encourages EPA to carefully consider Northwest River Partners comments suggesting that EPA must consider temperatures from non-impounded rivers and water flowing from Canada to establish an accurate TMDL model. AWO requests that EPA reissue a revised draft TMDL and provide stakeholders with the opportunity to provide comments before the draft is finalized.

Thank you for the opportunity to comment on the TMDL. AWO appreciates the opportunity to work with EPA and other CSRS stakeholders on this vital issue.

Sincerely,

Charles. P. Costanzo
General Counsel & Vice President – Pacific Region

Benton R E A

BENTON RURAL ELECTRIC ASSOCIATION

402 7th Street • P.O. Box 1150 • Prosser, Washington • (509) 786-2913 • Fax (509) 786-0291

Michael J Bradshaw
GM/Executive Vice President
Benton Rural Electric
Association
PO Box 1150
Prosser, WA 99350

July 20, 2020

Mr. Andrew Wheeler
Administrator
Environmental Protection Agency
ColumbiaRiverTMDL@epa.gov

RE: EPA Total Maximum Daily Load for Temperatures in the Columbia and Lower Snake Rivers

Dear Administrator Wheeler:

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

Benton REA is a not-for-profit, consumer-owned electric cooperative. Founded in 1937, Benton REA currently provides electricity to nearly 10,000 members and 15,000 accounts in portions of Benton, Yakima and Lewis counties in Washington state.

As a full requirement customer of the Bonneville Power Administration, Benton REA receives more than 80% of its electricity from the Federal Columbia River Power System (FCRPS). If revisions are not made, the TMDL, as written, needlessly threatens the vitality of the FCRPS and the multiple purposes for the system as established by the United States Congress. The results could be catastrophic for electricity ratepayers in the Northwest, particularly the most vulnerable, such as low-income consumers.

We would like to express our support for the comments provided by Northwest RiverPartners. As a Northwest RiverPartners member, we firmly agree with their position on the CLSRT TMDL and the need for its revision.

KEY POINTS OF EMPHASIS

- The states of Washington and Oregon are signaling that they intend to base energy and environmental policy on the CLSRT TMDL. This outcome is problematic because, as EPA notes, "The current water quality conditions present a significant challenge to achieving downstream water quality standards in Washington and Oregon."[1] This challenge arises because water temperatures entering Washington state from Canada and from Idaho often significantly exceed the respective states' water quality standards during the peak summer months. This confounding situation raises the possibility that the FCRPS dams will be held to unattainable standards.
- Due to the possibility described above, the stakes are very high for the CLSRT to be extremely accurate.
- The CLSRT TMDL relies upon the one-dimensional RBM10 model, which lacks the detail and sophistication necessary to provide precise results for a river system with the complexity of the Columbia-Snake river system.
- Tellingly, the TMDL did not attempt to simulate the entire Columbia River Basin with its RBM10 model, but instead truncated the Columbia and Snake rivers near the Washington state borders. This artificial limitation doesn't allow the model to accurately account 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).
- The TMDL, as written, includes significant arbitrary assumptions, such as including large storage dams in its "free flowing" state. These larger dams can release artificially cool water during the summer. This inconsistent treatment (i.e., including some dams but excluding others) places an unfair temperature standard on the downstream dams.
- A 2002 study under the US Army Corps of Engineers ("USACE") compared pre-lower Snake River dam measurements from 1955-1958 to measurements taken after the lower Snake River dams were constructed. The study found no evidence that river temperatures had increased, and instead remained unchanged or slightly lower after completion of the four lower main stem dams.[2] This real-life finding runs contrary to what we are seeing in the TMDL's modeling output.
- 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. This finding is much more consistent with the 2002 USACE finding described above.

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

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

RECOMMENDATION

Benton REA supports Northwest RiverPartners' recommendation that EPA revise its *Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers* and provide a revised 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 clean energy goals, and billions of dollars of extra costs forced on Northwest families.

Thank you again for the opportunity to comment.

Best regards,

Michael J. Bradshaw

Michael J Bradshaw
Benton Rural Electric Association
General Manager/Executive Vice-President

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1373 N. Hwy 261 | Telephone: (509) 659-1700
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July 21, 2020

Mr. Andrew Wheeler
Administrator
Environmental Protection Agency
ColumbiaRiverTMDL@epa.gov

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 Big Bend Electric Cooperative regarding the *Total Maximum Daily Load for Temperatures for the Columbia and Lower Snake Rivers* ("CLSRT TMDL").

Big Bend Electric is a small rural utility in eastern Washington providing electrical service to farmers, ranchers and homes in mainly non-urban areas of Adams and Franklin counties. As a cooperative we strive to care for our communities with democratic controls, open membership, education, cooperation and with independence. We serve less than 10,000 meters serving about 5,000 members over 2,500 square miles with fewer than 40 employees. Big Bend Electric purchases most of its power from Bonneville Power Administration (BPA). Over half of our power sales are directly to farmers for irrigation uses who rely on BPA to deliver low cost power to grow food for the world.

We would like to begin by expressing our support for the comments provided by Northwest RiverPartners. As a Northwest RiverPartners member, we firmly agree with their position on the CLSRT TMDL and the need for its revision.

If these revisions are not made, the TMDL, as written, needlessly threatens the vitality of the Federal Columbia River Power System ("FCRPS") and the multiple purposes for the system as established by the United States Congress.

KEY POINTS OF EMPHASIS

- The states of Washington and Oregon are signaling that they intend to base energy and environmental policy on the CLSRT TMDL. This outcome is problematic because, as EPA notes, "The current water quality conditions present a significant challenge to achieving downstream water quality standards in Washington and Oregon."[1] This challenge arises because water temperatures entering Washington state from Canada and from Idaho often

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

significantly exceed the respective states' water quality standards during the peak summer months. This confounding situation raises the possibility that the FCRPS dams will be held to unattainable standards.

- Due to the possibility described above, the stakes are very high for the CLSRT to be extremely accurate.
- The CLSRT TMDL relies upon the one-dimensional RBM10 model, which lacks the detail and sophistication necessary to provide precise results for a river system with the complexity of the Columbia-Snake river system.
- Tellingly, the TMDL did not attempt to simulate the entire Columbia River Basin with its RBM10 model, but instead truncated the Columbia and Snake rivers near the Washington state borders. This artificial limitation doesn't allow the model to accurately account 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).
- The TMDL, as written, includes significant arbitrary assumptions, such as including large storage dams in its "free flowing" state. These larger dams can release artificially cool water during the summer. This inconsistent treatment (i.e., including some dams but excluding others) places an unfair temperature standard on the downstream dams.
- A 2002 study under the US Army Corps of Engineers ("USACE") compared pre-lower Snake River dam measurements from 1955-1958 to measurements taken after the lower Snake River dams were constructed. The study found no evidence that river temperatures had increased, and instead remained unchanged or slightly lower after completion of the four lower main stem dams.[2] This real-life finding runs contrary to what we are seeing in the TMDL's modeling output.
- 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. This finding is much more consistent with the 2002 USACE finding described above.

RECOMMENDATION

Big Bend Electric Cooperative supports Northwest RiverPartners' recommendation that EPA revise its *Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers* and provide a revised 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 clean energy goals, and billions of dollars of extra costs forced on Northwest families.

Thank you again for the opportunity to comment.

Respectfully,

Christina A Wyatt

Christina A Wyatt
Manager of Power Supply

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

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July 21, 2020

Mr. Andrew Wheeler
Administrator
Environmental Protection Agency
ColumbiaRiverTMDL@epa.gov

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 Blachly-Lane Electric Cooperative regarding the *Total Maximum Daily Load for Temperatures for the Columbia and Lower Snake Rivers* ("CLSRT TMDL").

Blachly-Lane Electric Cooperative is a small consumer-owned electric distribution utility serving 2,865 members is rural Western Lane County, Oregon. The cooperative was established in 1937, and has been reliably serving our residents, farms, small and large businesses ever since.

Without revision of the approach to this matter, the impacts could overwhelm our small utility. Our members depend our service reliability, which could be impacted by rolling blackouts without revision to the CLSRT TMDL. Our rural members are already faced with high energy costs before billions of additional dollars are added, and will be adversely impacted economically. The region's clean energy goals will be far more difficult to obtain if this source of carbon-free energy is reduced.

Let our support for the comments provided by Northwest RiverPartners be known. As a Northwest RiverPartners member, we firmly agree with their position on the CLSRT TMDL and the need for its revision.

If these revisions are not made, the TMDL, as written, needlessly threatens the vitality of the Federal Columbia River Power System ("FCRPS") and the multiple purposes for the system as established by the United States Congress.

KEY POINTS OF EMPHASIS

- The states of Washington and Oregon are signaling that they intend to base energy and environmental policy on the CLSRT TMDL. This outcome is problematic because, as EPA notes, "The current water quality conditions present a significant challenge to achieving downstream water quality standards in Washington and Oregon."[1] This challenge arises because water temperatures entering Washington state from Canada and from Idaho often significantly exceed the respective states' water quality standards during the peak summer months. This confounding situation raises the possibility that the FCRPS dams will be held to unattainable standards.
- Due to the possibility described above, the stakes are very high for the CLSRT to be extremely accurate.
- The CLSRT TMDL relies upon the one-dimensional RBM10 model, which lacks the detail and sophistication necessary to provide precise results for a river system with the complexity of the Columbia-Snake river system.
- Tellingly, the TMDL did not attempt to simulate the entire Columbia River Basin with its RBM10 model, but instead truncated the Columbia and Snake rivers near the Washington state borders. This artificial limitation doesn't allow the model to accurately account 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).
- The TMDL, as written, includes significant arbitrary assumptions, such as including large storage dams in its "free flowing" state. These larger dams can release artificially cool water during the summer. This inconsistent treatment (i.e., including some dams but excluding others) places an unfair temperature standard on the downstream dams.
- A 2002 study under the US Army Corps of Engineers ("USACE") compared pre-lower Snake River dam measurements from 1955-1958 to measurements taken after the lower Snake River dams were constructed. The study found no evidence that river temperatures had increased, and instead remained unchanged or slightly lower after completion of the four lower main stem dams.[2] This real-life finding runs contrary to what we are seeing in the TMDL's modeling output.
- 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. This finding is much more consistent with the 2002 USACE finding described above.

[1] Columbia and Lower Snake River Temperature Total Maximum Daily Load. 5/18/2020. US EPA, p 42.
[2] Water Temperatures and Passage of Adult Salmon and Steelhead in the Lower Snake River

RECOMMENDATION

Blachly-Lane Electric Cooperative supports Northwest RiverPartners' recommendation that EPA revise its Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers and provide a revised 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 clean energy goals, and billions of dollars of extra costs forced on Northwest families.

Thank you again for the opportunity to comment.

Best regards,

Greg Gardner
General Manager

Department of Energy

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

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]

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[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
Vice President of Generation Asset Management
Bonneville Power Administration

CC:
Dave Croxton, EPA Region 10, Watersheds Section Chief, croxton.david@epa.gov

United States Department of the Interior

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IN REPLY REFER TO:
CPN-1000
2.2.4.22

VIA ELECTRONIC MAIL ONLY

Dan Opalski
Environmental Protection Agency Region 10
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ColumbiaRiverTMDL@epa.gov

Subject: Total Maximum Daily Load (TMDL) for Temperature in the Columbia and Lower Snake Rivers

Dear Mr. Opalski:

Thank you for the opportunity to comment on the Environmental Protection Agency's (EPA) TMDL for Temperature in the Columbia and Lower Snake Rivers. Reclamation appreciates EPA's significant efforts to improve understanding of the relationships between river temperatures and other conditions. In particular, Reclamation recognizes EPA's work to describe the complex relationships between multiple factors influencing water temperature at a landscape scale. Reclamation also recognizes the challenges imposed by the limited timeframe EPA had to develop such a complicated TMDL. In support of continued efforts to address temperature impairments in the river reaches subject to the TMDL, Reclamation offers these comments on both the TMDL and its potential implementation.

As a general matter, complex relationships and data gaps confounded the large scale of the TMDL analysis. In the former category, the TMDL portrays the delay in water transit of incoming excessively warm water from Canada as part of the thermal load attributable to warming that occurs in Lake Roosevelt. As a result, the TMDL overstates the extent to which activities subject to the TMDL, as opposed to other sources, affect temperature. This limits its usefulness in implementation efforts aimed at attainment and overestimates the load allocation attributable to Grand Coulee in the TMDL.

In the latter category, the TMDL inappropriately applies the water quality criteria for uses in Lake Roosevelt to locations miles downstream of Grand Coulee and Priest Rapid dams. While intended as a simplifying assumption, this assumption is inconsistent with the plain language of Washington's water quality standards and overlooks considerable variation likely occurring across such a large expanse.

Together these complex relationships and information shortcomings can confuse the thermal load attributable to Lake Roosevelt with the effects of incoming warm water at the Canadian border or other loads upstream of the dam. Reclamation seeks to operate Grand Coulee Dam to maximize the public benefits of the facility. At times, however, it may not be feasible to operate the dam in a way that causes water temperatures to meet applicable standards, particularly given the role of sources outside of Reclamation's control. To the extent it could be possible to influence temperatures through operations at Grand Coulee, Reclamation's authority to so operate the dam and reservoir is limited to addressing the effects Reclamation's actions cause. The remainder of this comment letter details the concerns above.

Incoming warm water from Canada prevents attainment of water quality standards.

The TMDL recognizes that daily average water temperatures in the Columbia River at the border with Canada exceed the 16° Celsius (°C) water temperature criterion in July, August, and September. Although the TMDL acknowledges that these boundary conditions may affect how often it is possible to meet water quality standards, it does not discuss the impact of incoming water from the Canadian border specifically. Instead, the attainability analysis presents conditions at the *last* dams on the Columbia and Snake Rivers: Bonneville and Ice Harbor. This understates the fact that warm incoming water from Canada precludes attainment of water quality standards at the border and affects attainment downstream. The impacts these inflowing waters have on meeting water quality standards after being delayed in Lake Roosevelt are not accounted for; for example, water temperatures that exceed criteria in August at the border may not pass through the reservoir until September or October when downstream criteria is exceeded. Reclamation recognizes that this limitation in EPA's methodology may require further refinement of the precise load allocation attributable to Grand Coulee operations to inform future attainability or TMDL discussions.

The TMDL analysis does not distinguish incoming water temperature from thermal loads caused by the existence of Grand Coulee Dam.

To calculate the cumulative excess temperature loads due to dams, the TMDL compared the "Current" and "Free Flowing" RBM-10 model scenarios for each summer month. This method is best understood as calculating the net effect *between* dams on the temperature regime, without isolating the impacts of the dams specifically. For many dams with water residence times of less than a month this comparison is not necessarily problematic. For Grand Coulee, however, with residence times from 20 to 60 days, this approach fails to distinguish between warming of water in Lake Roosevelt and the delayed transit of warm water from Canada.

In actuality, temperatures in Lake Roosevelt and in the Columbia River downstream of Grand Coulee result from many heat exchange pathways. Some are due to incidental heat sources or sinks in the reservoir, such as long and short wave radiation or evaporation. Others result from water flowing into the reservoir from tributaries, or from the Columbia River upstream of Lake Roosevelt. In addition to these factors, by slowing the flow of rivers, dams increase the residence time of incoming waters. The effect of this regulation on water temperature is to shift the timing of when high and low temperatures occur within the river. Notwithstanding the different sources of these temperature inputs, the TMDL fails to distinguish thermal loads from incoming waters at the Canadian border from the non-point source temperature loads attributable to Lake Roosevelt.

The values produced using a simple comparison between free-flowing and current conditions at Grand Coulee reveals the scale of this issue. Although "impounded water is warmed by solar radiation and warm air temperatures during the summer," (TMDL at 22) the TMDL model suggests the residence time effect *cools* the Upper Columbia by 0.8 and 0.2 °C in July and August respectively. Similarly, warming attributed to Grand Coulee Dam in September can be understood simply as the arrival at the dam of warm summer waters at a time when Canadian inflow is beginning to cool.

Critically, the residence time effect is not the same as a thermal load. It adds no additional thermal energy to the system. Rather, residence times affect when an upstream thermal load – in this case the combined load of incoming water from Canada and the load associated with thermal energy absorbed by Lake Roosevelt – appear at a point, whether in the reservoir or in the Columbia River below Grand Coulee Dam. Other than quantities of energy advected to air and land, thermal loads from Canada must transit downstream. These loads are beyond the reach of any entity subject to this TMDL. By characterizing both sources as excess thermal energy attributed to Grand Coulee, the TMDL suggests that Reclamation is more capable of controlling thermal loads than is actually the case. And by overstating the role of Grand Coulee in causing thermal conditions, the TMDL limits its usefulness as a tool to support water quality standard attainment.

The TMDL applies the wrong water quality criterion below Grand Coulee Dam.

States develop water quality criteria to protect designated uses in specific river reaches or waterbodies. In two locations in Washington, the boundary between reaches of the Upper Columbia River is defined by Grand Coulee and Priest Rapids Dams. At these locations, the TMDL applies the water quality standard for the upstream reach 51 miles below the boundary at Grand Coulee and 88 miles below the boundary at Priest Rapids. This constitutes 25% of the reach between Grand Coulee and Priest Rapids Dam and 100% of the reach between Priest Rapids Dam and the border between Washington and Oregon. The practical effect of this approach is that the load allocations for Grand Coulee and Priest Rapids Dams are based on water quality standards that do not apply to the reaches affected by the releases from those dams.

Washington law does not require this approach. TMDLs apply criteria to specific river miles or to the entire waterbody based on the designated use. Washington unambiguously established the boundaries of each waterbody within the Columbia River and designated uses and water quality standards within them. WAC 173-201A-206 does not provide discretion to modify the boundaries of waterbodies or the standards that apply within them. Rather, it provides instruction to the department to apply the more stringent criteria "*[a]t the boundary* between waterbodies protected for different uses." WAC 173-201A-206 (3)(d) (Emphasis added). "At the boundary" describes locations between two waterbodies where standards might be ambiguous. The term cannot reasonably be read to encompass so much of a reach as to obviate the state's designation of specific standards for that reach. Thus, Reclamation requests EPA re-calculate the TMDL allocations using the appropriate temperature standard and update the TMDL to be reflective of this.

Implementation of the TMDL will require additional analyses utilizing peer-reviewed tools.

Reclamation recognizes that, although EPA's RBM-10 model has been used in other TMDLs, it is not able to represent how Grand Coulee operations affect water temperature. Among other limitations to representing operations, RBM-10 simplifies operations and spatial temperature heterogeneity, such as thermal stratification in reservoirs. Implementation of the TMDL would thus benefit from tools capable of more completely reflecting how dam operations can affect water temperature.

Most importantly, future TMDL efforts implicating Grand Coulee must identify the incremental temperature effects of dam operations. In the TMDL, EPA compared a free-flowing river with current operations. Because Reclamation has no discretion over the existence of Grand Coulee Dam, which affects hydrology irrespective of Reclamation's operational decisions, this comparison provides little insight into what Reclamation may do to affect water temperature. Thus, a necessary first step in future TMDL analyses is to account for the baseline temperature effects attributable to the existence of Grand Coulee.

Future TMDL efforts should also be based on the same metric as expressed in the water quality standards. The TMDL identifies load allocations for dams based on daily average temperatures. The applicable temperature standards, however, are based on 7-day average daily maximum temperatures. These values can differ by 0.2 to 0.6 °C . When used in comparison with modeled current conditions, it is possible that these errors compound. Analyzing modeled results on the same metric as the standard is expressed would help avoid this error and provide a more useful compliance metric.

Conclusion

In summary, Reclamation is concerned that the TMDL may overstate the thermal load attributable to Grand Coulee Dam, conflate that thermal load with the effect of residence time behind the reservoir, and measure that gross impact against an inappropriate standard below the dam. Reclamation nevertheless remains committed to working with EPA to resolve these issues in the TMDL. Reclamation is also committed to working with states and regional sovereigns to evaluate and understand how Reclamation's actions influence water temperatures. If you have questions regarding these comments or would like to arrange a discussion regarding this letter, please contact Christopher Eder, Special Assistant to the Regional Director, at ceder@usbr.gov or (208) 378-5008.

Sincerely,

Acting for:

Lorri J. Gray
Regional Director

From:	Kevin Poole
To:	ColumbiaRiverTMDL
Cc:	Monika Lawrence
Subject:	Comment on TMDL for Temp on Columbia & Snake Rivers
Date:	Thursday, July 16, 2020 10:47:17 AM

To Whom It May Concern,
The City of Clarkston, WA has reviewed the document "Total Maximum Daily Load (TMDL) for temperature on the Columbia and Lower Snake Rivers." We have the following comment to be addressed and entered into the record.

In the discharge fact sheet created for the Clarkston WWTP in 2016 (WA0021113), temperature is listed as a Category 2 concern immediately upstream of the WWTP discharge, and it is not listed as a concern immediately downstream of the WWTP. The fact sheet also concluded that the effluent temperature from the Clarkston WWTP does not have a reasonable potential to exceed the state's temperature criterion. Please remove Clarkston from inclusion in the TMDL.

Kevin Poole P.E.
Public Works Director/Building Official
829 5th St.
Clarkston, WA 99403

509-758-1662 Office
509-552-0491 Cell

City of Camas
WASHINGTON

Public Works Department

July 21, 2020

Mary Lou Soscia, Columbia River Coordinator
EPA Oregon Operations Office
805 SW Broadway, Suite 500
Portland, OR 97205

Subject: **City of Camas Comments on U.S. EPA's *TMDL for Temperature in the Columbia and Lower Snake Rivers* (Issued May 18, 2020 for Public Comments)**

Dear Ms. Soscia:

The City of Camas provides wastewater collection and treatment at our wastewater treatment facility for approximately 25,000 residents in the eastern portion of Clark County, Washington. The City of Camas is committed to supporting state and federal regulatory processes that improve the quality of life for our residents as well as the water quality of the Columbia River. We have demonstrated our commitment to doing the right thing for the environment in a cost effective manner as reflected with our continuing investments and upgrades to the Wastewater Treatment Plant (WWTP). Our sewer system growth rate has recently been calculated to be approximately 4% per year due to residential and commercial growth.

On behalf of the residents served by the City of Camas, please accept the following comments regarding the above-referenced TMDL that EPA released for public comment on May 18, 2020.

TMDL Comment 1: River Reaches as Applied in the TMDL

The City of Camas requests that the EPA consider clarifying explicitly where and how river reaches apply to the modeling and the reserve allocations. The TMDL references the term "reaches" throughout the document, but does not clearly define the river regions within each reach. Section 2.4 refers to 10 reaches on the Columbia River and one reach on the Snake River in referring to applicable water quality temperature criteria – and cites Table 2-2. Section 6.5.1 (Dams) states that "this analysis estimates the cumulative temperature impact in each reach caused by all upstream dam impoundments and estimates when and where this impact exceeds the 0.1°C cumulative dam load allocation." This statement implies that a reach is the river segment between dams on the Columbia River - in the context of temperature modeling of the dams, however, it is not clearly stated. EPA should clearly define the river reaches applied in the TMDL at some point early in the document.

An important element of the TMDL defined by river reaches is the reserve allocation. In Section 6.5.4 – Reserve Allocations, the TMDL states (on page 61) that "EPA inserted a heat load in the model at the midpoint of each TMDL reach"… and "the resulting reserve load for each reach is 4.4 x 10^9 Kcal/day." The City of Camas requests that the TMDL document include a table to define each river reach in the TMDL so that NPDES point source dischargers can understand their locations along the river and the associated reserve allocations available to dischargers within their respective reach.

TMDL Comment 2: Tributaries Allocations in the TMDL

Section 3.2 Tributary Temperature in the TMDL does not clearly define the basis for allocating 0.1 degrees C heat load to the 23 major tributaries to the Columbia and Snake Rivers. The City of Camas requests that EPA clearly define the technical basis for this significant allocation of one-third of the total 0.3 degrees C allowable heat load allocation in the Columbia River.

The reasons for stating that the TMDL has significant uncertainty in assigning 0.1 degrees C (one-third) of the TMDL heat load allocation to tributaries during July-October is as follows:

- All tributaries included in the TMDL contribute an average water temperature that is 1.6 degrees C colder than the mainstem Columbia River temperature in September and even colder water is contributed in October (see Section 3.2 and Appendix E – Tributary Assessment Methods and Results);
- All tributary river temperatures in October are shown to be below 14.5 degrees C and only 3 of 21 tributaries to the Columbia River were above 13.0 degrees C (refer to TMDL Table 3-9);
- 21 of 23 tributaries have temperature criteria cooler than the Columbia and Snake River criteria (refer to TMDL Table 6-20); and
- These TMDL temperature data demonstrate that tributaries are providing thermal benefits to the Columbia and Snake Rivers in October and are not contributing heat loads above the 20 degree C temperature criteria.

In addition, as TMDLs are implemented on these tributaries and tributary heat loads decrease, they will increasingly contribute to thermal reductions in the mainstem. Therefore, the City is requesting that EPA include a method in the TMDL to reassign portions of the tributaries source allocation to the reserve allocation category as TMDLs are implemented on tributaries and as temperature criteria are achieved on each tributary. Support for this request to reassign tributary source allocations as TMDLs are implemented are listed as follows:

- 9 of 22 listed tributaries have had TMDLs completed so they will be contributing thermal benefits to the mainstem Columbia and Snake Rivers (see TMDL Table 6-20); and
- EPA modeling of the thermal improvements to the mainstem Columbia and Snake Rivers when tributary temperatures achieve temperature criteria through TMDL implementations show a cumulative maximum reduction of 0.2 degrees C is forecast for the Columbia River at RM 42, and this cumulative reduction is double the tributaries allocation of 0.1 degrees C (see page 63 in TMDL).

TMDL Comment 3: Seasonal Application of the WLAs

The City of Camas requests that the EPA clarify that the Temperature TMDL Waste Load Allocations (WLAs) only apply to NPDES point source dischargers during the historical periods when the Columbia and/or Snake Rivers exceeded their applicable temperature criterion. Section 6.2 on page 39 starts with the statement "The critical time periods for this TMDL are July-October for all locations." While the focus on this four-month season is consistently applied throughout the document, the WLAs for NPDES permitted facilities listed in Table 6-12 and Table 6-13 do not explicitly indicate that the WLA applies only for this four-month period. The City of Camas requests that EPA provide a statement in the text or footnote for Table 6-12 and Table 6-13 confirming that WLAs apply only during the four-month period of July-October, and to a portion of that period when the Columbia and Snake Rivers are out of compliance with water quality standards within the applicable river reach.

TMDL Comment 4: Application of Thermal WLAs When Discharge Temperatures Are Below the Temperature Criteria

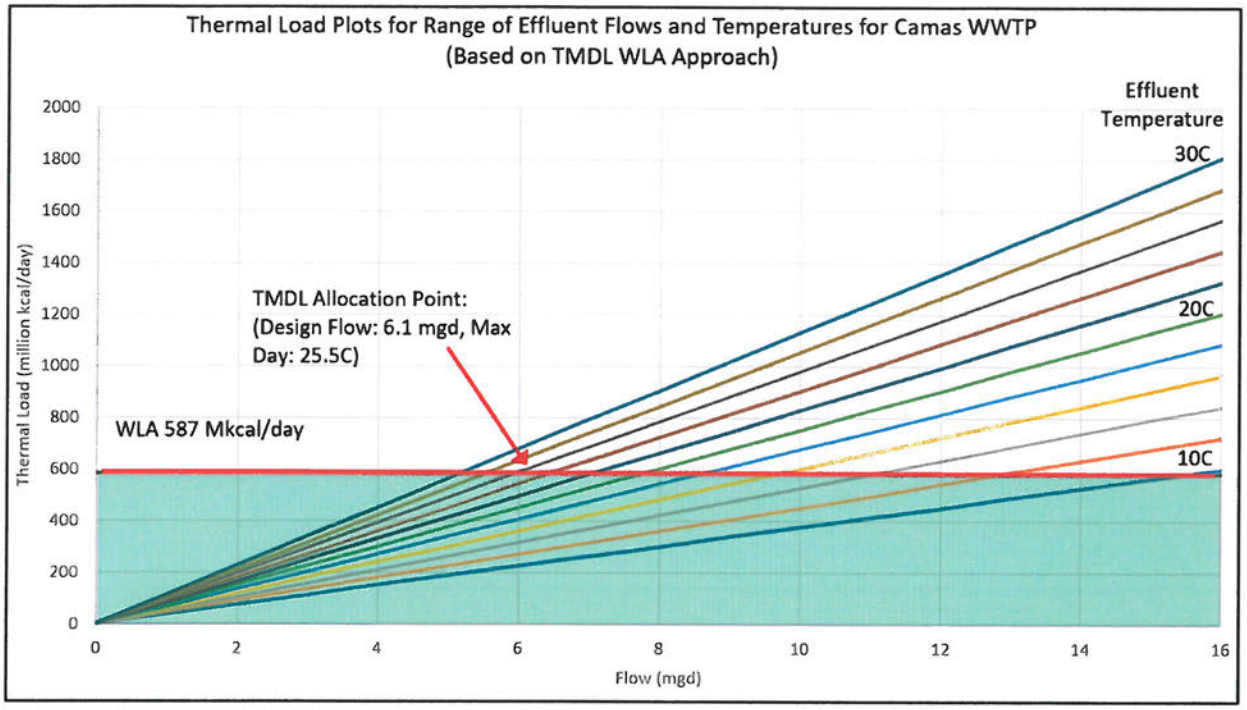
The City of Camas requests that the TMDL only apply WLAs to point source dischargers when the effluent from those dischargers exceeds the applicable temperature criterion at the discharge location. The WLAs for NPDES permitted point sources are presented in Tables 6-12 through 6-15 and it is explained in the first paragraph on page 51 that the "WLA was calculated using the facility design flow and the highest known or estimated temperature of the facility effluent." With the approach for WLA calculation used in the TMDL, discharges of effluent at temperatures below the applicable river temperature criteria appear to still be subject to a WLA and potential thermal load limits. Since discharges of effluent at temperatures below the applicable river temperature criteria contribute to river cooling and additional progress towards attainment of the temperature criteria in the river, thermal loads limits should not apply when the effluent temperature is below the applicable river temperature criteria.

This discharge temperature issue has been addressed in the Oregon Department of Environmental Quality's 2008 report "Temperature Water Quality Standard Implementation – A DEQ Internal Management Directive" through the definition of Excess Thermal Load (ETL) wasteload allocations and ETL calculations for use in NPDES permit compliance. The TMDL should either: 1) clarify that WLAs (based on a zero receiving water reference temperature) will only apply when effluent temperatures are above the applicable river temperature criteria; or 2) state that an ETL approach (see equation below) should be taken by the states in applying the thermal WLAs to NPDES permits and in defining monitoring and compliance requirements within NPDES permits.

$$WLA = (T_{ps} - T_{wqc}) \times Q_{ps} \times C_f$$

where,
WLA = thermal waste load allocation
Tps = temperature of the point source discharge when Tps > Twqc
Twqc = applicable water quality criteria temperature
Qps = flow of the point source discharge
Cf = unit conversion factor

The following plot illustrates the relationship between effluent flow and temperatures and applying a thermal WLA without a threshold 20 degrees C temperature for the receiving water and effluent temperature. If the City of Camas effluent flow reached 8.7 mgd in an October wet weather event, then effluent temperature would have to be 18 degrees C to stay within the TMDL defined WLA. In the wet season, with periodic higher effluent flows the effluent temperatures would have to be even lower to meet the WLA. The City of Camas is requesting that the TMDL state that an ETL approach should be used in applying the thermal WLAs to NPDES permits or that the WLAs (based on a zero receiving water reference temperature) will only apply when effluent and river temperatures are above the applicable river temperature criteria.



Failure to address the regulation of thermal waste loads with this consideration will put several point sources in jeopardy of compliance in the near-term during periods when their effluent is actually contributing to the reduction of river temperatures.

TMDL Comment 5: Application of WLAs in October in the Lower Columbia River

This City of Camas requests that the EPA not include October in the compliance period for point sources below RM 141.5. Tables 3-2 through 3-6 in the TMDL document that the 20 degrees C criteria is only exceeded in the months of July through September for this region of the river.

Table 6.1 lists the two water quality temperature criteria that Oregon applies in the lower Columbia River in October. The year-round criterion is 20 degrees C for River Miles 0 to 141.5, and the temperature criterion in a two-mile river segment below Bonneville Dam (RM 141.5 to 143.5) is 13 degrees C for October 15-March 31. Table 3-7 shows no temperature exceedances of the 20 degrees C temperature criterion in October from the Priest Rapids Dam (RM 396) to the Pacific Ocean. It would not be correct for the TMDL WLAs to apply to NPDES permitted facilities during periods of the year when the Columbia and Snake Rivers are in compliance with the 20 degrees C water temperature criterion.

TMDL Comment 6: Definition of Parameters for the WLAs Application

The City of Camas requests that the EPA clarify that implementation of the TMDL WLAs will be on a monthly average basis. Tables 6-12 and Table 6-13 define WLAs for NPDES point sources, but these tables do not state the seasonal period when applicable. The City requests that EPA specify that WLAs are to be applied by as monthly average values for compliance with the WLAs, and this was the basis for the modeling within the TMDL. **TMDL Comment 7: Request to Update Flow Basis for WLA Assigned to the Camas WWTP**

The TMDL lists a thermal WLA in Table 6-13 for the Camas WWTP of 587 million kcals/day, based on a reference temperature of zero. This WLA has been calculated by applying a maximum effluent temperature of 25.5 degrees C and an effluent flow of 6.1 mgd. The City of Camas WWTP submitted a General Sewer Plan/Wastewater Facility Plan amendment to the Washington Department of Ecology in 2016. This document supports the state and local coordinated planning basis for the applicable service area for future flows of 10.16 mgd (dry season) on a monthly average flow basis. The City of Camas requests that EPA update the allocation for the Camas WWTP to the appropriate maximum month effluent flow of 10.16 mgd.

TMDL Comment 8: TMDL Reserve Allocations

The City of Camas requests that the EPA clarify reserve allocation implementation approach as discussed below. In Section 6.5.4 of the TMDL, Reserve Allocations (pages 60-61) discusses consideration for the needs of future growth, new point sources, adjustments to the waste load allocations (WLAs), and other non-point sources. The TMDL is clear in delegating the requirement for managing reserve allocations to the states on page 61: "The reserve needs to be managed by Washington and Oregon during implementation, including maintaining a system to track the reserve, determining whether a point source can access the reserve, and establishing a process for granting a portion of the reserve." However, the TMDL document does not provide specific guidance on the approach or rules that would be acceptable to EPA to be consistent with the overall TMDL framework.

The City of Camas is requesting that reserve allocations for future growth allocations should be prioritized according to official growth planning frameworks within the states. Wastewater utilities develop General Sewer Plans and Wastewater Facilities Plans and coordinate them with the communities Comprehensive Plans to document and plan services for the growth within urban areas, including an assessment of necessary provisions for treatment and discharge locations. The reserve allocations for future growth should respect and compliment this established planning framework.

Comment 9: Watr Quality Credit Trading

The City of Camas requests that the EPA provide a statement of support in the TMDL for the use of water quality credit trading consistent with EPA guidance as an approach to attain the desired water quality objectives. Trading areas are typically defined based upon areas of consistent temperature criteria and location in relation to the point of maximum impact within a river reach. The City of Camas is requesting that EPA include statements of support for the use of water quality credit trading consistent with EPA and Washington guidance to comply with the TMDL, establish geographical boundaries where the trading would be allowed, consistent with the TMDL, or establish the procedures for defining geographic trading areas.

Conclusion

Thank you for providing the opportunity to review and comment on the TMDL for Temperature in the Columbia and Lower Snake Rivers. Because the TMDL will have substantial implications for resource management and potential future investment to attain the desired environmental outcomes, it is important that the TMDL allow as much flexibility as possible for the regulated community to seek cost effective and innovative compliance strategies. On behalf of the residents served by the City of Camas, we look forward to EPA's confirmations associated with the items addressed in this letter.

Sincerely,

Bob Busch
WWTP Operations Supervisor
City of Camas

Department of Environmental Services | City of Gresham
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July 21, 2020

Mary Lou Soscia, Columbia River Coordinator
EPA Oregon Operations Office
805 SW Broadway, Suite 500
Portland, OR 97205

Subject: **Comments on U.S. EPA's *TMDL for Temperature in the Columbia and Lower Snake Rivers* (Issued May 18, 2020, for Public Comments)**

Dear Ms. Soscia,

The City of Gresham provides wastewater collection and treatment at our wastewater treatment facility for approximately 110,000 residents of the greater City of Gresham in the eastern portion of Multnomah County, Oregon. The City of Gresham is committed to supporting state and federal regulatory processes that improve the quality of life for our residents as well as the water quality of the Columbia River. We are supportive of regulatory measures that are accurate, appropriate, and defensible. We are committed to doing the right thing for the environment in a cost-effective manner as reflected by the fact that our Wastewater Treatment Plant (WWTP) has been "net zero" over the last several years meaning it currently generates more electricity than it consumes.

On behalf of the residents served by the City of Gresham, please accept the following comments regarding the above-referenced TMDL that EPA released for public comment on May 18, 2020.

TMDL Comment 1: River Reaches Applied in the TMDL

The City requests that the EPA consider clarifying explicitly where and how river reaches apply to the modeling and the reserve allocations. The TMDL references the term "reaches" throughout the document, but does not clearly define the river regions within each reach. Section 2.4 refers to 10 reaches on the Columbia River and one reach on the Snake River in referring to applicable water quality temperature criteria – and cites Table 2-2. Section 6.5.1 (Dams) states that "the cumulative temperature impact in each reach caused by all upstream dam impoundments and estimates when and where this impact exceeds the 0.1°C cumulative dam load allocation." This implies that a reach is the river segment between dams on the Columbia River - in the context of temperature modeling of the dams, however, it is not clearly stated. EPA should clearly define the river reaches applied in the TMDL at some point early in the document.

An important element of the TMDL defined by river reaches is the reserve allocation. In Section 6.5.4 – Reserve Allocations, the TMDL states (on page 61) that "EPA inserted a heat load in the model at the midpoint of each TMDL reach"… and "the resulting reserve load for each reach is 4.4×10^9 Kcal/day." It is recommended that the TMDL document include a table to define each river reach in the TMDL so that NPDES point source dischargers can understand their locations along the river and the associated reserve allocations available to dischargers within their respective reach.

TMDL Comment 2: Tributaries Allocations in the TMDL

Section 3.2 Tributary Temperature in the TMDL does not clearly define the basis for allocating 0.1 degrees C heat load to the 23 major tributaries to the Columbia and Snake Rivers. The City requests that EPA clearly define the technical basis for this significant allocation of one-third of the total 0.3 degrees C. The basis of uncertainty in the TMDL heat load allocation to tributaries during July-October includes the following:

- All tributaries included in the TMDL contribute an average water temperature that is 1.6 degrees C colder than the mainstem Columbia River temperature in September and even colder water is contributed in October (Section 3.2 and Appendix E – Tributary Assessment Methods and Results);
- All tributary river temperatures in October are shown to be below 14.5 degrees C and only 3 of 21 tributaries to the Columbia River were above 13.0 degrees C (Table 3-9);
- 21 of 23 tributaries have temperature criteria cooler than the Columbia and Snake River criteria; and
- These TMDL temperature data demonstrate that tributaries are providing thermal benefits to the Columbia and Snake Rivers in October and are not contributing heat loads above the 20 degree C temperature criteria.

In addition, as TMDLs are implemented on these tributaries and tributary heat loads decrease, they will increasingly contribute to thermal reductions in the mainstem. Therefore, the City is requesting that EPA include a method in the TMDL to reassign portions of the tributaries source allocation to the reserve allocation category as TMDLs are implemented on tributaries and as temperature criteria are achieved on each tributary. Support for this request to reassign tributary source allocations as TMDLs are implemented are listed as follows:

- 9 of 22 listed tributaries have had TMDLs completed so they will be contributing thermal benefits to the mainstem Columbia and Snake Rivers (Table 6-20); and
- EPA modeling of the thermal improvements to the mainstem Columbia and Snake Rivers when tributary temperatures achieve temperature criteria through TMDL implementations show a cumulative maximum reduction of 0.2 degrees C is forecast for the Columbia River at RM 42, and this cumulative reduction is double the tributaries allocation of 0.1 degrees C.

TMDL Comment 3: Seasonal Application of the WLAs

The City requests that the EPA clarify that the Temperature TMDL Waste Load Allocations (WLAs) only apply to NPDES point source dischargers during the historical periods when the Columbia and/or Snake Rivers exceeded their applicable temperature criterion. Section 6.2 on page 39 starts with the statement "The critical time periods for this TMDL are July-October for all locations." While the focus on this four-month season is consistently applied throughout the document, the WLAs for NPDES permitted facilities listed in Table 6-12 and Table 6-13 do not explicitly indicate that the WLA applies only for this four-month period. The City requests that EPA provide a statement in the text or footnote for Table 6-12 and Table 6-13 confirming that WLAs apply only during the four-month period of July-October, and to a portion of that period when the Columbia and Snake Rivers are out of compliance with water quality standards within the applicable river reach.

TMDL Comment 4: Application of WLAs in October in Lower Columbia River

This City requests that the EPA not include October in the compliance period for point sources below RM 141.5 (below Bonneville Dam). Tables 3-2 through 3-6 in the TMDL document that the 20 degrees C criteria is only exceeded in the months of July through September for this region of the river.
Table 6.1 lists the two water quality temperature criteria that Oregon applies in the lower Columbia River in October. The year-round criterion is 20 degrees C for River Miles 0 to 141.5, and the temperature criterion in a two-mile river segment below Bonneville Dam (RM 141.5 to 143.5) is 13 degrees C for October 15-March 31. Table 3-7 shows no temperature exceedances of the 20 degrees C temperature criterion in October from the Priest Rapids Dam (RM 396) to the Pacific Ocean. It would not be correct for the TMDL WLAs to apply to NPDES permitted facilities during periods of the year when the Columbia and

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Snake Rivers are in compliance with the 20 degrees C water temperature criterion, which is during October through June.

TMDL Comment 5: Application of Thermal WLAs When Discharge Temperatures Are Below the Temperature Criteria

The City requests that the TMDL only apply WLAs to point source dischargers when the effluent from those dischargers exceeds the applicable temperature criterion at the discharge location. The WLAs for NPDES permitted point sources are presented in Tables 6-12 through 6-15 and it is explained in the first paragraph on page 51 that the "WLA was calculated using the facility design flow and the highest known or estimated temperature of the facility effluent." With the approach for WLA calculation used in the TMDL, discharges of effluent at temperatures below the applicable river temperature criteria appear to still be subject to a WLA and potential thermal load limits. Since discharges of effluent at temperatures below the applicable river temperature criteria contribute to river cooling and additional progress towards attainment of the temperature criteria in the river, thermal loads limits should not apply when the effluent temperature is below the applicable river temperature criteria.

This discharge temperature issue has been addressed in the Oregon Department of Environmental Quality's 2008 report "Temperature Water Quality Standard Implementation – A DEQ Internal Management Directive" through the definition of Excess Thermal Load (ETL) wasteload allocations and ETL calculations for use in NPDES permit compliance. The TMDL should either: 1) clarify that WLAs (based on a zero receiving water reference temperature) will only apply when effluent temperatures are above the applicable river temperature criteria; or 2) state that an ETL approach (see equation below) should be taken by the states in applying the thermal WLAs to NPDES permits and in defining monitoring and compliance requirements within NPDES permits.

$$WLA = (Tps - Twqc) \times Qps \times Cf$$

where,

WLA = thermal waste load allocation

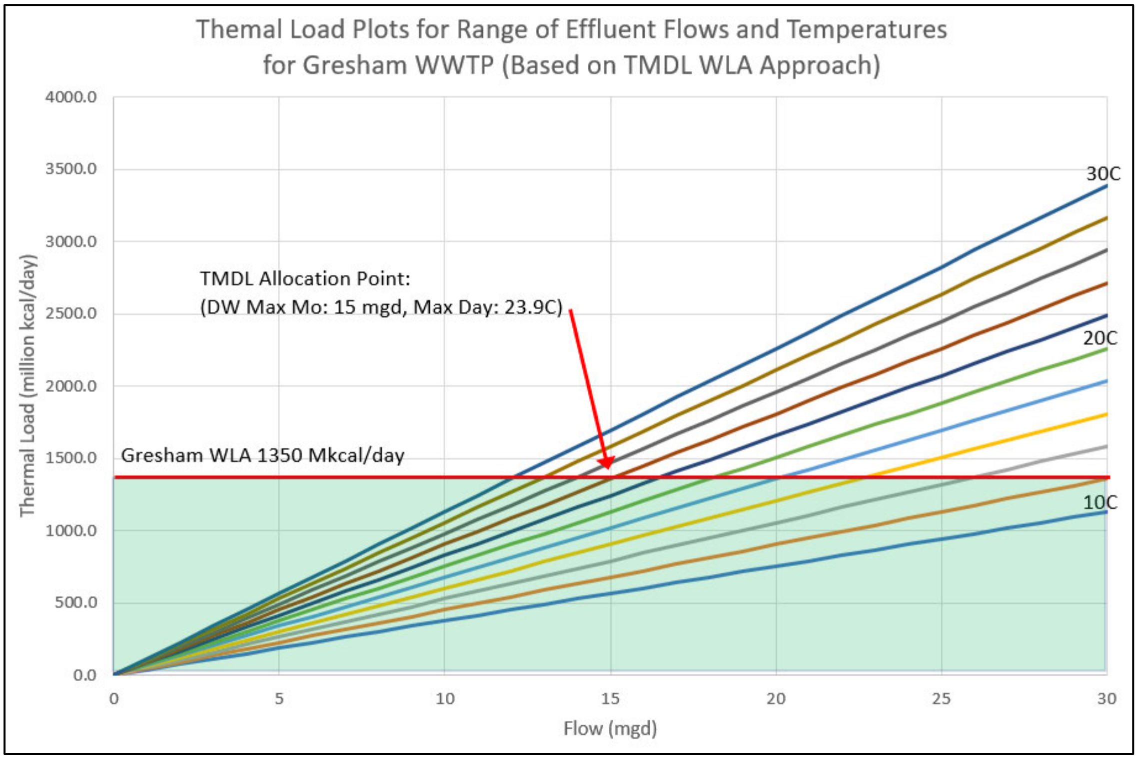
Tps = temperature of the point source discharge when Tps > Twqc

Twqc = applicable water quality criteria temperature

Qps = flow of the point source discharge

Cf = unit conversion factor

The following plot illustrates the relationship between effluent flow and temperatures and applying a thermal WLA without a threshold 20 degrees C temperature for the receiving water and effluent temperature. If the Gresham effluent flow reached 20 mgd in an October wet weather event, then effluent temperature would have to be 18 degrees C to stay within the TMDL defined WLA. In the wet season, with higher effluent flows the effluent temperatures would have to be even lower to meet the WLA. The City is requesting that the TMDL state that an ETL approach should be used in applying the thermal WLAs to NPDES permits or that the WLAs (based on a zero receiving water reference temperature) will only apply when effluent and river temperatures are above the applicable river temperature criteria.



Failure to address the regulation of thermal waste loads with this consideration will put several point sources in jeopardy of compliance in the near-term during periods when their effluent is actually contributing to the reduction of river temperatures.

TMDL Comment 6: Definition of Parameters for the WLAs Application

The City requests that the EPA clarify that implementation of the TMDL WLAs will be on a monthly average basis. Tables 6-12 and Table 6-13 define WLAs for NPDES point sources, but these tables do not state the seasonal period when applicable. The City requests that EPA specify that WLAs are to be applied by as monthly average values for compliance with the WLAs, and this was the basis for the modeling within the TMDL.

TMDL Comment 7: NPDES Facility with Existing Excess Thermal Load in Permit
The City of Gresham Wastewater Treatment Plant NPDES Permit No. 102523 already has an assigned heat load allocation that is an Excess Thermal Load (ETL) allocation, which means that it is based on the 20 degrees C temperature criterion and the equation included under TMDL Comment #5. Schedule A in the Gresham WWTP NPDES permit states in the footnote to Table A1 that: “Upon approval of a Total Maximum Daily Load for temperature for this sub-basin, this permit may be re-opened and new temperature and/or thermal load limits assigned.” It is the City’s understanding that this footnote in the NPDES permit indicates that the existing thermal load limits in the permit may be revised upon approval of this TMDL and such changes would not constitute backsliding according to the Clean Water Act. The City requests that EPA confirm that changes to the thermal load limits in the NPDES permit will avoid anti-backsliding restrictions.

TMDL Comment 8: Request to Update Flow Basis for WLA Assigned to Gresham WWTP

The TMDL lists a thermal WLA in Table 6-12 for the Gresham WWTP of 1,350 million kcals/day, based on a reference temperature of zero. This WLA has been calculated by applying a maximum effluent temperature of 23.9 degrees C and an effluent flow of 15.0 mgd. The City of Gresham completed a WWTP Master Plan Update (2017). This document supports the state and local coordinated planning basis for the applicable service area for future flows of 15.9 mgd (dry season) on a monthly average flow basis. The City requests that EPA update the allocation for the Gresham WWTP to the appropriate effluent flow of 15.9 mgd in Table 6-12 to fully respect the coordinated basis of planning.

TMDL Comment 9: TMDL Reserve Allocations

The City requests that the EPA clarify reserve allocation implementation approach as discussed below. In Section 6.5.4 of the TMDL, Reserve Allocations (pages 60-61) discusses consideration for the needs of future growth, new point sources, adjustments to the waste load allocations (WLAs), and other non-point sources. The TMDL is clear in delegating the requirement for managing reserve allocations to the states on page 61: "The reserve needs to be managed by Washington and Oregon during implementation, including maintaining a system to track the reserve, determining whether a point source can access the reserve, and establishing a process for granting a portion of the reserve." However, the TMDL document does not provide specific guidance on the approach or rules that would be acceptable to EPA to be consistent with the overall TMDL framework.

The City of Gresham is requesting that reserve allocations for future growth allocations should be prioritized according to official growth planning frameworks within the states. Wastewater utilities develop Wastewater Facilities Plans and coordinate them with the communities Comprehensive Plans to document and plan services for the growth within urban areas, including an assessment of necessary provisions for treatment and discharge locations. The reserve allocations for future growth should respect and compliment this established planning framework.

Comment 10: Water Quality Credit Trading

The City requests that the EPA clarify in the TMDL the use of water quality credit trading as an approach to attain the desired water quality objectives. Oregon has water quality trading guidance consistent with EPA guidance and trading may be a key method for ensuring compliance with the TMDL. The TMDL does not specify methods and rules for point source dischargers to comply with the WLAs, however trading programs will require the definition of geographic trading areas within which trading could occur between contributing sources. Trading areas are typically defined based upon areas of consistent temperature criteria and location in relation to the point of maximum impact within a river reach. The City of Gresham is requesting that EPA include statements of support for the use of water quality credit trading consistent with EPA and Oregon guidance to comply with the TMDL, establish geographical boundaries where the trading would be allowed, consistent with the TMDL, or establish the procedures for defining geographic trading areas.

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Thank you for providing the opportunity to review and comment on the TMDL for Temperature in the Columbia and Lower Snake Rivers. Because the TMDL will have substantial implications for resource management and potential future investment to attain the desired environmental outcomes, it is important that the TMDL allow as much flexibility as possible for the regulated community to seek cost effective and innovative compliance strategies. On behalf of the residents served by the City of Gresham, we look forward to EPA's confirmations associated with the items addressed in this letter.

Sincerely,

Alan Johnston

Alan Johnston, P.E.
Senior Engineer
503.618.3454
alan.johnston@greshamoregon.gov
Department of Environmental Services
City of Gresham

Ec: ... NPDES Permit Documents/Correspondence – DEQ/EPA

U.S. Environmental Protection Agency
Attn: Mary Lou Soscia
Region 10
1200 Sixth Avenue, Suite 155
Seattle, WA 98101-3188
Submitted to: ColumbiaRiverTMDL@epa.gov

July 21, 2020

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

Dear Ms. Soscia:

The City of Portland's Bureau of Environmental Services (BES) appreciates the opportunity to provide comments on the Total Maximum Daily Load (TMDL) for Temperature in the Columbia and Lower Snake Rivers. BES manages Portland's wastewater and stormwater infrastructure to protect public health and the environment. BES operates the City's Columbia Boulevard Wastewater Treatment Plant (CBWTP), the largest "major" NPDES permitted facility that discharges to the Columbia River (Permit Number OR0026905).

Effluent Flow Correction

The effluent flow value used to calculate the wasteload allocation for the CBWTP in the TMDL should be changed to 150.0 million gallons per day (MGD) to reflect the current capacity of the facility. The Oregon Department of Environmental Quality (DEQ) recently renewed the NPDES permit for the CBWTP (effective July 1, 2020). This permit includes more accurate facility characteristics, including maximum daily, weekly, and monthly flow rates to calculate waste discharge limits; these facility flow rates are 450 MGD, 250 MGD, and 150 MGD, respectively. The effluent flow of 130.0 MGD used in the TMDL to calculate the wasteload allocation for the CBWTP (Table 6-12; pg. 53) does not accurately reflect the capacity of the facility or the flows currently permitted by DEQ. EPA should update the effluent flow for the CBWTP to 150.0 MGD to reflect the current maximum monthly effluent flow and recalculate the wasteload allocation for the facility.

Wasteload Allocations as Excess Thermal Load

The wasteload allocations in the TMDL should be expressed as excess thermal loads: the heat load discharged by a facility when the effluent temperature is above the applicable water quality criterion. BES supports EPA's approach of expressing wasteload allocations as a heat load (kcal/day) to provide facilities with appropriate flexibility to manage operations to reduce the impact of their discharge on the receiving waterbody, however, these heat loads should be expressed as an excess thermal load. Currently, the wasteload allocations in the TMDL are expressed without reference to the applicable water quality criterion. Wasteload allocations represent the thermal load from a point source that can be discharged without resulting in a cumulative exceedance of the human use allowance—the allowable anthropogenic heat load that results in no more than a cumulative 0.3°C increase above the applicable criterion. Without incorporating the water quality criterion into the calculation, the wasteload allocations do not represent the loading capacity of the receiving water allocated to point sources. Additionally, as currently expressed, the wasteload allocations do not account for the fact that when a facility's effluent temperature is at or below the applicable water quality criterion, the effluent does not contribute to an exceedance of the criterion. Wasteload allocations in the TMDL should be expressed as excess thermal loads using the following equation:

$$ETL = (T_{eff} - T_{WQC}) \times Q_{eff} \times C_f$$

where:

ETL = excess thermal load (kcal/day), when $T_{eff} > T_{WQC}$
T_{eff} = effluent temperature (°C)
T_{WQC} = applicable water quality criterion (°C)
Q_{eff} = effluent flow (cubic feet per second)
C_f = conversion factor: 2,446,665 (kcal · second/°C · ft³ · day)

Using the excess thermal load equation described above is consistent with the approach utilized by Oregon DEQ in other temperature TMDLs. Expressing the wasteload allocations as excess thermal loads will also allow the state agencies to account for situations when effluent temperatures are at or below the applicable water quality criterion.

Specify Applicable Time Period

The TMDL should clearly specify the time period for which the wasteload allocations apply. As currently written, the TMDL highlights July through October as the critical time period when temperature criteria exceedances are observed (pg. 39). It is not clear, however, whether the wasteload allocations apply outside of the critical period.

Thank you again for the opportunity to provide input. If you have any questions regarding these comments, please contact Amanda Haney at Amanda.Haney@portlandoregon.gov or 503-823-7230 for more information.

Sincerely,

Michael Jordan
Director, Bureau of Environmental Services

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July 21, 2020

Mary Lou Soscia, Columbia River Coordinator
EPA Oregon Operations Office
805 SW Broadway, Suite 500
Portland, OR 97205

Subject: **City of Washougal Comments on U.S. EPA's *TMDL for Temperature in the Columbia and Lower Snake Rivers* (Issued May 18, 2020 for Public Comments)**

Dear Ms. Soscia:

The City of Washougal provides wastewater collection and treatment at our wastewater treatment facility for approximately 17,000 residents in the eastern portion of Clark County, Washington. The City of Washougal is committed to supporting state and federal regulatory processes that improve the quality of life for our residents as well as the water quality of the Columbia River. We have demonstrated our commitment to doing the right thing for the environment in a cost effective manner as reflected with recent upgrades to the Wastewater Treatment Plant (WWTP). Our sewer system growth rate has recently been calculated to be approximately 2 to 3% per year.

On behalf of the residents served by the City of Washougal, please accept the following comments regarding the above-referenced TMDL that EPA released for public comment on May 18, 2020.

TMDL Comment 1: Tributaries Allocations in the TMDL

Section 3.2 Tributary Temperature in the TMDL does not clearly define the basis for allocating 0.1 degrees C heat load to the 23 major tributaries to the Columbia and Snake Rivers. The City of Washougal (City) requests that EPA clearly define the technical basis for this significant allocation of one-third of the total 0.3 degrees C allowable heat load allocation in the Columbia River.

The reasons for stating that the TMDL has significant uncertainty in assigning 0.1 degrees C (one-third) of the TMDL heat load allocation to tributaries during July-October is as follows:

- All tributaries included in the TMDL contribute an average water temperature that is 1.6 degrees C colder than the mainstem Columbia River temperature in September and even colder water is contributed in October (see Section 3.2 and Appendix E – Tributary Assessment Methods and Results);
- All tributary river temperatures in October are shown to be below 14.5 degrees C and only 3 of 21 tributaries to the Columbia River were above 13.0 degrees C (refer to TMDL Table 3-9);
- 21 of 23 tributaries have temperature criteria cooler than the Columbia and Snake River criteria (refer to TMDL Table 6-20); and

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- These TMDL temperature data demonstrate that tributaries are providing thermal benefits to the Columbia and Snake Rivers in October and are not contributing heat loads above the 20 degree C temperature criteria.

In addition, as TMDLs are implemented on these tributaries and tributary heat loads decrease, they will increasingly contribute to thermal reductions in the mainstem. Therefore, the City is requesting that EPA include a method in the TMDL to reassign portions of the tributaries source allocation to the reserve allocation category as TMDLs are implemented on tributaries and as temperature criteria are achieved on each tributary. Support for this request to reassign tributary source allocations as TMDLs are implemented are listed as follows:

- 9 of 22 listed tributaries have had TMDLs completed so they will be contributing thermal benefits to the mainstem Columbia and Snake Rivers (see TMDL Table 6-20); and
- EPA modeling of the thermal improvements to the mainstem Columbia and Snake Rivers when tributary temperatures achieve temperature criteria through TMDL implementations show a cumulative maximum reduction of 0.2 degrees C is forecast for the Columbia River at RM 42, and this cumulative reduction is double the tributaries allocation of 0.1 degrees C (see page 63 in TMDL).

TMDL Comment 2: River Reaches as Applied in the TMDL

The City of Washougal requests that the EPA consider clarifying explicitly where and how river reaches apply to the modeling and the reserve allocations. The TMDL references the term "reaches" throughout the document, but does not clearly define the river regions within each reach. Section 2.4 refers to 10 reaches on the Columbia River and one reach on the Snake River in referring to applicable water quality temperature criteria – and cites Table 2-2. Section 6.5.1 (Dams) states that "this analysis estimates the cumulative temperature impact in each reach caused by all upstream dam impoundments and estimates when and where this impact exceeds the 0.1°C cumulative dam load allocation." This statement implies that a reach is the river segment between dams on the Columbia River - in the context of temperature modeling of the dams, however, it is not clearly stated. EPA should clearly define the river reaches applied in the TMDL at some point early in the document.

An important element of the TMDL defined by river reaches is the reserve allocation. In Section 6.5.4 – Reserve Allocations, the TMDL states (on page 61) that "EPA inserted a heat load in the model at the midpoint of each TMDL reach"… and "the resulting reserve load for each reach is 4.4×10^9 Kcal/day." The City of Washougal requests that the TMDL document include a table to define each river reach in the TMDL so that NPDES point source dischargers can understand their locations along the river and the associated reserve allocations available to dischargers within their respective reach.

TMDL Comment 3: Seasonal Application of the WLAs

The City of Washougal requests that the EPA clarify that the Temperature TMDL Waste Load Allocations (WLAs) only apply to NPDES point source dischargers during the historical periods when the Columbia and/or Snake Rivers exceeded their applicable temperature criterion. Section 6.2 on page 39 starts with the statement "The critical time periods for this TMDL are July-October for all locations." While the focus on this four-month season is consistently applied throughout the document, the WLAs for NPDES permitted facilities listed in Table 6-

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12 and Table 6-13 do not explicitly indicate that the WLA applies only for this four-month period. The City requests that EPA provide a statement in the text or footnote for Table 6-12 and Table 6-13 confirming that WLAs apply only during the four-month period of July-October, and to a portion of that period when the Columbia and Snake Rivers are out of compliance with water quality standards within the applicable river reach.

TMDL Comment 4: Application of Thermal WLAs When Discharge Temperatures Are Below the Temperature Criteria

The City of Washougal requests that the TMDL only apply WLAs to point source dischargers when the effluent from those dischargers exceeds the applicable temperature criterion at the discharge location. The WLAs for NPDES permitted point sources are presented in Tables 6-12 through 6-15 and it is explained in the first paragraph on page 51 that the "WLA was calculated using the facility design flow and the highest known or estimated temperature of the facility effluent." With the approach for WLA calculation used in the TMDL, discharges of effluent at temperatures below the applicable river temperature criteria appear to still be subject to a WLA and potential thermal load limits. Since discharges of effluent at temperatures below the applicable river temperature criteria contribute to river cooling and additional progress towards attainment of the temperature criteria in the river, thermal loads limits should not apply when the effluent temperature is below the applicable river temperature criteria.

This discharge temperature issue has been addressed in the Oregon Department of Environmental Quality's 2008 report "Temperature Water Quality Standard Implementation – A DEQ Internal Management Directive" through the definition of Excess Thermal Load (ETL) wasteload allocations and ETL calculations for use in NPDES permit compliance. The TMDL should either: 1) clarify that WLAs (based on a zero receiving water reference temperature) will only apply when effluent temperatures are above the applicable river temperature criteria; or 2) state that an ETL approach (see equation below) should be taken by the states in applying the thermal WLAs to NPDES permits and in defining monitoring and compliance requirements within NPDES permits.

$$WLA = (Tps - Twqc) \times Qps \times Cf$$

where,
WLA = thermal waste load allocation
Tps = temperature of the point source discharge when Tps > Twqc
Twqc = applicable water quality criteria temperature
Qps = flow of the point source discharge
Cf = unit conversion factor

The following plot illustrates the relationship between effluent flow and temperatures and applying a thermal WLA without a threshold 20 degrees C temperature for the receiving water and effluent temperature. If the City of Washougal effluent flow reached 3.0 mgd in an October wet weather event, then effluent temperature would have to be 18 degrees C to stay within the TMDL defined WLA. In the wet season, with periodic higher effluent flows the effluent temperatures would have to be even lower to meet the WLA. The City is requesting that the TMDL state that an ETL approach should be used in applying the thermal WLAs to NPDES permits or that the WLAs (based on a zero receiving water reference temperature) will only apply when effluent and river temperatures are above the applicable river temperature criteria.

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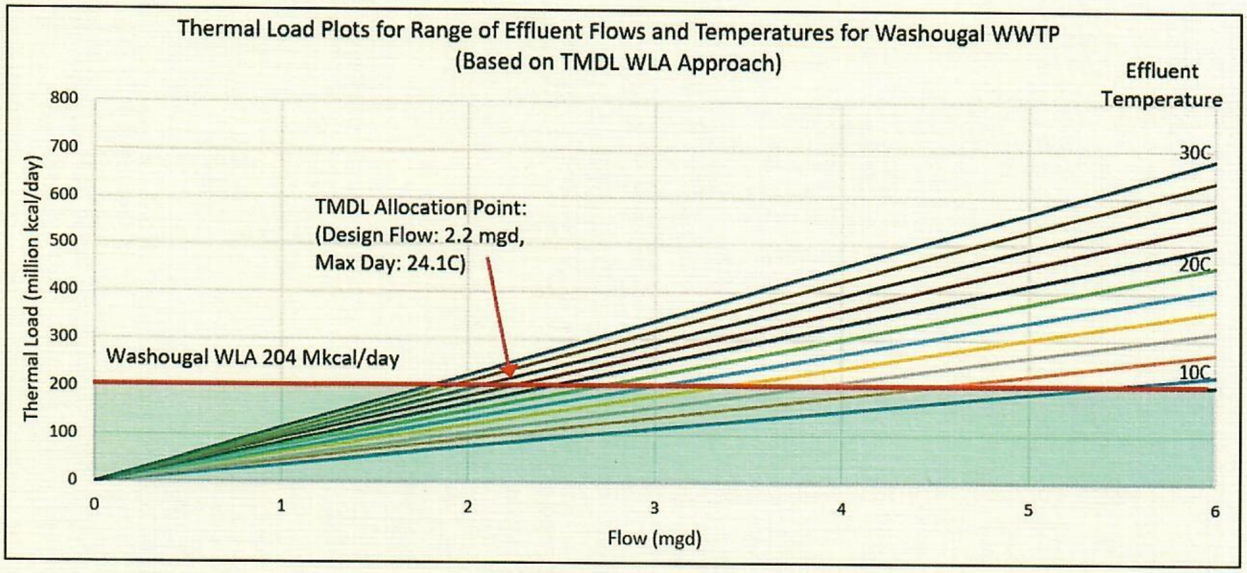

Failure to address the regulation of thermal waste loads with this consideration will put several point sources in jeopardy of compliance in the near-term during periods when their effluent is actually contributing to the reduction of river temperatures.

TMDL Comment 5: Application of WLAs in October in the Lower Columbia River

This City of Washougal requests that the EPA not include October in the compliance period for point sources below RM 141.5. Tables 3-2 through 3-6 in the TMDL document that the 20 degrees C criteria is only exceeded in the months of July through September for this region of the river.

Table 6.1 lists the two water quality temperature criteria that Oregon applies in the lower Columbia River in October. The year-round criterion is 20 degrees C for River Miles 0 to 141.5, and the temperature criterion in a two-mile river segment below Bonneville Dam (RM 141.5 to 143.5) is 13 degrees C for October 15-March 31. Table 3-7 shows no temperature exceedances of the 20 degrees C temperature criterion in October from the Priest Rapids Dam (RM 396) to the Pacific Ocean. It would not be correct for the TMDL WLAs to apply to NPDES permitted facilities during periods of the year when the Columbia and Snake Rivers are in compliance with the 20 degrees C water temperature criterion, which is during October through June.

TMDL Comment 6: Definition of Parameters for the WLAs Application

The City of Washougal requests that the EPA clarify that implementation of the TMDL WLAs will be on a monthly average basis. Tables 6-12 and Table 6-13 define WLAs for NPDES point sources, but these tables do not state the seasonal period when applicable. The City requests that EPA specify that WLAs are to be applied by as monthly average values for compliance with the WLAs, as this was the basis for the modeling within the TMDL.

TMDL Comment 7: Request to Update Flow Basis for WLA Assigned to Washougal WWTP

The TMDL lists a thermal WLA in Table 6-13 for the Washougal WWTP of 204 million kcals/day, based on a reference temperature of zero. This WLA has been calculated by applying a maximum effluent temperature of 24.1 degrees C and an effluent flow of 2.24 mgd. The City of Washougal WWTP sent a Revised Facility Plan based on the hydraulic

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expansion to the Department of Ecology in May 2014. This document supports the state and local coordinated planning basis for the applicable service area for future flows of 4.36mgd (dry season) on a monthly average flow basis. The City requests that EPA update the allocation for the Washougal WWTP to the appropriate effluent flow of 4.36mgd in Table 6-13 to fully respect the coordinated basis of planning.

TMDL Comment 8: TMDL Reserve Allocations

The City of Washougal requests that the EPA clarify reserve allocation implementation approach as discussed below. In Section 6.5.4 of the TMDL, Reserve Allocations (pages 60-61) discusses consideration for the needs of future growth, new point sources, adjustments to the waste load allocations (WLAs), and other non-point sources. The TMDL is clear in delegating the requirement for managing reserve allocations to the states on page 61: "The reserve needs to be managed by Washington and Oregon during implementation, including maintaining a system to track the reserve, determining whether a point source can access the reserve, and establishing a process for granting a portion of the reserve." However, the TMDL document does not provide specific guidance on the approach or rules that would be acceptable to EPA to be consistent with the overall TMDL framework.

The City of Washougal is requesting that reserve allocations for future growth allocations should be prioritized according to official growth planning frameworks within the states. Wastewater utilities develop General Sewer Plans and Wastewater Facilities Plans and coordinate them with the communities Comprehensive Plans to document and plan services for the growth within urban areas, including an assessment of necessary provisions for treatment and discharge locations. The reserve allocations for future growth should respect and compliment this established planning framework.

Comment 9: Water Quality Credit Trading

The City of Washougal requests that the EPA provide a statement of support in the TMDL for the use of water quality credit trading consistent with EPA guidance as an approach to attain the desired water quality objectives. Trading areas are typically defined based upon areas of consistent temperature criteria and location in relation to the point of maximum impact within a river reach. The City of Washougal is requesting that EPA include statements of support for the use of water quality credit trading consistent with EPA and Washington guidance to comply with the TMDL, establish geographical boundaries where the trading would be allowed, consistent with the TMDL, or establish the procedures for defining geographic trading areas.

Conclusion

Thank you for providing the opportunity to review and comment on the TMDL for Temperature in the Columbia and Lower Snake Rivers. Because the TMDL will have substantial implications for resource management and potential future investment to attain the desired environmental outcomes, it is important that the TMDL allow as much flexibility as possible for the regulated community to seek cost effective and innovative compliance strategies. On behalf of the residents served by the City of Washougal, we look forward to EPA's confirmations associated with the items addressed in this letter.

Sincerely,

Ryan Baker
Water/Wastewater Superintendent
City of Washougal

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Clearwater Paper Corporation
601 West Riverside, Suite 1100
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July 21, 2020

VIA EMAIL - COLUMBIARIVERTMDL@EPA.GOV

Daniel D. Opalski, Director
Office of Water and Watersheds, Region 10
U.S. Environmental Protection Agency
1200 Sixth Ave
Mail Code: 19-C09
Seattle, WA 98101

Re: TMDL for Temperature in the Columbia and Lower Snake Rivers

Dear Mr. Opalski:

As you may know, Clearwater Paper Corporation (Clearwater) operates a pulp and paper mill in Lewiston, Idaho which discharges wastewater into the lower Snake River immediately upstream of the boundary of the subject TMDL. Clearwater's discharge is currently subject to NPDES/IPDES Permit No. ID0001163 which includes temperature limits. Clearwater is concerned that the subject TMDL may result in the imposition of more stringent temperature limits in its NPDES/IPDES Permit since the subject TMDL is ambiguous as to how or if it might impact Clearwater's NPDES Permit. Thus, Clearwater may be directly affected by the subject TMDL and offers the following comments.

Clearwater did not receive a wasteload allocation (WLA) in the subject TMDL. It is not clear whether EPA's failure to provide a WLA to Clearwater's facility in the subject TMDL was an oversight. For example, on pp. 2-3 of the document it indicates that allocations for all point source dischargers to the assessment units in Table 1-1 were provided. Clearwater's facility discharges to the lower Snake River immediately upstream of RM 139 but downstream of the Anatone Station which is within the Assessment Units in Table 1-1. Moreover, Clearwater's temperature loading was utilized in Appendix D and relied upon in the TMDL to ensure boundary conditions "accounted for" Clearwater's discharge. See p. 54. However, it does not appear Clearwater's discharge was accounted for in the subject TMDL nor did the facility receive a WLA in Section 6.5.2 and Table 6-12 of the subject TMDL. This is of concern to Clearwater because a number of other pulp and paper mills are listed in Table 6-12, and Clearwater should be treated the same way as other competitors in the region with respect to the subject TMDL.

We assume EPA intentionally did not provide Clearwater a WLA because of how the subject TMDL drew its upstream boundary. Nevertheless, Clearwater seeks clarity on how or if the subject TMDL impacts its NPDES Permit. For example, the subject TMDL should make clear that the assumptions and requirements of the subject TMDL do not apply to permitting decisions for upstream sources including Clearwater's NPDES Permit. Alternatively, the TMDL should make clear that the WLAs in Appendix D (including Clearwater's temperature loading) and the current temperature limits in Clearwater's permit (set by EPA) are consistent with the assumptions and requirements of the subject TMDL. Such determinations by EPA in the subject TMDL will help inform IDEQ during the permit renewal process for Clearwater's facility.

Finally, when EPA last issued Clearwater's NPDES Permit in 2005 (and again in a draft NPDES Permit in 2019) a thorough temperature assessment was undertaken by EPA (and certified by IDEQ in a water quality certification) that Clearwater's permitted temperature discharge complied with both Idaho's and Washington's temperature water quality standards. Part of the analysis applied the natural background temperature provisions in both Idaho and Washington's standards. The subject TMDL determined that it would not utilize the natural background temperature provision in Washington's standards because there was no basin-wide water quality model that estimated natural conditions. Clearwater requests that the subject TMDL acknowledge that use of natural background temperature conditions in individual point source permitting decisions upstream of the boundary of the TMDL are not precluded by the TMDL.

Thank you for the opportunity to comment on the subject TMDL.

Sincerely,

Malisa Maynard

Malisa Maynard
Environmental & Sustainability, Senior Manager

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August 17, 2020

Mr. Andrew Wheeler
Administrator
Environmental Protection Agency
ColumbiaRiverTMDL@epa.gov

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 Clearwater Power Company (Clearwater) regarding the *Total Maximum Daily Load for Temperatures for the Columbia and Lower Snake Rivers* ("CLSRT TMDL").

Clearwater is located in Lewiston, Idaho and is a member-owned, not-for-profit rural electric cooperative that serves just under 11,000 customers within eleven (11) counties located in North-Central Idaho, South-Eastern Washington and the North-Eastern corner of Oregon. We also serve on both the Nez Perce and Coeur d'Alene Tribal Reservations. Clearwater serves some of the most remote and sparsely populated areas within Northern Idaho and averages only 3.7 accounts per mile of power line. Clearwater's rural residential load makes up nearly seventy percent (70%) of our energy sales and over ninety percent (90%) of our accounts.

Clearwater purchases 100% of its wholesale power supply from the Bonneville Power Administration (BPA) as a Full Requirements customer. In 2019, the wholesale cost of power accounted for 43% of our members' monthly power bill. As the single largest expense of providing safe, reliable and affordable power to our members/owners, we are very concerned about the CLSRT TMDL.

We would like to begin by expressing our support for the comments provided by the Pacific Northwest Generating Cooperative (PNGC Power) and Northwest RiverPartners. As a member of both organizations, we firmly agree with their position on the CLSRT TMDL and the need for its revision. If these revisions are not made, the TMDL, as written, needlessly threatens the vitality of the Federal Columbia River Power System ("FCRPS") and the multiple purposes for the system as established by the United States Congress.

KEY POINTS OF EMPHASIS

- The states of Washington and Oregon are signaling that they intend to base energy and environmental policy on the CLSRT TMDL. This outcome is problematic because, as EPA notes, "The current water quality conditions present a significant challenge to achieving downstream water quality standards in Washington and Oregon."[1] This

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

challenge arises because water temperatures entering Washington state from Canada and from Idaho often significantly exceed the respective states' water quality standards during the peak summer months. This confounding situation raises the possibility that the FCRPS dams will be held to unattainable standards.

- Due to the possibility described above, the stakes are very high for the CLSRT to be extremely accurate.
- The CLSRT TMDL relies upon the one-dimensional RBM10 model, which lacks the detail and sophistication necessary to provide precise results for a river system with the complexity of the Columbia-Snake river system.
- Tellingly, the TMDL did not attempt to simulate the entire Columbia River Basin with its RBM10 model, but instead truncated the Columbia and Snake rivers near the Washington state borders. This artificial limitation doesn't allow the model to accurately account 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).
- The TMDL, as written, includes significant arbitrary assumptions, such as including large storage dams in its "free flowing" state. These larger dams can release artificially cool water during the summer. This inconsistent treatment (i.e., including some dams but excluding others) places an unfair temperature standard on the downstream dams.
- A 2002 study under the US Army Corps of Engineers ("USACE") compared pre-lower Snake River dam measurements from 1955-1958 to measurements taken after the lower Snake River dams were constructed. The study found no evidence that river temperatures had increased, and instead remained unchanged or slightly lower after completion of the four lower main stem dams.[2] This real-life finding runs contrary to what we are seeing in the TMDL's modeling output.
- 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. This finding is much more consistent with the 2002 USACE finding described above.

RECOMMENDATION

Clearwater supports the Northwest RiverPartners' recommendation that EPA revise its *Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers* and provide a revised 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.

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

Per the *Columbia River System Operations 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 clean energy goals, and billions of dollars of extra costs forced on Northwest families.

Thank you again for the opportunity to comment.

Sincerely,

K. David Hagen
General Manager and CEO

cc: Kurt Miller, NW RiverPartners
cc: Roger Gray, PNGC Power

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July 24, 2020

Mr. Chris Hladick
Regional Administrator
U.S. Environmental Protection Agency, Region 10
1200 Sixth Avenue, Suite 155
Seattle, WA 98101-3188
Sent via email: ColumbiaRiverTMDL@epa.gov

Re: Comments on TMDL for Temperature in the Columbia and Lower Snake Rivers

Dear Regional Administrator Hladick:

The Columbia River Inter-Tribal Fish Commission (CRITFC) appreciates the opportunity to provide comments on the Total Maximum Daily Load for Temperature (TMDL) in the Columbia and Lower Snake rivers. CRITFC's mission is to protect our member tribes' treaty fisheries and the quality of waters in the Columbia Basin. CRITFC supports EPA's role in completing this TMDL so that the region can begin to address mainstem temperature impairments. However, CRITFC is disheartened by the TMDL's conclusion that it is unlikely that the numeric criteria portion of Washington and Oregon's water quality standards will ever be met[1].

In 1977, four sovereign treaty tribes of the Columbia River Basin: the Nez Perce Tribe, the Confederated Tribes and Bands of the Yakama Nation, the Confederated Tribes of the Umatilla Indian Reservation (CTUIR), and the Confederated Tribes and the Bands of the Warm Springs Reservation, formed CRITFC to provide coordination, management, and technical assistance to ensure that their treaty fishing rights are protected through the continuation and restoration of tribal fisheries into perpetuity. The ability to exercise those treaty rights is completely dependent upon clean water and healthy ecosystems. Treaty rights, environmental health, and tribal culture are all interconnected.

EPA has a trust responsibility and fiduciary duty to protect tribal treaty resources, which includes fish as well as the environment and habitat of sufficient quality necessary to support these treaty resources.[2] CRITFC and its member tribes rely on cooperation with EPA to protect water quality and to advance treaty fishery protection. For comments on this TMDL, CRITFC hereby incorporates by reference the comments filed by its member tribes, including the Yakama Nation and the CTUIR.

We offer the following observations and suggestions to improve the TMDL document before it is transmitted to the states of Oregon and Washington and incorporated into their current water

[1] TMDL at p. 2 ("Even if all the allocations in this TMDL are implemented and the temperature reductions envisioned are fully realized, it is unlikely that the numeric criteria portion of the WQS will be met at all times and all places")
[2] *See U.S. v. Adair*, 723 F.2d 1394 (9th Cir. 1983) (treaty rights to fish necessarily require enough water to maintain plants and fisheries).

quality management plans. The first section of these comments discusses the TMDL recommendation that will be most useful in guiding State implementation plans with some constructive suggestions for improvement. The second section addresses some substantive shortcomings that may require additional modeling and analysis.

1. TMDL Strengths

The TMDL provides an important contribution to understanding current conditions in the Columbia and Lower Snake rivers. The TMDL was developed by using a calibrated model as a baseline to assess various temperature impacts from multiple source categories. The result is a detailed analysis of the sources of thermal impairment on the Columbia and Lower Snake rivers. This analysis points to the Federal Columbia River Power System (FCRPS) as a primary source of thermal impairments. The TMDL makes clear that some significant changes to dam operations and alternative management of reservoir releases will be necessary to achieve temperature reductions and to limit the magnitude of impairments. The analyses show that the temperature regime of the mainstem is in dire condition. Areas where temperature criteria are oftentimes not being met at the Canadian border, and thus beyond the scope of state implementation. The TMDL analyses provide further support for drastic actions such as removal of the Lower Snake River dams in order to preserve uses in the system.

The TMDL identifies temperature targets to protect twelve mainstem Cold Water Refuges[3] (CWRs). EPA's 2019 draft Cold Water Refuges Plan[4] makes clear that the availability and sufficiency of CWRs on the mainstem is needed to attain designated uses in the Columbia Basin. Protecting CWRs is a priority for the Columbia River tribes in their efforts to protect treaty fisheries. State TMDL implementation plans for CWR protection should be developed to not only meet temperature targets but must also address the fact that CWRs need to be of sufficient volume to accommodate fish use. CRITFC has also expressed the concern that the distribution of CWRs recommended for protection by EPA is insufficient[5]. State TMDL implementation plans should specify protections and enhancements for the twelve CWRs in the TMDL but should be extended to specifically include the Umatilla River confluence and address the lack of CWRs between the Deschutes River and the mouth of the Snake River.

Appendix B is a welcome compilation of data on temperature conditions throughout the river system for 2011-2016 and provides a useful comparison to existing standards. The Appendix B summary also follows well-described quality assurance guidelines. This provides an excellent record of measured temperature conditions and impairment in the Columbia Basin. The figures and tables clearly present water quality criteria exceedance frequency and magnitude for July through October for the years 2011-2016. The tables and analysis could be improved by including data for June. It is apparent from the full-year graphics, that temperature criteria exceedances begin as early as June at multiple locations. Including June data in these tables and in the evaluation of critical time periods would allow reviewers to better determine the earliest onset of temperature exceedances such as those observed in high temperature/low flow years like 2015.

[3] TMDL at page 64, Table 6-21.
[4] EPA. 2019 Columbia River Cold Water Refuges Plan.
[5] Letter dated December 6, 2019 from CRITFC Comments on EPA's Columbia River Cold Water Refuges Plan to John Palmer EPA, Region 10.

2. Recommended Changes

The TMDL should not rely on Washington's Human Use Allowance for temperature targets.

EPA implements a 0.3º C so-called human use allowance to set temperature targets in the TMDL based on Washington State's water quality standards.[6] The provision is inapplicable to this TMDL and should not be used as the basis for allocating targets without proper justification. Part of this clarification would entail EPA to determine whether the waters of the Columbia and Snake rivers are exceeding temperature criterion due to "natural conditions".[7]

The TMDL needs Federal Agency commitment to reduce water temperatures at dams.

EPA's use of this "human use allowance" is not legally appropriate but accepting that EPA has used it to set temperature targets in this TMDL, CRITFC has concerns about the subsequent allocation of the allowance. EPA has determined that heat is contributed by impounding water behind dams as a nonpoint source of pollution and then allocates 0.1ºC of the total 0.3 ºC human use allowance to impacts from dam impoundments. The TMDL leaves how this allowance will be met to implementation programs designed by the states[8] that may not have the authority to compel changes to federal dam operations. The TMDL suggests that the Columbia River System Operations (CRSO) Environmental Impact Statement (EIS) will identify water temperature improvement projects for the Columbia River and may develop control measures that could lower water temperatures.[9] However, CRITFC's review of the draft EIS does not find a pathway to substantive temperature reductions in the preferred alternative.

EPA itself lacks authority to implement nonpoint source controls or assure reductions in nonpoint source pollution but provides a commitment to coordinate federal agency efforts through the Federal Caucus.[10] Previously, the promise of Federal Caucus coordination and intervention[11] has not resulted in any actions that reduce temperature exceedances in the ten years since a 2008 Federal Caucus Memorandum of Understanding[12] naming water temperature reductions as a priority focus area was signed. More substantive actions are needed. The TMDL purports that "federal dam operation plans provide adequate reasonable assurance for the temperature waste load and load allocations in this TMDL."[13] Without a more significant commitment to redefined federal dam operation plans these assurances appear to be neither reasonable nor adequate. The Federal Caucus needs to play a stronger role in coordinating federal responsibility to support the state implementation plans.

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[6] See, WAC § 173-201A-320(2).
[7] WAC § 173-201A-200(1)(c)(i).
[8] TMDL at page 74, ("Implementation of this TMDL is largely the responsibility of State and Tribal governments; however EPA does issue federal NPDES permits within the Columbia and Snake River watersheds and therefore has a role in incorporating point source wasteload allocations from this TMDL into those federal permits")
[9] TMDL at page 72 ("The Columbia River System Operations (CRSO) agencies (US Army Corps of Engineers, Bureau of Reclamation, and Bonneville Power Administration) are currently finalizing the 2020 Final CRSO EIS and associated NOAA Fisheries Biological Opinion for the federal hydropower system. The Final EIS and Biological Opinion may identify water temperature improvement projects for the Columbia River… The federal power agencies continue to review control measures outlined in these plans and implement operational adjustments, as appropriate, with the potential to lower water temperatures.")
[10] TMDL at page 74.
[11] TMDL at page 72 ("The Columbia River Basin Federal Caucus provides an ongoing forum for federal agencies in the Columbia River basin to work together on the planning, science, and implementation of actions to address water temperature improvements").
[12] TMDL at page 73; 2008 Federal Caucus Memorandum of Understanding
[13] TMDL at page 73.

EPA needs to do more to protect all salmonid life stages.

EPA itself also has a responsibility to ensure that cold water designated, and existing uses are protected consistently and equally throughout the Columbia Basin. EPA is required when approving state criteria to consider protection of downstream uses and provide for the attainment of standards in downstream waters.[14] The number of days that Washington's criteria were exceeded at Anatone, WA ranged from 55 – 74 days/year for the 2011-2016 period.[15]

The Idaho cold water criteria in the Snake River are a daily maximum (DM) of 22ºC and an average daily maximum (ADM) of 19ºC versus a downstream Washington DM of 19-20ºC and ADMs of 16-17.5ºC. EPA's Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards[16] recommends salmon/trout migration criteria of 20ºC seven-day average of the daily maximum (7DADM) and migration/juvenile rearing of 18ºC 7DADM. It seems irrational for EPA to allow such wide discrepancies in rivers that cross or share state boundaries, share the same salmon populations and life histories, and have similar use designations for salmon migration, spawning, and rearing.

Relatedly, in November 2019, EPA approved Idaho's Revised Site-Specific Criteria for spawning temperature for the Snake River below Hells Canyon Dam. The approval allows an increase in allowable spawning temperatures of 1.5°C from the former criteria of 13°C to now 14.5°C. This action was another giant step backward in protecting ESA-listed fish and will not help mitigate the effects of climate change. EPA should advocate for basin-wide standards as described in the 2003 Guidance and reverse its approvals of site- specific criteria that do not meet the 2003 Region 10 Guidance.

The TMDL must include water temperatures in fishways and forebays.

By focusing on tailrace data collection sites, the TMDL does not provide clarifying information on temperatures in fishways where cold water species concentrate during the passage season. While modifications at two of the Lower Snake projects have improved water temperature differentials in the ladder (the measurement of water temperature at the entrance of the adult ladder compared to the temperature at the exit), the water temperatures do not necessarily reflect tailrace conditions or meet state water quality criteria. These are temporary solutions that, at best, reduce adults from holding in the ladder but do not protect adults from the impacts of high temperatures.

Criteria set in the FCRPS biological opinion is not a solution to this issue either, because the document only requires that a 1°C differential between the entrance and the exit of the ladders. Water conditions in fishways should also be meeting state water quality criteria and avoid temperature-driven migration blockages. In 2015 high water temperatures slowed and impacted adult sockeye passage such that most of the Snake River run did not make it to Lower Granite Dam, let alone get through or past the project. Snake River sockeye adult survival (BON-LGR) was 0.04, which was much lower than previous years (2009 to 2014), ranging from 0.44 and 0.77. Due to this low survival, emergency transport operations were required to aid sockeye passage. While 2015 was unique, with climate change these conditions will occur in higher

[14] 40 CFR §131.10(b)
[15] TMDL Appendix B, Table 34
[16] EPA Region 10 Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards, 2003, 49 pp.

frequencies. Because of this, the TMDL should include fishways in its list of temperature targets since they are critical migration pathways for existing fisheries.

The TMDL should limit heat loads to meet acute impacts, not just average or chronic impacts.

Management of loads to not produce acute impacts is as important as avoidance of chronic impacts. Greater frequency of acute temperatures as found in 2015[17] (Isaak et al. 2018) emphasizes that heat loading in the TMDL must explicitly account for maximum temperatures. EPA's goal was to capture central tendencies in the simulations and an evaluation of current conditions is based on years 2011-2016 similar to the CRSO Environmental Impact Statement analysis. [18] While 2011-2016 includes a range of flow and temperature conditions, 2015 more closely represents acute warm temperature/low flow conditions. For example, the total number of days in July that exceeded the 17.5°C criteria at Grand Coulee in 2015 was 18 days. But the number of July days that exceeded the criteria for the averaged 2011-2016 period was only 5 days.[19] The TMDL uses the averaged days of exceedances to set load allocations. In addition, the analysis of thermal impacts tends to be smoothed out using monthly averages.

The TMDL allocations should be developed for conditions when temperatures are most extreme and where interference with migration, metabolic stress, reproductive success, and increased incidence of disease are likely to cause increased mortality. In addition, climate change should be allocated a portion of the 0.3°C human use allowance, given that this is largely a human impact. In EPA's 2012 Water Program Strategy, EPA commits to consideration of climate change when developing load allocations.[20] Despite the TMDL clearly establishing the significance of increasing air temperatures associated with climate change on warming in the Columbia River, no allocation or protections are given to what will clearly be continued warming in the future.

Invoking "Use Attainability Analysis" is inappropriate for this TMDL.

EPA suggests that states could proceed with a "Use Attainability Analysis" (UAA) as a viable pathway for satisfying regulatory requirements[21]. These statements take a simple view of the situation that neither the states, nor the EPA, could legally implement. The process of conducting a UAA is to analyze whether uses of a waterbody specified under a state's water quality standards are attained. These are called *designated* uses[22] and they may be different from *existing* uses. UAAs are not available to change *existing* uses and federal regulations require water quality levels that protect existing uses.[23] In this TMDL, EPA suggests that states consider removing several salmon life stage uses of the river, including migration, spawning, and rearing, rather than addressing and improving the integrity of this waterbody to protect those life stages.

[17] Isaak, D.J., C.H. Luce, D.L. Horan, G.L. Chandler, S.P. Wollrab, D.E. Nagel. 2018. Global Warming of Salmon and Trout Rivers in the Northwestern U.S.: Road to Ruin or Path Through Purgatory? Trans. Am. Fish. Soc. 147(3):566-587. https://doi.org/10.1002/tafs.10059
[18] Columba River System Operations Environmental Impact Statement, https://www.nwd.usace.army.mil/CRSO/
[19] TMDL, Appendix B, Table 4, page 10; and TMDL Table 3-4, page 18.
[20] EPA, *National Water Program 2012 Strategy Response to Climate Change*, ES-7 (2012)
[21] TMDL at page 2, ("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…a "use attainability analysis" that demonstrates that attaining the use is not feasible"); and at page 71 ("Washington and Oregon may consider changes to applicable designated uses to promote the states' ability to comply with established WQS.")
[22] 40 CFR § 131.3(f).
[23] 40 CFR §§ 131.3(e) & 131.12(a)(1).

This is in direct contravention to the objective of the Clean Water Act.[24] Furthermore, fish, and specifically salmonids, are existing uses in the river system and cannot be removed.

It would be inconceivable for CRITFC's member tribes or anyone living in the Pacific Northwest to envision a Columbia River system without a salmon fishery. It is fundamentally wrong to assume that a use that has existed since time immemorial could be legally determined to be unattainable. This suggested compliance pathway to the states should be removed from the TMDL document.

Tributary restoration will be beneficial but will take time.

The TMDL assigns 0.1°C of the loading capacity to tributaries. This allocation is equivalent to the cumulative temperature increase caused by existing riparian shade loss in the tributary watersheds. Appendix F of the TMDL reports modeling efforts to identify how much tributary temperatures could be changed by manipulating riparian vegetation shade. The study found that average August stream temperature could be 0.4°C lower if shade is restored across the system.[25] However, the study recognized that it is unlikely that tributary riparian shade restoration will occur to the extent that temperature reductions will be significant. The report advises that additional restoration options together with shade restoration will be required to keep temperatures near their current condition. Tributary restoration to minimize mainstem temperature impairments will take a significant amount of time and should be accelerated to achieve any substantial benefit.

The TMDL needs more analysis of irrigation practices and effects.

There is insufficient assessment of the effects of irrigation withdrawals and returns. An evaluation of the Banks Lake pump storage operations is included in the TMDL by simulating current conditions with Banks Lake flows and with those flows set to zero.[26] The simulation shows a maximum impact to mean monthly temperature of 0.1°C in both July and August at McNary and John Day dam tailraces. However, this evaluation represents only a portion of the impact of irrigating 6.5 million acres of land in the Columbia Basin.

The National Research Council (2004) reports that water withdrawals in July are 6.8% of the mean flow during average (1960-1999 years) at John Day Dam. [27] In the critical months of July and August in low water years the proportion of water withdrawal climbs to 16.6%. These months have the highest water withdrawals and have noticeable effects on mainstem flows, especially during dry years.[28] Additional increases to mainstem withdrawals have been proposed.[29]

Given the findings in the TMDL and the basin-wide withdrawals there should be some attribution of load allocated to these actions. The Banks Lake analysis is only a start to assessing the impact of all withdrawals on river temperatures. While limiting irrigation withdrawals may

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[24] CWA § 101(a).
[25] TMDL, Appendix F at page 12.
[26] TMDL, Appendix D starting at page 77.
[27] National Research Council. 2004. Managing the Columbia River: Instream Flows, Water Withdrawals, and Salmon Survival. Washington, DC: The National Academies Press. 260 p. https://doi.org/10.17226/10962. Table 3-1, at pg. 53.
[28] Ibid. at pg 55.
[29] Ibid, at pg 2, "There are currently many pending water withdrawal permit applications along the Columbia River in the State of Washington".

be beyond the legal scope of State TMDL implementation plans, actions that limit their impact should be included in a comprehensive plan.

The TMDL should consider comprehensive strategies to restore the natural thermal regime to protect salmon at all life stages.

The TMDL is focused on peak summertime temperatures, which is significant with respect to salmon adult migration. CRITFC is also concerned about protecting salmon spawning and egg incubation that occur during or soon after the period of summer maximum temperature. Dams, reservoirs, and irrigation withdrawals can lead to a loss of temperature diversity, such that maximum temperatures occur for an extended period of time leaving little cold-water refuge areas available for spawning and egg incubation. Under these conditions the duration of exposure to 20°C can impair gamete development and viability, reproductive behavior and success, pre-spawning survival, and smoltification of outmigrants.

Protection of the entire salmon life cycle is critical in terms of achieving standards. By October the current condition is 2.68°C warmer than free flowing condition.[30] Recent work on thermal tolerance of a wide range of fish species shows that spawning adults and embryos have narrower tolerance ranges and are most vulnerable and a critical bottleneck in the life cycle of fish.[31] Fall chinook are undergoing pre-spawning and spawning at temperatures that significantly exceed their historic norms. Implementation of the TMDL should focus on management strategies that are designed to keep temperatures at 20°C or below plus a narrative provision that would require restoration of a natural thermal regime.[32]

EPA should consider alternative options for cold water releases.

EPA field data from 2002 shows that in Lake Roosevelt "the reservoir stratifies under certain circumstances and that downstream temperatures can be affected significantly by withdrawing water from various levels of the reservoir".[33] Despite these findings, a different result was produced by the Bureau of Reclamation in 2018, which claims that despite the reservoir being a deep, storage reservoir it behaved more like a run-of-river reservoir and didn't produce reliable stratification.[34] However, their report notes that at times data at and below 240 feet from the forebay surface was not available and there may be questions about the reliability of the data. This analysis also was based on only one USGS sensor. Consequently, it seems that there remain significant questions about an ability to use deep water releases to cool the Columbia River downstream in summer. Temperature control structure release of deep, cold water from storage reservoirs (Brownlee, Dworshak, Roosevelt) or upriver on the Snake river from Idaho Power's Hells Canyon Complex, could have considerable impact on downstream temperatures and should be part of a comprehensive implementation plan.

The TMDL has insufficient information and analysis on mixing zones.

National Pollutant Discharge Elimination System (NPDES) permittees are allocated a 0.1°C increment of load allocation from the human use allowance. The TMDL presents data on the heat

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[30] Appendix D, Table 3-6
[31] Thermal bottlenecks in the life cycle define climate vulnerability of fish, Dahlke et al. (2020), Science 369, 65-70.
[32] EPA Region 10 Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards, 2003, at page 29.
[33] EPA. 2002. Columbia River temperature assessment: simulation of the thermal regime of Lake Roosevelt. Publication Number 910-03-003.
[34] BOR. 2018. Reclamation managing water in the West: thermal regime of the Columbia River at Lake Roosevelt. USDI Bureau of Reclamation, Pacific Northwest Regional Office, Boise, Idaho.

discharged from major NPDES facilities and has determined that the allocation will be met if sources discharge these loads on average.[35] The TMDL only evaluated the impact of hot water on mainstem temperatures after complete mixing.

Since the EPA RBM-10 model one-dimensional, this review of the cumulative point source thermal contribution misses the impacts that these sources could have on presenting blockages to adult migration. There is no consideration of the temporal or spatial distributions of these point sources. In years where there is a probability of high air temperature and low river flow, point source releases of temperature of up to 79.6 MGD at 45°C could lead to conditions that require immediate action.[36]

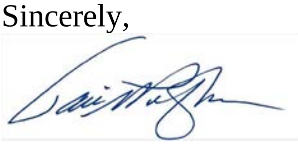
In 2015, EPA committed to carrying out conservation measures to minimize adverse effects of permitted thermal discharge plumes and to work with the Oregon Department of Environmental Quality (ODEQ) on technologies to limit mixing zone sizes to the smallest extent practicable.[37] ODEQ in turn reported in 2018 that they intended to identify technical and policy alternatives that would allow permit holders to meet temperature requirements.[38] The TMDL should map mixing zones for point sources and assess how these areas might impede salmon migration particularly during low flow/high temperature periods. State implementation plans should require tertiary treatment of point source thermal pollution during low flow/high temperature periods.

Conclusion.

EPA's TMDL is a good start and provides valuable information on the heat condition of the Columbia and Lower Snake rivers, but it is incomplete and misses the mark on several points of concern. The role of the FCRPS in exacerbating heat conditions in the river cannot be overstated, and EPA, along with the states and the federal partners, needs to develop management or other options to improve conditions throughout the system. Furthermore, this TMDL does not include the Snake River between the states of Oregon and Idaho, which is highly impacted by Idaho Power Company's Hells Canyon Complex. Finally, EPA's suggestion that the states remove designated uses simply to help the river meet water quality standards violates the objective of the Clean Water Act and does not serve to protect the legacy for any future generations.

Thank you for this opportunity to submit these comments. Please contact Dianne Barton, Water Quality Coordinator, with any questions at 503-238-0667.

Sincerely,



Jaime A. Pinkham
Executive Director

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[35] TMDL, Table 6-12 at page 53.
[36] TMDL, Table 6-12, page 54.
[37] Letter dated October 27, 2015 from Christine Psyk, EPA Office of Water and Watersheds to Kim Kratz, Assistant Regional Administrator, National Marine Fisheries Service.
[38] Oregon DEQ Water Quality Report: 2018 Annual Report – NPDES Permit Program, at page 8.

August 20, 2020

Chris Hladick, Regional Administrator
U.S. Environmental Protection Agency, Region 10
Park Place Building
1200 6th Avenue
Seattle, WA 98101

Sent via email to: ColumbiaRiverTMDL@epa.gov

Re: Columbia and Lower Snake River Temperature TMDL

Dear Regional Administrator Hladick:

The undersigned organizations (hereinafter, "we") submit these comments regarding the U.S. Environmental Protection Agency's (EPA) Temperature Total Maximum Daily Load for the Columbia and Lower Snake Rivers (TMDL). We appreciate the decades of technical and policy work by EPA Region 10 staff that culminated in this much-needed TMDL.

The TMDL contains important scientific information that should assist the restoration of the Columbia River basin's imperiled salmon and steelhead. The TMDL's analysis clearly shows that the four Lower Snake River dams, and certain Columbia River dams, cause significant temperature problems throughout the summer and fall.[1] For instance, the Lower Snake River dams can raise the temperature of the Lower Snake between .7 and 3.2 degrees C from July to October—often causing or contributing to water quality standards violations.[2] The analysis also suggests that a free-flowing Lower Snake River would cool periodically throughout summer in a manner that would facilitate fish migration even during otherwise hot years.[3] These important conclusions, from an expert scientific agency, should inform efforts to restore Columbia River basin salmon and steelhead.

EPA's use of the RBM10 model is a well-documented, scientific approach that yields conservative load allocations based on daily average water temperatures to implement the applicable water quality criteria. Like any model of a complex natural system, RBM10 contains assumptions and uncertainties.[4] Nevertheless, it is an appropriate and defensible tool to produce temperature load allocations for Columbia and Lower Snake river dams.[5]

Finally, we object to EPA's suggestion that Oregon and Washington weaken their water quality standards rather than address the actual water temperature issues impairing salmon and steelhead migration and survival. The purpose of a TMDL is to meet water quality standards, not weaken them.[6] EPA's repeated suggestion that the states employ Use Attainability Analyses[7] is, at its core, an invitation to abandon salmon recovery efforts in the Columbia and Snake rivers. A Use Attainability Analysis is a Clean Water Act procedure by which states may, under limited circumstances, remove a designated use for a specific water body.[8] Here, EPA is asking Oregon and Washington to remove salmon migration, spawning, and rearing as uses of the Columbia and Lower Snake rivers. EPA's suggested course of action is, frankly, unconscionable and directly at odds with the Pacific Northwest's long-standing effort to conserve and restore Columbia River basin salmon runs and ensure sustainable fisheries. Use Attainability Analyses will not restore healthy salmon runs or sustainable fisheries; EPA should withdraw its inappropriate request and focus on concrete actions to reduce water temperatures.

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[1] TMDL at p. 43 ("EPA's analysis of the cumulative nonpoint source heat loading from dam impoundments shows that the dam impoundments have a greater temperature impact than point sources and tributaries."); *see also id.* ("The 15 dams within the TMDL area have a cumulative warming effect during the summer and early fall.").
[2] TMDL at pp. 47–50.
[3] *See* TMDL at p. 70 (predicting minimum monthly average daily temperatures in the free-flowing Lower Snake that are significantly below the 20 degree C criterion and significantly cooler than current minimum temperatures in the dammed river).
[4] This comment hereby incorporates by reference the comments submitted by Paul Pickett regarding the TMDL (enclosed).
[5] To alleviate any potential confusion by future readers of the TMDL, EPA should add the label "Load Allocation" to the heading of Column H in Tables 6-6 through 6-9 of the TMDL.
[6] Given that EPA's approval of Oregon's *current* water quality criteria for temperature violated EPA's duty not to jeopardize the continued existence of many Columbia River basin salmon and steelhead populations, it is difficult to see how EPA could approve less-protective criteria without violating Section 7 of the Endangered Species Act. *Cf.* National Marine Fisheries Service, *2015 CRSO Biological Opinion on EPA's Proposed Approval of Certain Oregon Water Quality Standards*, p. 1 (2015).
[7] TMDL, pp. 2, 71.
[8] *See* 40 C.F.R. § 131.10(g).

With a few important revisions detailed below, we anticipate the TMDL will be a useful analysis and tool to help guide salmon recovery efforts in the Lower Snake and Columbia rivers.

Sincerely,

Miles Johnson
Senior Attorney
Columbia Riverkeeper

On behalf of:

Idaho Rivers United
Snake River Waterkeeper
Columbia Riverkeeper
Institute for Fisheries Resources
Northwest Environmental Advocates
Pacific Coast Fed. of Fishermen's Assoc.s
Save Our Wild Salmon Coalition
Defenders of Wildlife
Northwest Sportfishing Industry Assoc.
National Wildlife Federation
Association of Northwest Steelheaders
Great Old Broads for Wilderness
Fly Fishers International
Wild Salmon Center
Orca Conservancy
Washington Chapter, Sierra Club
Oregon Chapter, Sierra Club
Idaho Conservation League
Idaho Chapter, Sierra Club
American Rivers
Natural Resources Defense Council
NW Guides and Anglers Association
Endangered Species Coalition

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Kris Pratt
Liv Brumfield
Jim McKenna
JT Austin
Dianne Barton
Scott Hauser
DR Michel

Legal and Technical Comments

I. EPA's reliance on a .3 degree C "human-use" allowance is not supported by applicable state or tribal water quality standards or the underlying facts.

EPA set the temperature targets in the TMDL at .3 degrees C above the applicable numeric temperature criteria.[9] To justify for this approach, EPA relied on a so-called "human-use" allowance, summarized in the TMDL as follows:

> "when the receiving waters are not attaining standards, the available increase in loading capacity for human-caused sources in the Columbia River is 0.3°C above the criterion. Washington WQS have an analogous 0.3°C allowance, resulting in an available increase in loading capacity for anthropogenic sources of 0.3°C above the criteria . . . ."[10]

As explained below, however, EPA's use of a .3 degree C human-use allowance to set temperature targets for this TMDL was inappropriate and unjustified.

a. WAC 173-201A-320(3)(a) is not an across-the-board .3 degree C increase in Washington's temperature criteria.

Throughout the TMDL, EPA purports to rely on WAC 173-201A-320 to support EPA's position that Washington's water quality standards contain a .3 degree C human-use allowance.[11] However, WAC 173-201A-320 is not related to human-use allowances or TMDL target setting in any way. This regulation—which EPA selectively cites for the proposition that a "measurable change" is a "[t]emperature increase of 0.3°C or greater"[12]—applies ***only*** in the context of Tier II review.[13] EPA's reliance on language in WAC 173-201A-320 to justify TMDL temperature targets above Washington's temperature criteria is, therefore, misguided and illegal. Moreover, clinging to an out-of-context phrase in Washington's Tier II review regulations strongly signals that EPA knows that (as explained below) Washington's *actual* human-use allowance does not apply under these circumstances.

EPA also cannot credibly assert that .3 degrees C is the smallest temperature increment that can be used when setting TMDL targets or load allocations. In fact, much of the TMDL's distribution of allowable human-caused temperature pollution—between point sources, tributaries, and dams—is premised on divvying up the .3 degree C human use allowance. It is arbitrary and capricious for EPA to simultaneously assert that .3 degrees C is the smallest

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[9] TMDL, p. 35 ("The criteria + 0.3°C are therefore the temperature targets for the TMDL . . . .").
[10] TMDL, p. 40.
[11] TMDL, p 9; Appx. A, p. 4, fn. 1; Appx A, p. 7, fn. 9.
[12] WAC 173-201A-320(3)(a) (explaining that "*In the context of this regulation*, a measurable change includes a: (a) Temperature increase of 0.3°C or greater" (emphasis added)).
[13] Under Washington's water quality standards, Tier II review can be invoked to lower the quality of a water that is currently cleaner than the applicable criteria when doing so is "necessary and in the overriding public interest." WAC 173-201A-320(1).

measurable temperature increment while purporting to assign fractions of that increment to different categories of polluters.

b. Washington's .3 degree C human-use allowance does not apply here.

For the following reasons, Washington's human-use allowance is not applicable to the Columbia and Lower Snake rivers, and EPA should not have used it to set temperature targets in the TMDL. Washington's human-use allowance regulation reads, in its entirety:

> "When a water body's temperature is warmer than the criteria in Table 200(1)(c) (or within 0.3°C (0.54°F) of the criteria) and that condition is due to natural conditions, then human actions considered cumulatively may not cause the 7-DADMax temperature of that water body to increase more than 0.3°C (0.54°F)."[14]

The circumstances on the Lower Snake and Columbia rivers in Washington do not justify EPA's use of the .3 degree C increment. Accordingly, EPA's use of this increment will result in TMDL load allocations that are not "established at a level necessary to implement the applicable water quality standards,"[15] as required by the Clean Water Act.

1. EPA did not determine whether the Lower Snake and Columbia rivers are warmer than the temperature criteria "due to natural conditions."

EPA cannot rely on the .3 degree C human-use allowance because EPA has not determined ***why*** the Lower Snake and Columbia rivers are warmer than the temperature criteria. Washington's human-use allowance only applies when a water exceeds a temperature criterion "due to natural conditions."[16] As explicitly stated in the TMDL, EPA did not examine or determine whether the temperature exceedances in the Lower Snake and Columbia rivers are due to natural conditions or human impacts.[17] Without this critical piece of information, it was arbitrary and capricious for EPA employ Washington's human-use allowance to set temperature targets in the TMDL.

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[14] WAC 173-201A-200(1)(c)(i).
[15] 33 U.S.C. § 1313(d)(1)(c).
[16] WAC 173-201A-200(1)(c)(i); *see also Letter from Washington Department of Ecology to EPA regarding the proper application of Washington's human use allowance*, pp. 1–2 (Sept. 12, 2001) ("'Natural Conditions' for temperature means water temperatures as they are best assessed to have existed before any human-caused pollution or alterations. If the Snake or Columbia Rivers are found to have a natural condition higher than the standard, no additional heat pollution can be added that will result in raising the temperature by more than an additional 0.3 degrees centigrade.")
[17] TMDL, p. 11 (explaining that "For this TMDL, EPA has not attempted to estimate the natural conditions of the mainstems of the Columbia and lower Snake Rivers" and "there is no functional basin-wide water quality model for estimating the natural conditions of the Columbia and lower Snake Rivers").

2. Global warming has already consumed any available human-use allowance.

Even if EPA could justify applying the human-use allowance to the Columbia and Lower Snake rivers, the .3 degree C human-use allowance would already be consumed by the effects of human-caused global warming. Global warming has caused temperatures in the Lower Snake and Columbia rivers to increase by 1 to 2 degrees C since the 1960s.[18] EPA does not and cannot seriously dispute that the current, rapid trend in global warming is largely or entirely due to human actions, specifically atmospheric carbon pollution. Therefore, human actions that result in global warming have already caused the Lower Snake and Columbia rivers to increase by more than the theoretically allowable .3 degree C increment.[19] EPA's attempt to allocate the .3 degree C increment between point sources, tributaries, and the dams is therefore arbitrary and capricious because any theoretically available temperature increment has already been consumed by human-caused climate change.

II. The TMDL does not ensure that temperature criteria will be met at critical places and times.

The Clean Water Act requires EPA to establish TMDL load allocations at "level[s] necessary to implement the applicable water quality standards."[20] At best, the load allocations in this TMDL would implement some state temperature standards, at some times and places, under some circumstances. Sometimes meeting temperature standards falls far short of EPA's mandate. For the times, places, and conditions identified below, the TMDL's load allocations are not sufficient to ensure compliance with the temperature standards.

a. The TMDL's focus on tailrace temperatures ignores persistent temperature problems in fishways and dam forebays.

By focusing exclusively on tailrace temperatures,[21] the TMDL does not study or address the long-recognized problem of higher-than-average water temperature in fishways and dam forebays. Warmer water in fishways[22] and forebays[23] frequently violates numeric and narrative water quality standards and can create migration blockages, delays, and fall-back problems—all of which decrease adult salmon survival and reproductive success. Modifications at certain

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[18] TMDL, p. 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.").
[19] WAC 173-201A-200(1)(c)(i) (explaining that "human actions considered cumulatively may not cause the . . . temperature of that water body to increase more than 0.3°C").
[20] 33 U.S.C. § 1313(d)(1)(c).
[21] *See* TMDL, p. 35 ("All of the TMDL's target sites are at the tailraces of dams.").
[22] Fish Passage Center, *Requested data summaries and actions regarding sockeye adult fish passage and water temperature issues in the Columbia and Snake rivers*, p. 7 (2015); *see also* Fish Passage Center, *Review of April 2016 Draft of NOAA Fisheries report 2015 Sockeye Salmon Passage Report* (2016).
[23] EPA, *Draft Technical Memorandum Characterizing Columbia River Temperature Variability*, pp. 8–14 (August 9, 2019) (describing warmer temperatures at the surface of forebays of John Day and McNary dams).

fishways in recent years have improved migration, but temperature-driven migration blockages at other dams persist. Under the Clean Water Act, a TMDL must be "established at a level necessary to implement the applicable water quality standards."[24] Further, EPA has stated that "No TMDL will be approved if it will result in a violation of water quality standards."[25] State water quality standards for temperature apply in the fishways and at dam forebays; to the extent that each dam creates site-specific temperature hot-spots in the fishways, forebay, or elsewhere,[26] the TMDL should include those locations in its list of temperature targets. Failing to address this important aspect of the temperature problem in the Columbia and Lower Snake rivers is contrary to the language of the Clean Water Act and counterproductive to the goal of restoring adequate migratory habitat for salmon and steelhead.

b. The TMDL's focus on average monthly maximum temperatures in July through October is not sufficient to implement the applicable water quality standards.

The TMDL should address violations of the daily water quality criteria that can occur in late June in the lower Columbia and Lower Snake rivers. The states' 20 degree C water quality criteria apply in June, but the TMDL only "evaluates water quality exceedances from July – October."[27] This results in a TMDL that does not provide load allocations in late June and, therefore, violates the Clean Water Act by failing to implement the water quality standards.[28] This is no mere clerical error; late-June water temperatures above the criteria do occur and can have devastating effects on salmon and steelhead. For instance, in 2015, water temperatures reached "20°C (68°F) at the peak of the [sockeye] run, in late June."[29] That late-June hot water event precipitated the death of roughly 250,000 adult sockeye in the Columbia and Lower Snake rivers.[30] Accordingly, EPA's focus on average monthly maximum temperatures does not protect beneficial uses or ensure compliance with the standards at critical times.

When setting temperature load allocations for the dams, EPA should have used the worst-case conditions—not the observed monthly maximums averaged over a six-year period. EPA's guidance clearly states that:

> "When developing a TMDL . . . an attempt is made to use a reasonable 'worst case' condition. For example, stream analysis often uses a low flow (e.g., 7-day low flow, once

[24] 33 U.S.C. § 1313(d)(1)(c).
[25] EPA, *Guidance for Water Quality-Based Decisions: The TMDL Process*, p. 32 (1991).
[26] For instance, Lake Roosevelt's partial stratification and long retention time can cause a wide range of water temperatures to occur simultaneously at different locations throughout the reservoir. Therefore, it is arbitrary and unrealistic for EPA to assess this 150-mile-long, partially stratified reservoir's compliance with water quality standards based on a single temperature target at the Grand Coulee Dam tailrace, and while using a 1-dimentional temperature model.
[27] TMDL, p. 12, fn. 4.
[28] 33 U.S.C. § 1313(d)(1)(c).
[29] EPA, *Draft Columbia River Cold Water Refuges Plan*, p. 55 (October, 2019).
[30] *See EPA's answer in* Columbia Riverkeeper v. Pruitt, para. 4 (May 15, 2017) (admitting "that the death of roughly 250,000 adult sockeye salmon [in 2015] was attributable primarily to warm water.").

in 10-years commonly known as 7Q10 or biologically-based 4-day 3-year flows) high temperature design condition."[31]

Indeed, when developing Waste Load Allocations for the point sources in this TMDL, EPA appears to have attempted something along these lines.[32] When describing the loading capacity of the rivers more generally, however, EPA did not use a reasonable worst-case low flow/high temperature design condition, such as a 7Q10, as required by its own guidance. Instead, EPA appears to have used the *average* monthly maximum temperatures in the Columbia and Lower Snake during July, August, September, and October from 2011 to 2016.[33] This does not comply with EPA's guidance or ensure that the TMDL's load allocations will be sufficient to meet the criteria and protect salmon and steelhead during periods of above-average water temperature.

c. The TMDL fails to address Oregon's narrative temperature criteria.

EPA's TMDL does not require fall cooling necessary to meet Oregon's narrative water quality standards. Oregon's water quality standards require that the "seasonal thermal pattern in Columbia and Snake Rivers must reflect the natural seasonal thermal pattern."[34] EPA's regulations require TMDLs to attain such "narrative" water quality criteria.[35] Columbia and Lower Snake river dams significantly minimize and delay the natural fall cooling pattern that should prevail in these waterways.[36] Accordingly, the dams are causing a significant departure from the "natural seasonal thermal pattern" in violation of Oregon's narrative standard. The TMDL focuses exclusively on meeting numeric criteria and does not purport to protect or restore the natural seasonal thermal pattern of the Columbia and Snake rivers—despite the National Marine Fisheries Service's conclusion that such the narrative criteria were necessary to mitigate the numeric migration criterion adopted by Oregon.[37] Accordingly, the TMDL illegally fails to attain Oregon's narrative water quality criteria for temperature.

The TMDL also does not ensure compliance with Oregon's narrative water quality standard requiring sufficiently well-distributed cold water refugia. EPA's temperature refuges plan should explain what it would mean to have the sufficiently well-distributed cold water refugia in the Columbia River required by Oregon's narrative temperature criteria (and whether

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[31] EPA, *Guidance for Water Quality-Based Decisions: The TMDL Process*, p. 47 (1991).
[32] *See* TMDL, p. 51 (setting waste load allocations based on "90th percentile" flow and temperature conditions).
[33] *See* TMDL, p. 39.
[34] O.A.R. 340-041-0028(4)(d); *see also* TMDL, Appx. 1, pp. 12, 18, 23.
[35] 40 C.F.R. § 130.7(c)(1) ("TMDLs shall be established at levels necessary to attain and maintain the applicable *narrative* and numerical WQS *with seasonal variations*") (emphasis added).
[36] *See generally* Columbia Riverkeeper *et al.* Comments on the CRSO DEIS (April 14, 2020) (discussing the dams' seasonal alterations of the rivers' natural temperature regime) (enclosed).
[37] National Marine Fisheries Service, *2015 CRSO Biological Opinion on EPA's Proposed Approval of Certain Oregon Water Quality Standards*, p. 164 (2015) (explaining that the sufficiency of the 20 degree C criterion depends on "the effectiveness of the narrative criteria in protecting [cold water refugia] CWR and ensuring that the natural seasonal thermal pattern exists in the Columbia and Snake Rivers.").

they exist).[38] Compliance with a valid, final temperature refuges plan should achieve compliance with Oregon's narrative criteria for thermal refuges and, therefore, be a requirement of this temperature TMDL. Instead of providing for its thermal refuges plan to become a requirement of the TMDL, EPA cites its draft thermal refuges plan, claiming that the draft remains "under review" and asserting that its "preliminary findings provide a framework" for assuring that the refugia narrative criterion is met.[39] This is meaningless. By placing the refuges plan outside the TMDL, EPA claims credit for its research on refuges while undermining any future attempts to enforce the refuges plan. Ultimately, EPA's TMDL provides no concrete protections for thermal refugia and does not ensure Oregon's narrative criteria will be met—undermining EPA's tremendous investment of time and resources in studying thermal refuges to support adult steelhead and fall Chinook migration in the context of the hydrosystem and climate change.

III. The TMDL lacks reasonable assurances that the dams will meet their load allocations.

The TMDL correctly identifies certain dams as significant sources of heat pollution and assigns those dams load allocations to help meet temperature standards. Unfortunately, the TMDL lacks the requisite "reasonable assurances"[40] that those dams will actually meet their load allocations. As EPA has explained:

> "when a TMDL is developed for waters impaired by both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur, the TMDL must provide "reasonable assurances" that nonpoint source control measures will achieve expected load reductions . . . . This information is necessary for EPA to determine that the TMDL, including the load and wasteload allocations, has been established at a level necessary to implement water quality standards."[41]

Given the circumstances and history described below, EPA's claim that such reasonable assurances exist with respect to federal dams[42] is disingenuous and arbitrary.

Recent Clean Water Act Section 401 Certification actions by Washington and Oregon for eight federal dams on the Columbia and Lower Snake rivers might provide reasonable assurances—if EPA would acknowledge those 401 Certifications in this TMDL and stop working to undermine them. In response to a request from EPA, the Washington Department of

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[38] The current draft of EPA's thermal refuges plan does neither of these things. *See generally* Northwest Environmental Advocates, *Comments on EPA's Draft Columbia River Cold Water Refuges Report* (2019) (enclosed).
[39] TMDL, p. 32.
[40] EPA, *Guidance for Water Quality-Based Decisions: The TMDL Process*, p. 6 (1991) (explaining that each TMDL must contain "Reasonable assurances that the nonpoint source load allocations established in TMDLs (for waters impaired solely or primarily by nonpoint sources) will in fact be achieved.").
[41] EPA, *Reconsideration of EPA's Approval of Vermont's 2002 Lake Champlain Phosphorus Total Maximum Daily Load ("TMDL") and Determination to Disapprove the TMDL*, p. 8 (January 24, 2011).
[42] TMDL, p. 73 ("The regulatory and non-regulatory measures described . . . in . . . federal dam operation plans provide adequate reasonable assurance for the temperature wasteload and load allocations in this TMDL.").

Ecology (Ecology) recently issued 401 Certifications for eight federal dams on the lower Columbia and Lower Snake rivers.[43] Ecology's 401 Certifications require the Corps' dams to "meet the load allocations in the Columbia and Lower Snake River Temperature Total Maximum Daily Load."[44] Section 401 Certifications for dams are federally enforceable, permit-like documents that can provide reasonable assurances for TMDL purposes,[45] and EPA has committed to partner with states and use all available federal and state laws and regulatory programs—such as Clean Water Act Section 401 Certifications—to achieve TMDL load allocations for nonpoint sources.[46] EPA inexplicably ignores these eight recent 401 Certifications that are expressly conditioned to implement the TMDL's load allocations. EPA has also previously withdrawn, and continues to withhold, final NPDES permits for the Corps' dams in a misguided effort to avoid Ecology's 401 Certifications.[47] EPA also recently promulgated new Clean Water Act regulations in an illegal attempt to strip states and tribes[48] of their authorities to issue 401 Certifications.[49] By ignoring and working to undermine 401 Certifications for federal dams on the Columbia and Lower Snake rivers, EPA is violating its own TMDL guidance and removing any reasonable assurance that the federal dams will meet this TMDL's load allocations.

The federal agencies overseeing the hydrosystem have proven extremely resistant to *any* actions to improve temperature conditions for salmon and steelhead—let alone the

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[43] *See* Washington Department of Ecology, *Orders on Clean Water Act Section 401 Certification*, No.s 18143–18150 (May 7, 2020); *see also* Oregon Department of Environmental Quality, *Letter objecting to EPA's proposed NPDES permits for Lower Columbia River dams under Clean Water Act Section 401(a)(2)* (May 15, 2020).

[44] *See, e.g.* Washington Department of Ecology, *Order No. 18146 Granting Water Quality Certification for the Bonneville Project*, Condition B(2)(a) (May 7, 2020).

[45] For instance, this very TMDL (p. 73) touts Ecology's 401 Certifications for non-federal PUD dams on the mid-Columbia River as providing reasonable assurances that these non-federal dams will meet the load allocations in the TMDL.

[46] EPA, *Guidance for Water Quality-Based Decisions: The TMDL Process*, p. 5 (1991) ("For all section 303(d)-listed waters impaired solely or primarily by nonpoint sources, each EPA Region should work in partnership with each State to achieve TMDL load allocations for nonpoint sources. All available Federal, State, and local programs and authorities should be used, including . . . regulatory . . . programs authorized by Federal, State, or local law."); *see also* TMDL, p. 73 ("EPA expects the States to work within their authorities to implement activities to reduce nonpoint source heat loading.").

[47] On February 1, 2019, EPA abruptly withdrew draft NPDES permits and a previous request for 401 Certifications for federal dams on the Columbia and Lower Snake rivers. EPA provided no explanation for its decision. Notably, EPA's decision to withdraw the requests for 401 Certification came one day after *The Seattle Times* ran a front-page story describing the temperature crisis on the Columbia and Snake rivers and Ecology's 401 Certification authority. *See* Lynda Mapes, *Washington state to regulate federal dams on Columbia, Snake to cool hot water, aid salmon*, The Seattle Times (Jan. 31, 2019); *see also* Lynda Mapes, *EPA ices Washington state's effort to regulate hot water in Columbia, Snake rivers*, The Seattle Times (Feb. 6, 2019).

[48] Affiliated Tribes of Northwest Indians, *Resolution #2020-25*, p. 3 (2020) (supporting "401 Certifications for dams on the Lower Snake and Columbia rivers to address temperature and other water quality issues and meet the Load Allocations in EPA's temperature TMDL"; requesting the "Corps to withdraw its appeal of Washington's 401 Certifications"; and requesting "EPA to withdraw its recent re-interpretation of Clean Water Act Section 401, through which EPA purports to deprive tribes and states of their authority, granted by federal law, to protect water quality and fisheries.") (enclosed).

[49] EPA, *Clean Water Act Section 401 Certification Rule*, 85 Fed. Reg. 42,210 (July 13, 2020).

transformative, structural changes likely necessary to achieve the TMDL's load allocations for the Columbia and Lower Snake river dams. Nevertheless, EPA says that "implementation of this TMDL depends on . . . river temperature reduction efforts by other federal agencies."[50] For the reasons below, EPA's 'dependence' on federal dam managers to address temperature problems is completely unfounded and does not provide any reasonable assurance that the dams will meet their load allocations.

As EPA well knows, federal agencies like the Corps have long sought to obscure, and avoid responsibility for, their dams' impacts on water temperature in the Columbia and Lower Snake rivers. EPA's sudden reliance on the Corps and others to voluntarily meet the TMDL's load allocations is, therefore, perplexing and arbitrary. Nearly twenty years ago, the Corps prevailed upon EPA to bury the TMDL at issue here. When EPA took up the TMDL again several years later, the Corps pressed EPA to pretend that the impacts of the dams were somehow part of the natural river system and beyond the reach of the TMDL.[51] Rebuffed, and concerned that EPA would issue a TMDL containing load allocations for the dams, the Corps pressured the State of Oregon to eliminate salmon and steelhead as Clean Water Act-protected uses of the Columbia River[52] (an invitation Governor Kulongoski pointedly refused). Now that EPA has issued this TMDL, the Corps is asking the Washington Pollution Control Hearings Board to invalidate the 401 Certifications that make the TMDL's dam load allocations legally enforceable.[53] Perhaps most troubling from a "reasonable assurances" standpoint, the Corps' 401 Certification appeal asserts (albeit without specifics or substantiation) that complying with the TMDL's load allocations would be beyond the Corps' legal authorization.[54] In other words, the Corps claims that meeting the TMDL's load allocation would be illegal.[55] Given the Corps' long-running and highly successful campaign to avoid acknowledging or addressing the dams' water quality standards violations, EPA's reliance on the Corps' "river temperature reduction efforts"[56] is cynical, misguided, and provides no assurance that the dams will meet the TMDL's load allocations.

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[50] TMDL, p. 72.

[51] Army Corps, *Comments to EPA on the Preliminary Draft Columbia/Snake River Mainstem Temperature Total Maximum Daily Loads*, p. 4 (Nov. 6, 2002) ("The Corps recommends that the thermal effects due to the existence of the dams be included in the baseline").

[52] *See, e.g., Letter from Army Corps, Bureau of Reclamation, and EPA to Oregon Department of Environmental Quality encouraging Use Attainability Analyses for the Columbia and Snake Rivers* (May 9, 2005).

[53] *See, e.g.,* Army Corps, *Notice of Appeal to the Washington Pollution Control Hearings Board re Ecology Order No. 18146 Granting Water Quality Certification for the Bonneville Project* (June 8, 2020).

[54] *See id.* at 4.

[55] If the Corps is right, industrial and municipal point sources discharging into the Columbia and Lower Snake rivers will be saddled with the burden of addressing the dam's temperature problems. *See* EPA, *Guidance for Water Quality-Based Decisions: The TMDL Process*, p. 15 (1991) ("Where there are not reasonable assurances, under the CWA, the entire load reduction must be assigned to point sources."); *see also* 40 C.F.R. 130.2(i).

[56] TMDL, p. 72.

The federal plans and reports mentioned in the TMDL[57] similarly do not contain the "reasonable assurances" required by EPA's guidance requires. Specifically, the TMDL states that:

> "The Final EIS and Biological Opinion [for the federal hydropower system] may identify water temperature improvement projects for the Columbia River, similar to those identified in the Water Quality Plan for Total Dissolved Gas and Temperature (USACE 2009) and the Sockeye Salmon Passage Report (NOAA 2016)."[58]

None of these four documents provide "reasonable assurances" that the dams will meet their load allocations. The CRSO BiOp and EIS explicitly state that **the Corps will not change the configuration or operation of its dams to reduce heat pollution caused by the reservoirs** or meet the TMDL's load allocations.[59] Accordingly, EPA's reliance on the BiOp and EIS to meet the TMDL load allocations is arbitrary and contradicted by the plain text of these documents. Furthermore, the Corps' *Water Quality Plan for Total Dissolved Gas and Temperature* and NMFS' *2016 Sockeye Salmon Passage Report* have made little to no impact on average river temperatures over the last decade, so any temperature improvements "similar to" the measures in those documents will not help meet the dams' load allocations. Three decades of illegal plans by the CRSO agencies have not alleviated the dams' temperature pollution; the 2020 BiOp and EIS explicitly continue this approach and, in fact, promise *not* to take actions that could meet the dams' load allocations.

EPA also has no reasonable basis to expect that Oregon and Washington's TMDL programs will help meet the load allocations for tributaries in this TMDL. EPA claims that, "As Washington and Oregon continue to develop and implement TMDLs for tributaries, EPA expects modest improvements in mainstem Columbia River temperatures."[60] This expectation is unfounded. EPA provides no evidence that Oregon and Washington's TMDLs have resulted in tributary temperature improvements thus far or will in the future. Washington's TMDL program has ground to a halt,[61] and Oregon's existing temperature TMDLs violate the Clean Water Act by allowing temperatures higher than numeric criteria.[62] EPA cannot rely on these other TMDLs as reasonable assurances.

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[57] *See* TMDL, pp. 72–73 (mentioning the CRSO Biological Opinions and Environmental Impact Statements, as well as NMFS' 2016 Sockeye Salmon Passage Report).

[58] TMDL, p. 72.

[59] *See, e.g.,* Army Corps, *CRSO EIS*, Executive Summary, p. 39 ("The Preferred Alternative is expected to have similar effects as the No Action Alternative on water temperature."); *see also, e.g.,* NMFS, *2020 CRSO BiOp*, p. 513 (Adult Snake River sockeye migration survival is not expected to improve under the dam operation regime proposed in the 2020 EIS "because the minor improvements and impairments discussed [in the BiOp] should, on the whole, result in no substantial differences" in water temperature.).

[60] TMDL, p. 63.

[61] *See Northwest Environmental Advocates v. EPA*, Case 2:19-cv-01537-BJR, Complaint, Para. 6 (September 26, 2019) ("Ecology has completed only one TMDL in the past three fiscal years").

[62] *Nw. Envtl. Advocates v. United States EPA*, 2018 U.S. Dist. LEXIS 209529 (D. Or. Dec. 12, 2018).

Reasonable assurance that the dams will meet their TMDL load allocations might be achieved by the following actions:

- EPA incorporating Washington's 401 Certification conditions (and Oregon's 401(a)(2) Objections) into the pending NPDES permits for the dams and issuing these NPDES permits;

- EPA revising the TMDL to make the dams' temperature allocations into Waste Load Allocations (as discussed in Section V, below); and

- The Corps withdrawing its appeals of Washington's 401 Certifications for eight dams on the Columbia and Lower Snake Rivers that require compliance with the TMDL's load allocations for dams.

Without such actions to provide reasonable assurances that the dams will meet their load allocations, the Clean Water Act requires EPA to significantly reduce or eliminate the temperature waste load allocations for industrial and municipal dischargers.[63]

IV. The TMDL must address the intensifying effects of climate change on water temperatures.

The TMDL should include strategies to address climate change and its predictable impact on the rivers' attainment of water quality standards over the next several decades. Due to the effects of climate change—including reduced snowpack, increased water temperatures, and lower summer flows—the frequency of temperature criteria exceedances will likely increase.[64] While EPA has done important technical work to identify the effects of climate change on river temperatures thus far, the TMDL's baseline conditions and load allocations do not address foreseeable *future* temperature increases linked to climate change. Importantly, EPA has committed to "consider climate change impacts when developing . . . load allocations in Total Maximum Daily Loads."[65] This TMDL should be no exception to that goal. Failing to propose load allocations, or other "adaptive management approach[es],"[66] sufficient to address foreseeable future climate conditions and increases in water temperature is a departure from EPA's stated policy and will result in a TMDL that quickly becomes outdated and unhelpful.

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[63] EPA, *Guidance for Water Quality-Based Decisions: The TMDL Process*, p. 15 (1991) ("Where there are not reasonable assurances, under the CWA, the entire load reduction must be assigned to point sources."); *see also* 40 C.F.R. § 130.2(i).
[64] National Marine Fisheries Service, *2015 CRSO Biological Opinion on EPA's Proposed Approval of Certain Oregon Water Quality Standards*, p. 163 (2015) ("Climate change is likely to make it more difficult to attain a biologically protective temperature [for salmon] in migration corridors, but it is not likely to change what constitutes a biologically protective temperature for this use.").
[65] EPA, *National Water Program 2012 Strategy: Response to Climate Change*, p. ES-7 (2012).
[66] *Id.* at 58.

V. EPA should treat dams as point sources of temperature pollution and assign them Waste Load Allocations.

EPA should have assigned the dams Waste Load Allocations. Instead, the TMDL miscategorized the dams' heat pollution as nonpoint source pollution and, consequently, assigned the dams Load Allocations.[67] Heat pollution from the dams and reservoirs is point source pollution within the meaning of Clean Water Act Section 301(a), 33 U.S.C. § 1311(a).[68] Heat is a pollutant;[69] dams are point sources;[70] and the Columbia and Snake rivers meet any definition of the waters of the United States. The only outstanding issue was whether the dams caused the "addition" of heat to the rivers, and the TMDL conclusively answers that question in the affirmative.[71] EPA's reliance on the 40-year-old *Gorsuch* decision is unavailing; that case is distinguishable on the facts[72] and its reasoning has not convinced subsequent courts.[73] Neither does the Water Transfer Rule support EPA's position, as EPA expressly disclaimed that its rule applies to dams.[74] The reasoning in *LA County Flood Control District* also cannot save EPA's failure to properly categorize the dams' heat pollution because that opinion was premised on the intervening point source *not* adding a pollutant to the water.[75] Here, as EPA's TMDL conclusively demonstrates, the dams and reservoirs cause the addition of heat pollution to the rivers. Accordingly, they are point sources of temperature pollution that should receive Waste Load Allocations in the TMDL.

In addition to complying with the purpose and plain meaning of the Clean Water Act, assigning the dams Waste Load Allocations would allow EPA to satisfy the "reasonable assurances" requirement discussed in Section III, above, because the Waste Load Allocations

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[67] TMDL, p. 1 ("In developing this TMDL, EPA evaluated the temperature impacts from . . . nonpoint source heat loading from dams"); pp. 43–44 ("In this TMDL, heat contributed by impounding the river in reservoirs behind the dams is considered a nonpoint source of pollution (and given a load allocation), while discharges from cooling water structures, transformers, and sump pumps are considered point sources (and given wasteload allocations). Wasteload allocations are incorporated in NPDES permits during implementation . . . ."
[68] *See generally* Enion, M. Rhead, *Rethinking National Wildlife Federation v. Gorsuch: The Case for NPDES Regulation of Dam Discharge*, 38 *Ecology Law Quarterly* 4, pp. 797–850. (2011).
[69] 33 U.S.C. § 1362(6).
[70] *Nat'l Wildlife Fed'n v. Gorsuch*, 693 F.2d 156, 165 n.22 (D.C. Cir. 1982) ("The pipes or spillways through which water flows from the reservoir through the dam into the downstream river clearly fall within th[e] definition" of point sources.).
[71] *See* TMDL, pp. 47–50 (May 18, 2020) (Columns E and F in Tables 6-6 through 6-9 show the heat pollution caused by the four Lower Snake River dams individually and cumulatively during the summer and fall.); *see also* EPA, *Columbia River Temperature TMDL: State and Tribal Meetings PowerPoint Presentation*, Slides 32, 44 (January 2020) (Explaining that the dams are the "biggest source" of heat pollution and that "Each of the four Snake River dams and John Day contribute to temperature impairments . . . throughout the [summer and fall].")
[72] The discussion of temperature pollution in *Gorsuch* focused on reservoirs that merely stratified heat that already existed in the river when it entered the reservoir; in the Columbia and Snake river reservoirs, however, little to no stratification occurs and the reservoirs themselves accumulate additional heat pollution.
[73] *See, e.g., Greenfield Mills, Inc. v. Macklin*, 361 F.3d 934, 947–48 (7th Cir. 2004).
[74] National Pollutant Discharge Elimination System (NPDES) Water Transfers Rule, 73 Fed. Reg. 33,697, 33,705 (June 13, 2008).
[75] *L.A. Cty. Flood Control Dist. v. NRDC, Inc.*, 568 U.S. 78, 82–83 (2013).

would become enforceable effluent limits in EPA's pending National Pollution Discharge Elimination System permits for the dams on the Lower Snake and Columbia rivers. This would cure a legal defect in the TMDL and relieve other industrial and municipal point source dischargers of the burden of addressing the Corps' heat pollution.[76]

VI. The TMDL Fails to Include an Adequate Margin of Safety

The TMDL's implicit margin of safety is arbitrary and inadequate. All TMDLs must include a margin of safety to ensure compliance with state and tribal water quality standards despite inherent uncertainties.[77] For the following reasons, this TMDL's implicit margin of safety is not adequate:

- As explained in more detail in the comments of Paul Pickett, incorporated herein by reference, the reserve allocation for point sources is not a margin of safety. EPA alternatively describes the "reserve" as a margin of safety and part of the increment that states can distribute to industrial and municipal point source dischargers. It is arbitrary and illogical for EPA to assert that the "reserve" is both things at once.

- The TMDL's use of monthly average maxima in development of temperature allocations is not a conservative assumption supporting an "implicit" margin of safety. As explained in Section II(b), above, and in other comments submitted by the Idaho Conservation League, the average monthly maxima strategy relied on by EPA does not even satisfy the requirement to provide a reasonable worst-case analysis. This inadequate methodology certainly cannot provide an additional, implicit margin of safety.

- Focusing on summer temperatures from 2011 to 2016 cannot form the basis of an implicit margin of safety. While these temperatures are warmer than average summer temperatures during the last few decades, climate data suggest that they are part of an ongoing and intensifying trend. The Columbia and Snake rivers are unlikely to revert to historical average temperatures in the near future, so the use of recent temperature data does not provide a margin of safety. As explained Section IV, above, the failure to include any load allocations or adaptive measures to address the foreseeable impacts of future climate change makes the implicit margin of safety inadequate.

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[76] *See* EPA, *Guidance for Water Quality-Based Decisions: The TMDL Process*, p. 15 (1991) ("Where there are not reasonable assurances, under the CWA, the entire load reduction must be assigned to point sources."); *see also* 40 C.F.R. § 130.2(i).

[77] 33 U.S.C. § 1313(d)(1)(c).

VII. An inadequate TMDL risks jeopardizing species protected by the Endangered Species Act.

Adequate protections for water temperature are necessary to ensure the continued existence of Columbia and Snake river salmon and steelhead, and the Southern Resident Killer Whales that depend on them. Some Chinook salmon from the Columbia and Snake Rivers migrate through the Salish Sea. The Salish Sea contains Critical Habitat for endangered Southern Residents, and the National Marine Fisheries Service has proposed expanding that Critical Habitat designation to include the marine waters traversed by all Columbia and Snake river Chinook. These Chinook salmon contribute to availability and quality of prey for Southern Residents, which are a Primary Constituent Element of their Critical Habitat. With a population of 72, any action—including a deficient TMDL—that further degrades their habitat and prey availability jeopardizes the continued existence of Southern Residents in violation of Section 7 of the Endangered Species Act.

VIII. The TMDL does not implement applicable tribal water quality standards for temperature in the Columbia River.

The TMDL's temperature targets and load allocations do not address the water quality standards of the Spokane Tribe of Indians or the Confederated Tribes of the Colville Reservation. **Unless EPA's efforts to engage these two tribes in full government-to-government consultation about the TMDL have <u>expressly</u> stated EPA's intention to sidestep[78] these tribal nations' water quality standards, EPA likely is not fulfilling its consultation obligation.** Additionally, ignoring tribal water quality standards "applicable"[79] to the Columbia River results in a TMDL that is not "established at levels necessary to attain and maintain the applicable narrative and numerical [water quality standards]."[80] The tribal water quality standards are significantly different, and in some ways more protective of water temperature and fisheries, than Washington's standards. For instance, the Spokane Tribe of Indian's temperature criteria is 13.5 degrees C in September and October, while Washington's criteria at that time and place is 16 degrees C. Accordingly, a TMDL designed to meet Washington's water quality standards is not a legal or functional substitute for meeting tribal water quality standards. Considering EPA's position that "[i]mplementation of this TMDL is largely the responsibility of State and Tribal governments,"[81] EPA might have at least designed the TMDL to meet the applicable tribal water quality standards.

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[78] TMDL, p. 6 ("In this TMDL, the EPA has not relied upon the CTCR or the Spokane WQS for temperature; this TMDL does not establish allocations for Tribal waters.").

[79] TMDL, p. 6 ("This Section identifies the *applicable* temperature WQS for the mainstems of the Columbia and lower Snake Rivers, including those WQS that have been federally promulgated or adopted by the four governments with jurisdiction over these rivers and approved by EPA: Confederated Tribes of the Colville Reservation (CTCR), Spokane Tribe of Indians, Oregon, and Washington.") (emphasis added).

[80] 40 C.F.R. § 130.7(c)(1).

[81] TMDL, p. 74.

Enclosures:

- Paul Pickett, *Technical Comments on Columbia/Snake TMDL* (2020)
- Affiliated Tribes of Northwest Indians, *Resolution #2020-25*.
- Northwest Environmental Advocates, *Comments on EPA's Draft Columbia River Cold Water Refuges Report* (2019).
- Fish Passage Center, *Requested data summaries and actions regarding sockeye adult fish passage and water temperature issues in the Columbia and Snake rivers* (2015).
- Fish Passage Center, *Review of April 2016 Draft of NOAA Fisheries'* 2015 Sockeye Salmon Passage Report (2016).
- Columbia Riverkeeper *et al.*, *Comments on the CRSO Draft Environmental Impact Statement* (2020).

(b) (6) [redacted]
Olympia, WA 98506

July 21, 2020

To: U.S. EPA Region 10
From: Paul J. Pickett
Subject: TMDL for Temperature in the Columbia and Lower Snake Rivers - Review for Columbia Riverkeeper

Columbia Riverkeeper has contracted with me to review the TMDL for Temperature in the Columbia and Lower Snake Rivers. My summary of key comments is provided below, followed by a full set of my comments on the main TMDL document and Appendices C and D.

I'd like to mention my qualifications for this review. I am an Environmental Engineer and I have been working with computer water quality and hydrology models for over 35 years. I retired last year from the Department of Ecology, where I worked on TMDL studies for Environmental Assessment program beginning in 1991, and was their TMDL technical consistency lead. I was the Department of Ecology's technical lead for the Columbia and Snake River TMDL studies in the early 2000's. I have given papers on TMDL studies at conferences across the United States.

<u>Summary Comments</u>

1. Overall, this TMDL is well done, and is adequate for initiating actions to move towards compliance with the Clean Water Act. There are a variety of technical issues that could strengthen the TMDL and provide more comprehensive protection of the water quality of the Columbia and Snake Rivers and of the endangered salmon that depend on those rivers. The comments I provide should be taken in a constructive spirit, and are intended to strengthen EPA's case that the dams on the Columbia and Snake Rivers, combined with the impacts of water management and other pollutant sources, have had an extraordinary impact on the river and its aquatic species. These impacts violate the Clean Water Act and call for vigorous and creative solutions to protect these natural resources, which belong to every citizen of the United States.
2. The TMDL makes no mention of the Endangered Species Act. The nexus of ESA with the TMDL seems like a critical aspect of managing the Columbia and Snake Rivers. The TMDL should include a brief summary of ESA issues, including listed species and the history of court cases and biological opinions as they relate to water temperatures.
3. The TMDL study area should include the Snake River from the Oregon/Idaho border to the Clearwater River. This stretch is 303d listed, and the technical analysis has been completed. Allocations should be set for this reach.
4. The Oregon/Idaho temperature TMDL for the Snake River upstream of Washington should be described and its potential impacts on the river downstream should be discussed. In particular, the ability of that TMDL to meet Washington Standards should be evaluated, and possible implementation strategies explored that would lower temperatures in Washington. The scenarios that evaluated upstream boundaries show the importance of this issue to downstream water temperatures.
5. The analysis in the TMDL, especially in Appendix D, shows the major impacts of Lake Roosevelt on downstream temperatures. Yet the analysis of Lake Roosevelt is limited, since it simulates the reservoir in one dimension.
    a. The TMDL should include an analysis of the thermal structure of the reservoir.
    b. Show how stratified conditions relate the simplifying assumption of lateral and vertical averaging of temperatures in the reservoir.
    c. Show the spatial extent of water meeting or not meeting criteria, and availability in time and space of conditions suitable to salmonids.

   d. Also evaluate the potential for selective withdrawal to reduce downstream temperatures, such as is done at Dworshak Dam for the Snake River.
   e. Consider using the CE-QUAL-W2 model for Lake Roosevelt and the RBM-10 model downstream of Grand Coulee Dam. At least explain why CE-QUAL-W2 wasn't used for Lake Roosevelt.
6. The TMDL should address all temperature criteria that apply to the Columbia and Snake River, including all Tribal standards, and criteria for all seasons.
7. Irrigation return flows should be included in the TMDL. The locations of return flow should be mapped and listed in tables. Flow and temperature data from irrigation return flows should be described. Load allocations should be set for return flows. The effect of return flows should be included in the analysis of Banks Lake withdrawals. Future increases in Banks Lakes withdrawals and irrigation return flows should also be evaluated.
8. The RMJOC-II analysis provides a powerful data set of Columbia and Snake River hydrology, with and without dams and irrigation water use. The TMDL should evaluate this data set and compare its flow calculations to RMJOC-II. Scenarios for temperature should be developed using the RMJOC-II data set, to evaluate climate change impacts on the current conditions river and a river without regulation or irrigation.
9. A more detailed narrative is needed to summarize the findings in Appendix D. Important information is reported there that explains many of the key drivers of temperatures in the two rivers.
10. The impacts of emerging and future climate change should be evaluated in more detail. The effect of increased air temperatures on worsening the impacts of dams should be clearly presented.
11. The discussion of uncertainty should be expanded to be comprehensive and, when possible, quantitative. The analysis of uncertainty should also review the effect of simplifying assumptions and parameter selection on the scenarios, in particular the free-flowing river scenarios. The TMDL should analyze the effect of uncertainty in the TMDL on potential bias in the analysis and on implicit margins of safety.
12. Two sources of uncertainty in particular need more evaluation: the use of meteorological data from locations far from the rivers, and the use of the evaporation coefficient.
    a. Exploring the weather data by comparison to local sources of data would be one way to confirm the validity of that approach.
    b. The sensitivity of the evaporation coefficient should be explored further, in particular with the free-flowing scenarios.
13. Confirmation scenarios should be run with a split data set. This would help evaluate the effect of the model's assumptions and parameter selection on an extrapolated set of conditions. I use the term "confirmation" ("verification" and "validation" are commonly used terms for the same process), although it might be better described as a quality assessment blind test. The extrapolated run with comparison to measured data would evaluate how much error might be expected in scenarios such as the free-flowing river.
14. The TMDL fails to make the case that the "target locations" represent the location of largest impacts. An analysis of temperatures in each model segment for a limited set of output might help confirm that regulating to the target locations are protective of the river.
15. A reserve is not appropriate for a TMDL where no reasonable assurance can be provided that allocations for the dams will be met. It is reasonable to "grandfather in" existing discharges, but future discharges should find a way to be included in the point source waste load allocation, such as by paying for load reductions of another source. A "bubble allocation" for all point sources would be one way to accomplish this, such as was used in the earlier draft TMDL.

Specific comments

TMDL Section 1

1. Page 1, Section 1.0: no mention of earlier effort?
2. Page 2, Section 1.1, paragraph beginning "One option…":
    a. This paragraph has no relevance to the TMDL and I can see no good reason why it was included.
    b. It also ignores the issue that EPA should be regulating upstream states to protect the water quality of downstream state (Oklahoma v Arkansas). If they want to raise the issue of upstream water quality, they should explain how they are addressing temperatures in the Snake and Clearwater Rivers in Idaho and Oregon.
3. Page 2, Section 1.2: It's not clear why the TMDL begins at the confluence of the Clearwater River. The segment of the Snake River above the Clearwater River is also on the 303d list for Temperature (Listing ID: 14217). This reach should also be addressed in the TMDL.
4. Page 4, Table 1.1: the last two listings for the Snake River are upstream of the Clearwater River and below the Anatone gage. If these two segments are listed, they should be included in the TMDL. In addition, the RBM10 model begins at Anatone, so the Snake River from Anatone to the Clearwater River should have been included.

TMDL Section 2

5. Page 6, Section 2.0: No explanation is provided for why the TMDL does not include the standards of the Colville and Spokane Tribes. The Spokane Tribal standards have more stringent criteria for fall, winter, and spring (September, Oct-March, and April – May). This appears to contradict the statement: "EPA used the most protective of these criteria to develop the TMDL." Therefore, this TMDL may not be protecting Tribal waters, which may be a violation of the Clean Water Act, federal rules, and case law.
6. Page 10, Section 2.3: A TMDL was established for the Snake River upstream of Washington (Idaho and Oregon). The implications of this TMDL on downstream waters should be described and discussed.

TMDL Section 3

7. Page 13, Section 3.0: the period 2011-2016 is a reasonable time frame, based on the information in the DEIS. However, an explanation is needed here as to why it is reasonable. Show the flow and air temperature percentiles for each year.
8. Page 14, Section 3.1:
    a. Explain why July-October were chosen for monthly, and not the entire year. Some of the applicable water quality criteria apply year-round.
    b. The calendar months used have no ecological meaning. Appropriate time periods should be selected based on physical and biological patterns. The appropriate period might begin on the 15th of the month. And shorter averaging periods, such as two weeks, may be more appropriate.
9. Page 16, Table 3.1: Why is the annual maximum higher than any of the monthly maximums at almost every site? If August is the month of warmest temperatures, wouldn't the annual maximum be the same or lower?
10. Pages 17-21, Tables 3.2-3.7: The annual number of days in exceedance is sometimes higher than the sum of days from July through October. In what other months are the temperatures exceeded? Those months should be included in the analysis.
11. Page 26, final paragraph:
    a. Explain why these 23 tributaries were selected.
    b. There are several wasteways where irrigation return flows return to the Columbia River. A list of these should be provided, and temperature data from these described where available.

TMDL Section 4

12. Page 28, Secton 4.0, first paragraph:
    a. Other sources that impact temperature should be mentioned and discussed, and evidence provided to document why they were not included: changes in groundwater inflows; water withdrawals; irrigation return flows; and riparian shading.
        i. Assumptions of negligible impact should be tested with sensitivity analyses.
    b. …"where they enter into Washington from Canada, and from Idaho and Oregon, respectively."
13. Page 29, Section 4.1, first paragraph:
    a. explain why RBM10 was selected for the TMDL. This framework has several weaknesses: it is uniquely developed by EPA Region 10, so it lacks a track record and breadth of application; and it simulated daily averages so it cannot be compared directly to the daily maximum water quality criteria.
    b. Explain why CE-QUAL-W2 wasn't used. This framework has been applied successfully in dozens of applications and provides a dynamic simulation with results as daily maximum temperatures.
14. Page 30, Section 4.2, second paragraph:
    a. The Snake River above Anatone is shared by Idaho and Oregon, and both states should be mentioned.
    b. EPA's evaluation should include whether the temperature TMDL for the Snake River upstream of Anatone is adequate to protect Washington's water quality standards.
15. Page 30, Section 4.2, third paragraph and Table 4-1: Appendix D contains a variety of scenarios that provide important information. Table 3-1 in Appendix D has 13 scenarios, but Table 4-1 only shows 5. This section should summarize all scenarios and their implications for the TMDL.
16. Page 30, Section 4.3: Appendix D shows important information about the effect of climate change on the free-flowing river versus current conditions. The modeling results suggest that a free-flowing river is much more resilient to climate change than the current river, in terms of the magnitude of water temperature increases. This is an important point and should be included in this section and in the analysis of allocations.
17. Page 31, Section 4.4:
    a. "EPA relies on the RBM10 model…as the best available estimates of the temperature changes…" This is a broad claim that cannot be proven. The Corps has used the CEQUAL-W2 model, which may provide a better estimate in some ways. Reword, perhaps: "…as a robust model whose results are of a quality adequate to meet the goals of the TMDL."
    b. This discussion of uncertainty should be expanded. In particular, the spatial and temporal uncertainties created by using a one-dimensional model with a daily average time step should be explored in detail.
    c. RBM10 is particularly weak for Lake Roosevelt, which has stratification and long retention times. The uncertainties this introduces should be discussed.
    d. The title of this section is "Accounting for Uncertainty". However nowhere in the section is any accounting provided. Suggest: "Sources of Uncertainty"
    e. Additional sources of uncertainty are documented below in my notes on Appendix C. These should be described and how they are addressed in the TMDL should be explained.

TMDL Section 5

18. Page 32, final paragraph:
    a. Provide an explanation of the contents of Table 5-1, especially "Plume CWR Volume" and "Stream CWR Volume".
    b. Explain the methodology that allowed EPA to estimate that these tributaries represented 97% of CWRs.
19. Page 33, Figure 5-1:
    a. Why is the John Day River not shown?
    b. Show the state line on the map.

TMDL Section 6

20. Page 35, Section 6.1.1, second paragraph: target sites were the tailraces of dams, and their well-mixed conditions match the model well.
    a. Because they are well-mixed, they may not represent a location where the daily maximum temperature is highest. This is particularly true for Lake Roosevelt, which stratifies and may have much warmer temperatures in surface waters in the reservoir.
    b. The vertical structure of temperature should be analyzed. Evaluate where there are higher temperatures at the surface of the reservoir, and evaluate them for compliance with standards. Also, evaluate where there is cooler water in deeper waters.
    c. The temperature patterns from upstream to downstream in every segment should be evaluated to determine the locations where the highest temperatures occur. Either this will confirm the tailrace as being an acceptable location to evaluate criteria, or the "hot spots" should be included as target locations.
    d. In general EPAs decision to choose "target sites" seems arbitrary and unrelated to compliance with the state's standards. Three alternative locations were provided, with justification for each. If a thorough analysis of model results was conducted to determine critical locations, it should be described. Then either evidence should be provided to show these locations are protective, or an alternative approach developed.
21. Page 36, Table 6-1: Locations should be added for the Hanford Reach (upstream of Snake River); Camas/Washougal (RM 119); Anatone (just below the ID/OR state line); and the Interstate Bridge (Clarkston/Lewiston just upstream of the Clearwater River – Dept. of Ecology monitoring location).
22. Page 38, Table 6-2: Locations should be added for the Hanford Reach (upstream of Snake River); Camas/Washougal (RM 119); and the Interstate Bridge (Clarkston/Lewiston just upstream of the Clearwater River – Dept. of Ecology monitoring location).
23. Page 39, Section 6.2:
    a. "To ensure that critical temperature locations are identified…" It's not clear why longitudinal results were not evaluated to identify the critical locations in the rivers, rather than per-selecting locations.
    b. Were outputs processed at "major tributary confluences" upstream or downstream of the confluence, or both?
    c. It's not clear why it was a conservative assumption that "EPA assumed that historical levels of agricultural withdrawals (2011-2016) would continue." If this is conservative for estimating current conditions, the impact of these withdrawals should be included in determining sources of temperature impairment.
24. Page 40, Section 6.3, Figure 6-1: It's good to include Anatone on this figure. Also include the Hanford Reach (upstream of Snake River); Camas/Washougal (RM 119); and the Interstate Bridge (Clarkston/Lewiston just upstream of the Clearwater River – Dept. of Ecology monitoring location).
25. Page 42, Section 6.4: "…this TMDL is established using the existing temperature data at both borders because there is inadequate information (e.g., data, water quality models) to evaluate potential future actions that may be taken near these locations and therefore inadequate information to estimate any resulting temperature changes that may occur in the future." This is not exactly true – there is a temperature TMDL for the Snake River upstream of the Washington border. This TMDL should be evaluated both for the long term effect on downstream temperatures if fully implemented, and on its adequacy to protect Washington's Water Quality Standards.
26. Page 42, Section 6.5, general: Two issues should be addressed by the TMDL, probably in this section
    a. Temperatures in fish ladders are often above state temperature criteria. This problem should be analyzed and fish ladders at each dam should have allocations set and implementation strategies.
    b. Reservoirs have inundated tributaries and lost cool habitat. This is related to cold water refuges, but goes beyond that. The loss of critical habitat from cool areas being inundated by warm reservoir waters should be quantified and specifically addressed by allocations and implementation.

27. <u>Page 44, Table 6-4:</u> Missing Ice Harbor Dam.
28. <u>Page 45, Section 6.5.1:</u> “The daily average temperature is therefore a more conservative indicator of dam impact. This component of the analysis is considered as a margin of safety (Section 6.6).” This is an appropriate approach to provide a margin of safety.
29. <u>Page 60, Section 6.5.3, next to last paragraph in this section:</u> Providing no allocations for stormwater NPDES permits is effectively a “zero discharge” requirement. However, a summer thunderstorm on warm pavement, which then discharges to the river, could be a significant load in a large urban area. As part of implementation, EPA and the State of Washington should enforce zero discharge and eliminate summer stormwater discharges.
30. <u>Page 61, Section 6.5.4:</u>
    a. A reserve is not appropriate for additional point sources that can increase temperatures, given that reasonable assurance for reducing temperatures from dams is unlikely, the river will remain impaired, and additional point sources will increase impairment. The TMDL should be design to discourage new point source of water above criteria, and encourage the reduction and elimination of discharges.
    b. A zero reserve would incentivize point sources to reduce effluent temperatures, if they could “sell” part of the allocation for future growth. This would set a “no net increase” in point source temperatures in place.
    c. In general, a mechanism should be included in the TMDL to encourage reduced point source temperatures, since climate change is likely to increase the temperatures of effluent, especially from stormwater and lagoon treatment systems.
31. <u>Section 6, general:</u> Impacts from irrigation diversions and return flows should be estimated and reported in the TMDL.
    a. Although diversions do not receive allocations, their effect on temperature should still be evaluated so that their impacts are understood, and overall restoration can take them into account.
    b. Irrigation return flows may be significantly large and warm as a whole, and their impacts also need to be quantified and included in load allocations.
    c. The RMJOC-II hydrologic modeling exercise provides the input data needed to evaluate these impacts.
    d. Future plans for increased Banks Lake withdrawals and increased irrigation return flows should be included in the TMDL.
32. <u>Page 64, Section 6.5.6:</u> Additional information should be provided for these CWR tributaries: 303d listings for temperature; degree of impairment (temperature above criteria); and target dates for state TMDL studies (where known)
33. <u>Page 65, Section 6.6:</u>
    a. First bullet: two different metrics are combined here. Using the DM instead of 7-DADM is a conservative assumption. But averaging 6 years may or may not be conservative, so it should be discussed separately.
        i. The average of the 6 years may be conservative if, as past studies have suggested, a median year has a bigger impact than a hot year. This should be discussed, with evidence, in more detail
    b. Third bullet:
        i. The reserve allowance is not a margin of safety, for the reason noted (may be eventually used up),
        ii. As noted in an earlier comment, stormwater sources were not included, which takes away from the margin of safety if warm stormwater discharges continue to occur.
    c. Fourth bullet: this is not necessarily a conservative assumption. Impacts may be larger in a moderate year than in a hot years. However, my understanding is that those six years represented a representative range of flow and temperature conditions. As noted in an earlier comment, the TMDL should document the conditions in those 6 years (percentiles of flow and air temperatures compared to historical).
    d. Starting with “In addition to the above, …”, through the rest of the section: the quality of the model should be documented in the framework section (section 4.1), but does not count as a margin of safety.

34. Page 70, two bullets on the bottom of the page: Other sources of warming should be included on this list, including irrigation return flows, reduced groundwater inflows, and increased water withdrawals.

Appendix C

35. Sources of uncertainty for this model include:
    a. Topographic and riparian shade assumed negligible
    b. Sediment heat exchange assumed negligible
    c. Groundwater and hyporheic flow and heat exchange assumed negligible. This neglect of this term could present problems for the no-dams scenario, since actual conditions without dams may be cooler when these terms are included.
    d. Reservoir elevation change assumed negligible (except for Grand Coulee)
    e. Lake Roosevelt elevation changes and Grand Coulee Dam outflows are decoupled.
    f. Flow is routed by simple mass balance and continuity
    g. Smaller tributaries that were not included assumed negligible
        i. Irrigation return flows (CBIP wasteways)
        ii. Sanpoil, White Salmon, Little White Salmon, and Wind Rivers
        iii. Willamette River tributaries downstream of the gage (which is quite a ways upstream)
    h. River gradient is high enough to assume no attenuation and simple travel time calculation
    i. Estimated temperatures for the Hood, Sandy, and Kalama Rivers were based on the Deschutes River This appears to be a poor choice, since the Deschutes is a much different system from the other three.
    j. Meteorological stations are widely dispersed, and in two cases (Spokane and Yakima) far from the river.
        i. "In addition, the meteorological data were similar between most of the selected stations, indicating that the number and distribution of stations provided adequate spatial resolution of meteorological conditions throughout the model domain area." No explanation of what "similar" means and how it was tested.
        ii. A comparison of the met station used to the more widely dispersed AgriMet stations could help assess the variability introduced from the stations selected.
    k. Calibration to heat flux transfer coefficients E*v* runs the risk of curve-fitting. Approach used was reasonable, but a model verification run would help to assess the impact of E*v* values.
    l. Variability of dam operations alter the mass balance of the flow regime. This is related to the run-of-the river assumption, since changes in dam operations implies that the outflows of the reservoir are being manipulated and reservoir elevations change.

    These sources of uncertainty should be discussed in Section 4.4 of the TMDL, and also in Appendix D as part of an evaluation of uncertainty of the scenarios.
36. Section 3.0, Calibration
    a. The temperature calibration metrics are not unusual for temperature modeling, and especially for a model of a system this large.
    b. The model performance was less accurate for the Snake River in the fall, although still within a reasonable range. This should be investigated.
    c. Underprediction of flows raises questions. It could reflect the absence of irrigation return flows and groundwater inflows. The flow balance from RMJOC-II should be compared to the model flows to see if there are significant discrepancies.
    d. Graphical results look reasonable
37. Section 4.0 – alternative upstream boundaries
    a. It's reassuring that moving the boundary downstream improves it a little but not a lot. Whenever the model domain is made shorter, the results are likely to improve regardless. But more on that after reviewing the appendix.
38. Section 5.0 Sensitivity Analyses

a. The number of parameters analyzed was fairly limited. The sensitivity to the evaporation coefficient adds to concerns about the use of this parameter to calibrate. This reinforces the need for a confirmation scenario.
b. An interesting pattern is that increased temperature and increase evaporation coefficient offset each other. So if local air temperatures are incorrect (difference between met station and river location) the evaporation coefficient would be offsetting that error. So the model could be trading incorrect temperatures with incorrect wind. Again, a possibility of curve-fitting here.
c. The sensitivity of river temperatures to upstream temperatures is significant. This points to the question raised in the main TMDL about the Snake River TMDL in Idaho and Oregon. It would be interesting to plug in a scenario with a successful TMDL upstream. Of course, the upstream TMDL is doing "offsets" – cooling tributaries to offset reservoir temperatures. I wonder what affect that could have on the Snake in Washington?
    i. Likewise, Lake Roosevelt stratifies a bit. The model suggests the tailrace represents average temperatures in the reservoir. Or does? Maybe the tailrace represents surface water temperatures. With a one-dimensional model, there's no way of telling. Perhaps cool water from deeper in the lake could be selectively withdrawn to cool the river below Grand Coulee? If they have vertical temperature profiles, perhaps the "version B" model could be run with relatively cool hypolimnetic temperatures.
    ii. But Lake Roosevelt needs a two-dimensional model . I believe Portland State has developed one. Perhaps EPA should use the 2-D CE-QUAL-W2 model in Lake Roosevelt, and start RBM10 at the Coulee tailrace. Then the model could test selective withdrawal from Lake Roosevelt.

39. The lack of a confirmation run is concerning. The input data set should have been split and the model calibrated with one set, and then rerun with the second data set without changing calibration. This would provide more information about model quality and uncertainty introduced from the framework and input variables.
    In particular, it would assess whether calibrating to the evaporation coefficient constituted "curve fitting" (artificially achieving a better fit to observe data by a parameter with no physical meaning), or if it represented an estimate of legitimate local conditions that weren't measured. This is important since the no-dam scenarios would depend on the appropriateness of the evaporation coefficient, and the potential accuracy of extrapolating to unmeasurable conditions is unknown.
40. Based on past reviews of temperature models, local wind conditions can be the biggest factor providing uncertainty in a model. CE-QUAL-W2 provides wind sheltering coefficients that are site specific. RBM10 calibrated by adjusting heat flux coefficients for each weather station by season, effectively adjusting wind and relative humidity data for each met station to improve the model's fit. (I infer that air vapor pressure is derived from weather station relative humidity, water surface vapor pressure from the temperature of the water.) This may be a major source of uncertainty. Local wind data where available should be compared to the data used for the model. A sensitivity run with local data substituted for NWS stations should be considered.

Appendix D

41. Overall the analysis of Appendix D is well done and informative. Some areas to consider improvements follow.
42. Page 8, Section 2.2.3: The discussion on this page has several problems
    a. "EPA achieved these goals through the following actions:" The action listed do not make a convincing case that this statement is true.
    b. First bullet: aggregating 6 years will lose the variation between years, which is part of "critical conditions".
    c. Second bullet: monthly averaging may lose important information on critical periods, such as a heat wave lasting less than a month. In addition, there is no physical or biologic reason to use a calendar month.
    d. Fourth bullet: "mean and 90^{th} percentile level" – of what?
    e. Fifth bullet: no evidence is provided that the locations selected were "worst-case locations of impact". Assuming that it's true does not "ensure" that it's true.
43. Page 13: "A single-day outlier…" this discussion emphasizes the concern expressed in other comments about the potential influence of the evaporation coefficient on the accuracy of the model when extrapolating outside observed conditions. There is uncertainty about the physical meaning of the evaporation coefficient how it contributes to uncertainty in the scenarios. As noted elsewhere, a confirmation model run is called for.
44. Table 3-1, row WD1: "…without the diversion/return flow." How was return flow modeled? The irrigation return flows were not included as tributaries. See earlier comment about including irrigation return flow in the model.
45. Page 33," A multiplier of 1.3 was applied to the Canyon data…": Total annual water volumes should be similar for the with- and without-Dworshak Dam flow inputs. Was that tested? If it was, show that as additional evidence of the reasonableness of that approach.
46. Page 34, "The Ahsakha temperatures were looped for each year…": was the possibility considered of finding six years in the Ahsakha temperature record that match the 6 scenario years, in terms of total flow and air temperatures, or in terms of percentile distributions? This could have been a more robust approach.
47. Figures 3-27 and 3-28: Yakima, <u>Oregon</u> ???
48. Page 76, Section 3.8.3: This analysis and its description seem weak. The source reference used was from a study in Ontario, which has many differences from the Columbia Basin. No local information was used to compare the analysis results. It's hard to believe there are no studies that provide estimates of summer stormwater volume and water temperatures. Many cities are using models to estimate stormwater runoff. There may also be studies of stormwater where temperatures were taken. This analysis provides no information on the precipitation used for the assessment or how flow volumes were calculated. The results show the impact by reach, but it's not clear where the largest impact occurred. It's also not clear which model was used. The impacts of stormwater on the free-flowing river should be assessed.
49. Page 77, Section 3.9: There is no discussion of how outflows were handled, since apparently irrigation return flows were not included in the model. It's not clear if the analysis considers both the effect of flow diversion and return flows of heated water.
50. Page 84, Section 5.0: more discussion of uncertainty should be provided. Which factors likely have the greatest effect? Do the sources of uncertainty add a bias to the analysis of scenarios, and does that bias tend to increase or decrease impacts?

2020 Mid-Year Virtual Convention

RESOLUTION #2020 – 25

"SUPPORT TRIBAL AND STATE AUTHORITY TO PROTECT WATER QUALITY AND RESTORE COLUMBIA RIVER BASIN SALMON"

PREAMBLE

We, the members of the Affiliated Tribes of Northwest Indians of the United States, invoking the divine blessing of the Creator upon our efforts and purposes, in order to preserve for ourselves and our descendants rights secured under Indian Treaties, Executive Orders, and benefits to which we are entitled under the laws and constitution of the United States and several states, to enlighten the public toward a better understanding of the Indian people, to preserve Indian cultural values, and otherwise to promote the welfare of the Indian people, do hereby establish and submit the following resolution:

WHEREAS, the Affiliated Tribes of Northwest Indians (ATNI) are representatives of and advocates for national, regional, and specific tribal concerns; and

WHEREAS, ATNI is a regional organization comprised of American Indians/Alaska Natives and tribes in the states of Washington, Idaho, Oregon, Montana, Nevada, Northern California, and Alaska; and

WHEREAS, the health, safety, welfare, education, economic and employment opportunity, and preservation of cultural and natural resources are primary goals and objectives of the ATNI; and

WHEREAS, as indigenous peoples, we honor in all ways our relation to Creation and in that spirit acknowledge a sacred obligation to ensure all our relations are treated in a dignified manner that reflects tribal cultural values that have been passed down for countless generations; and

WHEREAS, the southern resident orcas and wild Columbia River basin salmon are integral parts of Pacific Northwest tribal culture and economy; and

WHEREAS, many northwest tribes have treaty and/or ceremonial rights guaranteeing their ability to take and consume Columbia River basin salmon in perpetuity; and

WHEREAS, the efforts of numerous agencies and tribes have thus far achieved limited success in restoring native Columbia River basin salmon runs, and many such runs—especially in the Snake River basin—have gone extinct or are approaching extinction; and

WHEREAS, in 2015, Columbia Basin salmon experienced high-water temperatures that delayed adult salmon migration and ultimately caused record-high mortality, including the near-complete failure of that year's Snake River sockeye run; and

WHEREAS, the Lower Snake and Columbia rivers routinely exceed tribal and state water quality standards or temperature designed to protect salmon migration, and attainment of these tribal and state standards would improve migration and reproductive success for Columbia River basin salmon; and

WHEREAS, adult salmon that encounter and are forced to hold in warm water during their upstream migration begin dying from stress and disease, and heat-stressed salmon are also more likely to succumb to predators, stray from their natal streams, and experience reduced reproductive success; and

WHEREAS, the best available science shows that the four Lower Snake River dams, and certain Columbia River dams, are the main causes of human-induced water temperature problems, and temperatures in a free-flowing Lower Snake River would be much more supportive of successful salmon migration and spawning; and

WHEREAS, the U.S. Environmental Protection Agency (EPA) released a temperature Total Maximum Daily Load (TMDL) analysis under the Clean Water Act that identifies temperature reductions, called Load Allocations, for certain dams on the Lower Snake and Columbia rivers necessary to meet water quality standards for temperature and fully support salmon migration; and

WHEREAS, the Washington Department of Ecology recently exercised its broad authority under Section 401 of the Clean Water Act to protect water quality and fisheries by issuing conditions (hereinafter, "401 Certifications") regarding the lower Columbia and Lower Snake River dams operated by the U.S. Army Corps of Engineers (Corps); and

WHEREAS, Washington's 401 Certifications legally require the Corps' dams to meet Washington's water quality standards for temperature and all other pollutants, including meeting the Load Allocations in EPA's temperature TMDL; now

THEREFORE BE IT RESOLVED, that ATNI supports the Washington Department of Ecology's 401 Certifications for dams on the Lower Snake and Columbia rivers to address temperature and other water quality issues and meet the Load Allocations in EPA's temperature TMDL; and

BE IT FURTHER RESOLVED, that ATNI hereby calls upon the Corps to withdraw its appeal of Washington's 401 Certifications; and

BE IT FINALLY RESOLVED, that ATNI hereby calls upon EPA to withdraw its recent re-interpretation of Clean Water Act Section 401, through which EPA purports to deprive tribes and states of their authority, granted by federal law, to protect water quality and fisheries.

CERTIFICATION

The foregoing resolution was adopted at the 2020 Virtual Mid-Year Convention of the Affiliated Tribes of Northwest Indians, Portland, Oregon, on June 30 – July 2, 2020, with a quorum present.

Leonard Forsman, President

Norma Jean Louie, Secretary

NORTHWEST ENVIRONMENTAL ADVOCATES

November 19, 2019

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Re: **Columbia River Cold Water Refuges Plan, DRAFT (Oct. 2019)**

Dear John:

Approximately a quarter century after the Oregon 1992–1994 triennial review that ended in 1996—the first triennial review in which the importance of thermal refugia was first identified as a key part of providing designated use protection—the U.S. Environmental Protection Agency (EPA) has issued a purported plan to ensure that such refugia offset the hazards salmonids face in migrating through the increasingly hot waters of the Columbia River. Two lawsuits against EPA later; two lawsuits against the National Marine Fisheries Service (NMFS) later; two NMFS biological opinions later, two EPA Region 10 temperature guidance documents later . . . EPA has finally issued a draft plan to identify, evaluate, and possibly protect thermal refugia in the Columbia River. EPA, *Columbia River Cold Water Refuges Plan, DRAFT* (Oct. 2019) (hereinafter "Plan").

In our opinion, while the scientific information about salmonids' use of refugia is impressive and generally easy to understand, the "plan" aspect of this plan is so seriously lacking as to not exist. Plan: "a method of achieving an end." Merriam-Webster, *available at* https://www.merriam-webster.com/ dictionary/plan. Plan: "An orderly or step-by-step conception or proposal for accomplishing an objective" or "[a] proposed or intended course of action." The American Heritage Dictionary of the English Language, 5th Edition, *available at* https://www.wordnik.com/words/plan. This EPA plan is not a plan. It is a very nice report that contains a conclusion—that there are likely sufficient refugia now but will not be in the future—and that cites many other plans and makes such tepid recommendations that one is fearful of calling them recommendations. Certainly recommending that someone, somewhere, at some time, follow some other group of plans is not a plan itself. It's a dodge. It is EPA failing to do anything at all to generate a sense of urgency to state governments that they must take actions to address their failing nonpoint source control programs (and other related failings, such as water flow management, dams, etc.), and to set out the actions that EPA and other federal agencies must take or should take. In a plan that relies heavily on statements about protecting riparian vegetation, remarkably EPA says absolutely nothing about its own role in ensuring that states protect and restore forested riparian vegetation. In fact, this plan says very little about changing fundamental aspects of the regulatory status quo under the Clean Water Act and state legal authorities even in those instances when EPA hints broadly at it.

Prior to jumping into the first section on the regulatory background, this document should give a short discussion of why temperature is an important water pollution issue to address, why the Columbia is of particular importance, why EPA believes that thermal refugia offer relief from a 20º C criterion but not warmer temperatures, the role of uncertainty in EPA's beliefs, and briefly discuss that which is rather obliquely referred to later in the document, namely the 2015 death of sockeye that EPA describes as "the use of CWR [cold water refugia] is seen as an ineffective migration strategy for these fish." *Plan* at 24.

I. <u>Page by Page Review</u>

1.1 REGULATORY BACKGROUND

Page 2 – This page includes what is purportedly a quotation from Oregon's water quality standards that says "the Lower Columbia River: 'must have coldwater refugia that's sufficiently distributed so as to allow salmon and steelhead migration without significant adverse effects from higher water temperatures elsewhere in the water body.'" Despite its having quotation marks, this is not an accurate quotation because Oregon's water quality standards are not grammatically incorrect and do not include contractions. Also, there should be a citation added: OAR 340-041-0028(4)(d). In addition, EPA should include information about the designated uses in the Columbia River as designated by the State of Washington. *See* WAC 173-201A-602. Instead, EPA focuses only on those waters that are covered by the Oregon narrative criterion, as if the designated uses on their own—which presumably are identical or near identical in both states—do not demand the same protection to salmonids as that provided by the Oregon narrative criterion, namely the ability to migrate through the Columbia River to their natal streams. EPA should make clear that its analysis meets Washington's water quality standards as well as the Reasonable and Prudent Alternative set out in the NMFS Biological Opinion that caused EPA to issue the plan. *See* NMFS, *Endangered Species Act Biological Opinion on the Environmental Protection Agency's Proposed Approval of Certain Oregon Water Quality Standards Including Temperature and Intergravel Dissolved Oxygen* (Nov. 3, 2015) (hereinafter "NMFS Biological Opinion").

The same is true with regard to Oregon's definition of cold water refugia, which requires only that the refugia be "at least 2 degrees Celsius colder than the daily maximum temperature of the adjacent well mixed flow of the water body." While the NMFS Biological Opinion did not find that this definition jeopardizes salmonids, it is obvious that at some set of elevated temperatures that are two degrees Celsius from each other, this definition no longer protects the designated uses even if the lower of the temperatures poses less of a threat. Given that EPA finds that Lower Columbia River temperatures "reach peak temperatures of about 22°C in mid-August," *Plan* at 24, and EPA has also found that two degrees less than 22º C, namely 20º C, causes "significant disease risk," *Plan* at Table 4-1, the definition is already inconsistent with facts in the water. As EPA goes on to predict rising temperatures in both the Columbia River and the tributaries that provide the thermal refugia, EPA's failure to discuss the definition, as if it were set in regulatory stone, is a significant misstep. These increased temperatures are in the range of very high deleterious effects, as demonstrated by the summary of those effects in Table 4-1. Elsewhere, as in Recommendation No. 26 part c, EPA mentions that steps might be taken under the Clean Water Act to provide more protection so it is not as if EPA considers such matters as outside the scope of this document. *See Plan* at 161 ("Consider special designations, antidegradation policies, and/or narrative water quality criteria as appropriate to prevent warming above current temperatures and maintain existing flows in the 12 priority CWR tributaries.").

Page 2 – We humbly suggest that EPA should cite the name of the case that invalidated the Endangered Species Act consultation that led to this plan. The citation for that case is: *Northwest Environmental Advocates v. U.S. E.P.A.*, 855 F.Supp.2d 1199, 1128 (2012). Note that the original NMFS Biological Opinion listed cold water refugia as a mitigating factor for the adverse effects of the EPA-approved water quality standards on salmonids. *Id*. In fact, three of the six mitigating factors were about refugia. *Id.* ("To support its conclusion, the NMFS listed six mitigating factors, including: . . . (3) the provision for cold water refugia, (4) consideration of aspects of water temperature cycles and refugia, (5) the narrative criterion protecting migration without significant adverse effects[.]"). But for this NWEA lawsuit, NMFS would not have developed any analysis demonstrating that the State of Oregon was ignoring this key provision of the EPA-approved water quality standards. But for this lawsuit, EPA would not have developed any analysis of whether the cold water refugia are and will be in the future sufficient to protect migrating salmon in the Lower Columbia River.

Page 3 – It is unclear why EPA makes reference to NMFS's having concluded that "evidence in the record" indicated the refugia narrative criterion was not being implemented. There was no "record" other than what NMFS compiled in the course of its evaluation.

Page 3 – This EPA plan should make reference to the Willamette and what is or is not happening with that corollary plan but the word literally is not to be found in this document.

1.2 Types of Cold Water Refuges

Page 3 – The discussion of refugia in stratified reservoirs mentions that fish may reside in "cooler water at depth." It does not state whether this cooler water may be impaired in other ways, such as lack of dissolved oxygen, that would render it unsuitable for salmonids.

1.3 Overview of the Columbia River Cold Water Refuges Plan

Pages 3–5 – EPA states that the geographic scope of its plan is "focused on the Lower Columbia River between the mouth and river mile 309 (Oregon-Washington border), where the Oregon cold water narrative criteria applies (Figure 1-1)." EPA's plan is inadequate as it suggests a lack of a legal requirement to protect the migrating salmon from the 20º C criterion in Washington State based on the lack of a similar refugia-specific narrative criterion. The Clean Water Act is clear that designated uses must be protected regardless of the criteria. *PUD No. 1 of Jefferson Cnty. v. Wash. Dept. of Ecology*, 511 U.S. 700 (1994). We agree that EPA should have, as it says it did, extended its analysis to the Snake River even though the rationale—"since the Snake River entry at river mile 325 is near the Oregon-Washington border"—is flawed. Based on the current August mean water temperature reported by EPA, *Plan* at Fig 2-1, and Washington's designated uses, EPA should have included the portion of the Columbia River in Washington State.

Pages 9–10 – Figures 2-5 and 2-6 are of significant importance and should be available for the public and various agencies to see with the kind of detail that cannot be achieved in a print format, or at least the print format that EPA offers here. Specifically, EPA should offer the reader the ability to access these figures online with the ability to zoom in on details and/or it should print portions of the overall map at a scale that allows the details to be read. Without the details, the information is not useable. Likewise, Figure 2-7 should be prepared with an on-line version that labels all of the tributaries.

Page 25 – EPA shows on Figure 3-1 that the "[r]efuge use" is during the period of time in which temperatures at Bonneville Dam exceed 20º C. However, the text and Figure 3-2 say something different: "As shown in Figure 3-2, migrating steelhead begin to use CWR when the Columbia River temperature reaches 19°C, and when temperatures are 20°C or higher approximately 60-80% of the steelhead use CWR." Therefore, the indication of refugia use on Figure 3-1 is incorrect because it does not reflect the use of refugia when temperatures reach 19º C and it purports to include steelhead.

Page 28 – EPA needs to discuss the ramifications for its conclusion that some salmonids are not using cold water refugia to mitigate their exposure to high water temperatures. EPA's approval of the Oregon 20º C criterion was based on the narrative criteria that accompany it. If some species of salmonids are being harmed by or are not protected by the 20º C criterion and do not use the thermal refugia to mitigate that harm, then Oregon's water quality standards are not performing the function for which they were adopted and approved by EPA. Specifically, EPA finds that sockeye "are most susceptible to warm temperatures with limited mortality at 19-20°C and significant mortality at 20-21°C." *Plan* at 45. Sockeye do not appear to use refugia. *Id*. at 54. Yet, in 2015, "Lower Columbia river temperatures were significantly warmer than average during the June-July sockeye run, reaching 20°C (68°F) at the peak of the run, in late June." *Id.*

at 55; *see also id.* Fig 4-7. EPA recounts the results that year:

> In early June when river temperatures were below 19°C, survival between the two dams was high (90-100%). During week 4 in Figure 4-8 (June 22–28), when river temperature climbed above 20°C, survival dropped to 70% for Columbia River sockeye and 50% for Snake River sockeye (10% for Snake River sockeye transported as juveniles). In weeks 5-8, when river temperatures exceeded 21°C, survival was very low (0-20%). Because most of the Snake River sockeye migrated in late June and July, the overall survival for Snake River sockeye between Bonneville Dam and McNary Dam was only 15% in 2015 (FPC 2015).

Id. at 55. EPA's own conclusion demonstrates that Oregon's temperature standards do not protect sockeye. Either new numeric criteria that correspond to the runs of species that are not using the river during the very highest temperatures but that are affected by high temperatures during their period of river use need to be adopted or some other solution must be found in the water quality standards. The fact that this plan finds that the refugia do not provide mitigation to all salmonids migrating through the Lower Columbia River means that this plan must set out a solution to that regulatory problem. It does not, however, even engage in the topic.

3.4 STEELHEAD USE OF COLD WATER REFUGES

Pages 30–35 – EPA explains how it has calculated the number of steelhead using the refugia and the estimated density. It does not mention here that the density in combination with the temperatures to which the fish are exposed increase adverse impacts of fish disease. Later in the plan, we see that EPA has identified the carrying capacity of the refugia as an issue that needs research. *Plan* at 157 ("high densities of adult fish are known to contribute to the spread of disease."). Nonetheless, EPA should address the issue to the best of its ability without the benefit of the research it has flagged is needed. The very heart of the question of whether there are sufficient refugia, as the plan is required to address, involves whether use of the refugia identified are sufficient to harbor fish, including without increasing their risk of disease from proximity. Instead, the plan's only references to disease, other than in the context of the needed research, is the disease caused by higher temperatures.

3.5 FALL CHINOOK USE OF COLD WATER REFUGES

Pages 35–37 – Same comment as immediately above.

Pages 38–39 – EPA concludes that salmonids did not historically rely on cold water refugia to the degree that they do now, with the higher river temperatures. Again, this suggests that EPA should discuss the impact of fish disease and the metabolic effects of holding in refugia on this reliance.

4.1 ADVERSE TEMPERATURE EFFECTS TO MIGRATING ADULT SALMON AND STEELHEAD

Page 45 – In the first paragraph, EPA states that Oregon and Washington have a 20º C maximum water quality criterion for the Columbia River, which is consistent with EPA's recommended criteria. This is incorrect. First, as EPA knows, Oregon's standard includes additional narratives—one of which is the subject of this very document—because 20º C is not sufficiently protective. Second, EPA Region10's recommendations to states on water quality standards for temperature mirror EPA's belief that the 20º C criterion is not sufficiently protective:

> To protect this use, EPA recommends a 20°C maximum 7DADM numeric criterion plus a narrative provision that would require the protection, and where feasible, the restoration of the natural thermal regime. EPA believes that a 20°C criterion would protect migrating juveniles and adults from lethal temperatures and would prevent migration blockage conditions. However, EPA is concerned that rivers with significant hydrologic alterations (e.g., rivers with dams and reservoirs, water withdrawals, and/or significant river channelization) may experience a loss of temperature diversity in the river, such that maximum temperatures occur for an extended period of time and there is little cold water refugia available for fish to escape maximum temperatures.
>
> In this case, even if the river meets a 20°C criterion for maximum temperatures, the duration of exposure to 20°C temperatures may cause adverse effects in the form of increased disease and decreased swimming performance in adults, and increased disease, impaired smoltification, reduced growth, and increased predation for late emigrating juveniles (e.g., fall chinook in the Columbia and Snake Rivers). Therefore, in order to protect this use with a 20°C criterion, it may be necessary for a State or Tribe to supplement the numeric criterion with a narrative provision to protect and, where feasible, restore the natural thermal regime for rivers with significant hydrologic alterations. Critical aspects of the natural thermal regime that should be protected and restored include: the spatial extent of cold water refugia (generally defined as waters that are 2°C colder than the surrounding water), the diurnal temperature variation, the seasonal temperature variation (i.e., number of days at or near the maximum temperature), and shifts in the annual temperature pattern. The narrative provision should call for the protection, and where feasible, the restoration of these aspects of the natural temperature regime. EPA notes that the protection of existing cold water refugia should already be provided by the State's or Tribe's antidegradation provisions or by the cold water protection provisions discussed in Section V.2 below. Thus, the new concept introduced by the narrative provision EPA recommends here is the restoration of the natural thermal regime, where feasible.

EPA, *EPA Region 10 Guidance For Pacific Northwest State and Tribal Temperature Water Quality Standards* (April 2003) at 29.

4.5 Energy Loss and Pre-Spawning Mortality of Fall Chinook Salmon from Exposure to Warm Migration Temperatures

Page 54 – The paragraph on the likely effects of climate change ("Under simple temperature increases of . . . .") on timing of and survival after increased temperatures is oddly placed in the document. We do not object to its being here so long as the information is also repeated later on in the document where climate change is discussed.

4.6 Increased Mortality and Shift in Run Timing of Sockeye and Summer Chinook from Warm Migration Temperatures

Page 54 – Discussing the hazards to sockeye of delaying migration by using cold water refugia omits any statement as to whether the timing of their migration is the same as it was historically or it is altered. This is relevant information that should be included one way or the other. What EPA describes in this section is sockeye that are stuck between a "rock and a hard place." On one hand, if they use the refugia and delay, they will be harmed by warmer upstream temperatures and by not using the refugia they are harmed by the downstream temperatures.

Page 55 – Fig. 4-7 should have temperatures converted or added to reflect the Celsius temperatures used throughout the document. The same is true of Fig. 4-11 on page 59 and possibly other figures.

Pages 56–57 – The information set out in this section supports the need for EPA to interpret the designated uses and existing uses, as protected under the antidegradation policies of the states consistent with federal rules, of the Columbia as requiring protection, as discussed above. For example, EPA states that, "[o]ver time, because the June sockeye migrants are more successful, the genetic traits of the June migrants increase as a percentage of the population, contributing to the shift in migration timing (Crozier et al. 2011)." And, EPA says that "Figure 4-10 shows how increasing July river temperatures at Bonneville Dam (Panel B) over the past 60 years has resulted in earlier migration of Columbia River sockeye salmon." Likewise, EPA states that, "much like the sockeye salmon run, the summer Chinook run has also shifted to earlier in the year, likely in response to rising July temperatures." *Plan* at 59. EPA is silent on protection of these species as existing uses even though they are protected by state water quality standards. *See, e.g.*, OAR 340-04100004(1); *Northwest Environmental Advocates v. U.S.E.P.A.*, 855 F.Supp.2d 1199, 1220-1222 (D. Or. 2012).

5.1 HISTORIC TEMPERATURE CONDITIONS OF THE LOWER COLUMBIA RIVER

Page 61 – When "EPA notes that flow regulation, land use changes, natural variability, and other factors likely influenced the observed changes, and increased water temperatures may not be ascribed solely to anthropogenic climate change influences," EPA should also note that it is long overdue to prepare a temperature Total Maximum Daily Load (TMDL) for the Columbia River, pursuant to section 303(d) of the Clean Water Act, a regulatory document in which this refugia information must be included.

5.2 FUTURE TEMPERATURE CONDITIONS OF THE LOWER COLUMBIA RIVER AND ITS TRIBUTARIES

Pages 64–67 – EPA concludes:

> It is therefore likely that fewer salmon and steelhead will migrate in the Lower Columbia River during mid-July through August in the future under these warming trends, resulting in a change in the timing of salmon and steelhead runs. Adult sockeye salmon and summer Chinook will likely continue to migrate earlier as already observed, with very few migrants in July. Adult fall Chinook are likely to migrate later with minimal migrants in August, and those that do migrate then will likely need to use CWR to have sufficient energy to successfully spawn. Steelhead may use CWR for longer duration to avoid peak temperatures, or they may not be able to use CWR over the mid-summer like they currently do because mainstem temperatures are too warm in late July/early August for steelhead to reach the CWR in the Bonneville reach. If the latter proves true, this may result in a bi-modal migration pattern for steelhead with early summer and late summer runs. However, whether these species can shift their migration timing to adapt to the rate of warming, and whether such shifts can be done successfully without disruption to their full freshwater life cycle, is uncertain (Crozier et al. 2011 and Keefer & Caudill 2017).

Plan at 64. On page 66, EPA goes on to say that

> Temperatures in the tributaries to the Lower Columbia River, including the 23 tributaries that currently provide CWR, are also predicted to increase due to climate change. Table 5-1 displays the predicted increase in August mean temperatures for the 23 CWR tributaries (12 primary CWR highlighted in blue) using the NorWeST SSN model (Appendix 12.17). August mean temperatures for the CWR tributaries are predicted to increase by 1.2–1.5°C by 2040 and by 2.1–2.7°C by 2080 relative to current baseline (1995–2011).

> Of significant concern are those primary CWR tributaries that are predicted to have August mean temperatures that exceed 18°C. Tributary temperatures exceeding 18°C, although still serving as CWR if more than 2°C cooler than the Columbia River, are at levels associated with increased risk of disease and energy loss. For instance, by 2040, the Deschutes, Lewis, and Sandy Rivers are predicted to exceed 18°C, temperatures that will diminish their CWR function. By 2080, the Cowlitz, White Salmon, and Klickitat Rivers are predicted to have August mean temperatures exceeding 18°C, diminishing their CWR function.

Id. at 66. So how does EPA conclude that there are sufficient thermal refugia to meet the standard?

6.1 CWR SUFFICIENCY ASSESSMENT FRAMEWORK

Page 67 – EPA complains that evaluating whether the existing refugia are sufficient to meet the requirements of the Oregon water quality standards that it approved is "complex" because Oregon does not have "quantitative metrics to define what is sufficient." This lack of clarity is a reflection of EPA's own disinterest in the role of the refugia in real life. Oregon clearly, by its inaction that was highlighted by the NMFS BiOp, was only interested in tacking on the cold water refugia narrative criterion in order to get EPA to approve a temperature criterion of 20º C that it knew was not protective of salmonids. At the time of the EPA approval, EPA was well aware that Oregon had no plan and no intention to implement this criterion, including because Oregon claimed that it would do so through NPDES permits, which was an obviously false assertion. EPA's complaints come across as whining when instead the agency should reflect on its own shortcomings in approving the provision in the first place, when it knew that it was just a paperwork exercise. Only by being honest about its failings can the agency not repeat its mistakes in the future.

Page 67 – EPA should include the source for the statement: "mortality of caught and released fish" in cold water refugia. We believe that EPA has obtained information from NMFS on this topic and that it should reveal the source because it would be useful for the fish and wildlife agencies in pursuing restrictions on fishing in the cold water refugia where without restrictions the fish cannot, in fact, obtain refuge.

Page 67 – We appreciate EPA's recognition that "although CWR can help mitigate adverse effects to migrating salmon and steelhead when Columbia River temperatures exceed 20°C, the CWR narrative standard should not be interpreted to 'allow for' or to 'fully compensate for' Columbia River water temperatures higher than the 20°C numeric criterion." Note that this is not what EPA argued in its briefs to the court. *See, e.g.*, *Nw. Envtl. Advocates v. EPA*, Civil No. 05-1876-HA, United States' Memorandum in Support of United States' Cross-Motion for Partial Summary Judgment on Clean Water Act Claims and in Opposition to Plaintiff's Motion for

Partial Summary Judgment on Clean Water Act Claims (Jan 14, 2011) at 29. We believe that this point should be made in any summaries of EPA's findings and recommendations so as to not leave the wrong impression with readers that the presence of refugia somehow means there are no problems with temperature in the Columbia nor hazards associated with the 20º C criterion.

Page 68 – We fully support EPA's evaluation of the sufficiency of refugia in the three time frames. However, it is unclear on what basis EPA stops at 2040, especially in light of its own predictions that temperatures will dramatically rise in both the Columbia River and the tributaries that provide thermal refugia by the year 2080. *See Plan* at 66, Table 5-1.

Page 74 – On this page, EPA concludes that,

> the lack of CWR in the nearly 100 miles between the Deschutes River and McNary Dam, including the John Day reservoir which has the highest temperatures in the Lower Columbia River, is of concern. This nearly 100-mile reach poses the greatest risk from warm temperatures for migrating salmon and steelhead. Thus, it is difficult to conclude that CWR distribution is sufficient based solely on locations. In addition, there is very little opportunity to restore CWR in this reach, and even under natural conditions there were likely only a few small tributaries (e.g. Willow Creek, Rock Creek) and the Umatilla River that provided CWR.

While it does little or nothing for the fish themselves, this conclusion leads to the result that EPA must revisit its approval of the Oregon 20º C criterion for this stretch of the Columbia River. In addition, EPA should reconcile this conclusion with its other conclusion that there are, in fact, sufficient thermal refugia. The facts should guide the conclusion, not the desire to justify EPA's approval of the water quality standard.

Page 74 – EPA concludes that "[t]he strongest line of evidence that the current amount of CWR is sufficient under current Columbia temperatures is the adult survival rates from Bonneville Dam to McNary Dam. As discussed in Section 4.4, the adult survival rate after accounting for harvest and straying for Snake River steelhead and fall Chinook is over 90%." EPA then cites NOAA's conclusion that it "does not view adult migration conditions in this river segment as 'substantially impaired' for upper Columbia and Snake River steelhead and Snake River fall Chinook." Frankly, this is an odd conclusion. First, it fails to address the species that do not rely on refugia and are, nonetheless, adversely affected by the 20º C criterion, e.g., sockeye. Second, this statement only applies to the already and admittedly severely depressed populations of steelhead and Chinook. Were the species' populations to increase, would the refugia be sufficient? Presumably the desired goal of the Clean Water Act is not to maintain salmonid populations at a level at which they are defined as at risk of extinction, known as "threatened" and "endangered" under the Endangered Species Act. Third, is the definition of a protective water quality standard one that does not cross a line that is defined as "substantially impaired"? That is not how we read the Clean Water Act and EPA's implementing regulations. 40 C.F.R. § 131.11(a) ("the criteria shall support the most sensitive use"). Fourth, having estimated that the same survival rate applies to both hatchery and wild Snake River fall Chinook, Plan at 50, did EPA calculate the effect of that rate on the wild fish population? Fifth, after citing the assertion that temperature-related mortality is not currently "substantially impairing" the recover of Snake River steelhead and fall Chinook, did EPA combine this less-than-substantial loss with other losses to consider that species on the verge of extinction do not necessarily need to owe their status to any single adverse impact on their populations? And, finally, given that to have the in-the-water effect of protecting, enhancing, and/or restoring thermal refugia—which EPA confirms are essential elements to Oregon's water quality standards and salmonid survival of Columbia River migration—the extraordinarily slow wheels of regulation must begin to move, the trees must be protected and planted, the best management practices for nonpoint sources must be implemented—that is to say there is zero time to waste to get ready for a hotter future—how does EPA draw any conclusion that suggests the problem of inadequate thermal refugia is not upon us now? EPA cannot turn a switch on twenty years down the road to protect the fish; that switch must be turned on now.

Page 75 – EPA concludes that, "primarily because there does not appear to be capacity limitations on the use of CWR in the Lower Columbia River, and adult steelhead and fall Chinook migration survival rates exceed 90% in this reach, EPA's assessment is that the current amount of CWR is sufficient under current Columbia River temperatures." This statement is not supported by EPA's failure to evaluate capacity limitations, particularly with regard to disease. The finding rests on an extremely flimsy basis of something not appearing to be a problem about which nothing is known. In addition, EPA concluded that "the lack of CWR in the nearly 100 miles between the Deschutes River and McNary Dam . . . is of concern. *Plan* at 74.

Page 76 – On this page, EPA summarizes the uses of thermal refugia and concludes that the spatial and temporal extent "appears to be sufficient" now but "may not be in the future." First, how is it that EPA can conclude it "may" not be in the future when EPA has predicted very high temperatures under future conditions? And on the same page conclude that "there is significant risk that the Lower Columbia River adult migration survival rates for steelhead and fall Chinook will decrease in the future"? There doesn't seem to be any "may" about it. Second, there is a lot of science in this report that is titled a plan. How is it that EPA comes to a conclusion that it "appears" there are sufficient refugia? It seems more likely that EPA has concluded that the refugia that exist are all that are there rather than they are sufficient. Because EPA in this very document states that historically refugia were not the critical key to salmonid survival than they are today. Since EPA goes on to conclude that by 2040, "there is significant risk that the current amount of CWR will not be sufficient to minimize the risk to migrating salmon and steelhead," EPA should draw a single conclusion: that there are not sufficient refugia. When EPA approves a water quality standard, it is not approving it for a limited period of time but, rather, based on the science it has before it. Instead, EPA divides the future into periods for which it draws different conclusions, and then fails to sound the alarm, an alarm that might have led to a plan that called for urgent action rather than the tepid response laid out in the remainder of this document.

7 Actions to Protect & Restore Cold Water Refuges

Page 77 (and Appendix 12.20) – In this opening to the beginning of the plan aspect of the plan, EPA starts with its conclusion from the analysis part of the plan that there are sufficient refugia. As we stated immediately above, that is a problem. EPA establishes zero sense of urgency in any of its proposals. Then, EPA highlights two refugia in addition to the 12 primary tributaries: the Umatilla River and Fifteenmile Creek. As EPA points out, the Umatilla is "the only significant opportunity for increased CWR in the warm 93-mile reach between the Deschutes River CWR and McNary Dam." It errs, however, when it chooses to lean on the TMDLs that have been completed "indicating the potential for decreased summer temperatures in the river (Appendix 12.20)." To the extent that EPA is relying on completed TMDLs for predicted temperatures, this is in error. TMDLs, seeking to meet the now-vacated natural conditions criterion that allowed purportedly natural conditions to supersede the numeric criteria, modeled purported natural temperatures. The problem with these temperatures is that they did not remove all anthropogenic impacts in the modeling process. In fact, many of them are quite explicit as to what anthropogenic impacts remain. One of the more obvious impacts that remain in the purportedly natural temperatures is the heat from the majority of streams miles in a basin. As Oregon generally only modeled the mainstem rivers, assumptions had to be made about what to use for tributary inputs. These assumptions ranged from the use of current temperatures to the numeric criteria. Some TMDLs and their extensive appendixes state this piece of information clearly and others do not. As a result of using an assumption that does not reflect the removal of current anthropogenically-influenced conditions such as existing lack of vegetation, lack of tributary flows, dams, wide channels, width:depth ratios, loss of groundwater inputs, and loss of channel complexity, the modeling outputs predicted temperatures that could not have been "natural." As NWEA detailed in a brief to a successful federal court challenging EPA's approval of numerous Oregon TMDLs, and citing the administrative record in that case:

> Anthropogenic influences that were omitted from determinations of purportedly natural criteria are set out at: AR00005 at 63 (Rogue, Applegate; channel armoring and wetland draining), *id*. at 90 (current tributary temperatures and flows); AR0034 at 1131 (Snake: upstream sources, impoundments, changes in flow, channel straightening, diking, and removal of riparian vegetation); AR0085 at 4203 (Umatilla, Walla Walla: channel armoring, wetland draining, urbanization); AR0086 at 4329 (Umatilla, Walla Walla: mainstem and tributary flows); AR0108 at 4913 (Willamette: some dams, tributary temperatures), *id.* at 4914 (dams, flow, simplified channel), *id*. at 4915 (loss of channel complexity, velocities); *id*. at 4918 (deepening, bank armoring, dike construction, aggregate

> mining, wetlands and floodplain reclamation); AR0166 at 10598 (Umatilla, Willow Creek: channel conditions, hydrology); AR0182 at 11137 (Umpqua: floodplain connectivity, large woody debris, channel complexity), *id*. at 11118 (dam reservoirs); AR0218 at 12760 (Rogue, Bear: loss of off-channel areas, natural stream widths), *id*. at 12764, (irrigation activities); AR0253 at 13720 (Molalla-Pudding: tributary temperatures and flows); AR0283 at 14427 (Rogue: stream location, hydrology), *id.* at 14434 (58 dams); AR0309 at 15505 (Middle Columbia, Miles Creeks: dams), *id*. at 15527 (estimated tributary natural conditions); AR0319 at 15782 (Lower Grande Ronde: channel width and bank stability); AR0342 at 16825 (Malheur: all changes except riparian vegetation); AR0371 at 17823 (John Day: groundwater and sinuosity); AR0373 at 18071 (John Day: current tributary temperatures).

Nw. Envtl. Advocates v. EPA, Plaintiff's Motion for Summary Judgment on Clean Water Act and Endangered Species Act Claims, Civil No. 3:12-cv001751-AC (Nov. 25, 2014) at 19– 20, fn 16. It is highly inappropriate for EPA to cite to the so-called natural temperatures that come from these TMDLs because they do not represent the lowest temperatures that could be achieved.

The cited appendix is a memorandum that includes a discussion of the Umatilla TMDL that states: "significant restoration needs to be completed on the Umatilla before it becomes a viable cold water refuge. The TMDL identifies improved water use efficiency and riparian vegetation to restore floodplain connectivity as well as improving water quality to col water temperatures[.]" Appendix 12.20 at 2. EPA notes about Fifteenmile Creek that "the Fifteenmile Creek TMDL, which models temperatures under fully restored conditions and describes actions needed to restore the watershed. The modeling analysis in the temperature TMDL for this creek indicates that if flow and shade were restored to near "natural" conditions, the summer river temperatures could be significantly reduced and flow restored to the point that a CWR could be formed at the creek's confluence with the Columbia River." *Id*. at 4. Naturally, it is not rocket science that increasing flows and shade would lead to cooler waters. That is an early view of one of the primary problems with this plan.

EPA concludes that in the absence of analysis, i.e., TMDLs, completed for "the other 10 non-primary CWR tributaries and potentially other tributaries to the Lower Columbia River," it can only conclude that these "may have the potential to be restored to provide additional CWR. Restoration activities, such as riparian planting, bank stabilization, or water efficiency improvements in the other 10 non-primary CWR tributaries may increase the quality and quantity of their CWR. The EPA had limited information to quantify temperature improvements after restoration, so this Plan focused on areas with temperature TMDLs and other available information to select the two "restore" tributaries as described above." *Id*. at 4. Thus, in Table 1 of this appendix, EPA identifies eight potential refugia tributaries —Skamokawa Creek, Mill Creek, Abernethy Creek, Germany Creek, Bridal Veil Creek, Wahkeena Creek, Oneonta Creek, Rock Creek—for which there is “no information on restored natural temperatures,” the basis for not identifying them as priorities for restoration. This is a poor basis upon which to reject any potential refugia. First, the impacts of climate change and the uncertainty of the carrying capacity issue suggest that this is an emergency and the definition of an emergency is to do everything possible. Second, the results of the TMDL modeling exercises are inherently flawed so waiting on them seems pointless. Third, the TMDLs do not, in fact, guide any activities that are aimed at controlling nonpoint source pollution, the primary source of stream warming. EPA is pointlessly letting a technicality stand in the way.

Unless a tributary is simply not able to provide any benefit to migrating salmonids, it seems foolish to eliminate it from consideration for a lower priority restoration. In a warming world in particular, it should be true that all potential refugia be treated to the treatment EPA proposes for the 12 primary tributaries plus the Umatilla and Fifteenmile Creek, namely “to: 1) avoid human actions that could increase temperatures of the tributary, and 2) restore the tributary to cool temperatures to potentially partially or fully counteract predicted warming from climate change” or “to restore . . . watersheds to provide additional CWR.” The only reason to treat a less useful tributary differently is the allocation of restoration funding. However, all regulatory actions that should be taken, most of which are not discussed in this so-called plan, do not require such funding.

On page 7 of this appendix, there is note to the author to “cite memo” for “Factors influencing temperature: riparian vegetation” that you probably would like to fix.

Pages 81–82 – Table 7-1 includes only four “Actions to Protect and Restore CWR,” namely to restore stream morphology, limit new water withdrawals, maintain/restore riparian shade, and to address sedimentation at the mouth. Again, this is not rocket science. This plan falls well short of explaining how these changes are going to come about, step by step. Needless to say, each of these identified refuges includes a check mark on riparian shade protection and all but one includes stream morphology. Repeating what scores of other plans and reports have to say is not itself a plan to protect, enhance, and restore cold water refugia.

Pages 83–152 – Comments set out below pertaining to subsections 7.3 through 7.16 are both specific to those subsections and apply generally to all of the subsections. For example, the comment pertaining to page 83 below that discusses ambiguities in EPA’s language applies to all such use of language in describing the same information for the other refugia. In another example, the comment pertaining to Figure 7-4 on page 85 applies to all such figures in the subsections. We have attempted to refrain from repeating ourselves when it would serve no purpose other than to increase the length of these comments.

7.3 COWLITZ RIVER (RIVER MILE 65) – PROTECT AND ENHANCE

Page 83 – EPA states:

> The lower portion of the Cowlitz River is designated for salmonid spawning, rearing, and migration by the Washington Department of Ecology, which assigns a water quality criterion of 17.5°C for maximum water temperatures. The maximum water temperature modeled for the Cowlitz River is 21°C (1993-2011) (Appendix 12.18). Based on actual maximum temperature readings, the lower Cowlitz River is on the 303(d) list for temperature impaired waters.

It is unclear, from the U.S. Forest Service website cited in the Appendix 12.18, what "maximum temperatures" are being modeled. These presumably are not the modeled natural temperatures that could be achieved if flows, vegetation, channel morphology and the like were restored. So, what are they? And why are they relevant? EPA does not say. EPA also does not say why a waterbody described as violating water quality standards currently is under a title termed "protect and enhance." Enhance seems to be a lesser level of effort than "restore," the word used for the two non-primary refugia that are in worse shape. It is inconsistent and misleading to use different words and, at the very least, EPA should explain why one 303(d) listing is of better quality than another 303(d) listing such that some waters do not warrant being labeled for restoration by EPA.

Page 84 – The fact that this refuge is the equivalent of "approximately 622 Olympic-sized swimming pools" is not any kind of explanation of crowding that might take place and cause disease-related problems. Perhaps it helps to visualize it but it's not particularly helpful. It would be more helpful if one is trying to make relative comparisons to put the information into a table.

Page 85 – EPA states that "[t]he riparian forests along the lower 20 miles of the Cowlitz River have been severely degraded through industrial and commercial development, and channelization in these areas limits potential for recovery." This is a rather important area, as it is the refuge area, and therefore, even if, say, the river is too wide to be shaded (this information is not given), making it more fish-friendly would seem to be a priority. Concluding that its potential for "recovery," a vague term, does not state what really might be able to be accomplished. It is unclear what the point of a plan is when it seems to give up pretty readily, rather than to really dive in and see if something could be done or it is completely hopeless.

EPA also states that "[r]estoration of riparian shade on private forestlands, which cover much of the lower Cowlitz basin, is expected to improve through time and implementation of Washington's State Forest Practice Rules." This is the first of many references to the states' logging rules. Remarkably, EPA does not distinguish between the better Washington rules and the really terrible Oregon rules that we will discuss below. But the Washington logging practices are not fully protective of designated uses, as Ecology can attest to, and EPA knows full well. *See, e.g.*, Washington Department of Ecology, *2009 Clean Water Act Assurances Review for Washington's Forest Practices Program* 3 (July 15, 2009) ("After ten years, no studies have been completed or data collected that provide an indication of whether or not the forest practices rules are improving water quality or maintaining forested waters in compliance with the water quality standards."); Memorandum from Mark Hicks, Ecology, to Forest Practices Board, Re: *Clean Water Act Milestone Update* (April 22, 2019) ("It has been almost 20 years since the Assurances were first granted, but the effectiveness of the rules remains largely untested."); William Ehinger and Stephanie Estrella, Ecology, and Greg Steward, Northwest Indian Fisheries Commission, *Type N Hard Rock Study Stream Temperature/Shade*, presentation to the TFW Committee Meeting (Oct. 5, 2017). Therefore, in what appears to be an emergency setting—will there be sufficient thermal refugia to support migrating salmon throughout the entire Columbia River basin?—a mention of the existing logging practices without any corresponding mention of how they must be improved is stunning. What kind of plan is this that just says "OK, people, just keep doing whatever you're doing"? The Washington logging practices are not adequate. What does EPA think should happen with these logging practices to address a current or imminent emergency <u>bearing in mind that trees that have been cut take many years in which to grow and provide full shade</u> (and protect streams from sedimentation etc.)? The answer to that would be the start of a real plan.

Page 85 – Figure 7-4 and others like it in this document, are not explained and could, just conceivably, be the most important contribution from this document. Who did the analysis; where can it be found in more granular detail and better color differences; how was "maximum potential shade" identified; what is the width of the riparian area that constitutes "maximum potential shade"; how does this area relate to forest and agricultural practices; which areas of greatest difference between potential maximum and current shade would require new regulation or funding to address (e.g., are on agricultural lands versus are replanted areas that were logged); what are the temperature ramifications of the various shade differences; what types of land use are most causing the shade differences; why does EPA conclude in its discussion of these results that "[r]estoration of riparian shade on private forestlands, which cover much of the lower Cowlitz basin, is expected to improve through time and implementation of Washington's State Forest Practice Rules"; in what timeframe does EPA believe that what percentage of this undershaded watershed will be remedied under current regulations; how does EPA factor in "higher potential for restoration" to achieving protection, enhancement, and restoration of thermal refugia? In short, how does EPA suggest that the data and findings reflected in Figure 7-4 (and similar maps for other refugia) be used and why does it not provide any recommendations specifically to use them?

Page 86 – EPA's conclusion that climate change will "exacerbate low summer flows in the mainstem Cowlitz River, because of lower snowpack melt in the summer" points to the need for recommendation on flows. There is nothing. EPA's conclusions about the effects of climate change here, as throughout this document, should point to the need for immediate actions yet there is nothing urgent in the "plan" aspects of the plan. Since one primary attribute of a watershed that is capable of maintaining the coldest possible waters is forested riparian areas, and forested riparian areas can only come about if they are fully protected as they exist or they are given the longest possible timeframe in which to grow before temperatures rise, it is difficult to understand why EPA has not identified as an urgent priority maintaining or restoring buffers of a sufficient width, density, and height to protect maximum shade and the other attributes of a waterbody that maintains colder water (e.g., channel morphology). While logging and farming are not the only incursions into a future with full forested riparian buffers, EPA does not address these two sources of stream warming. If EPA's conclusion is that we should just give up in our attempt to keep water at temperatures appropriate for cold water salmonids—which to all appearances it has already done—it should just come out and say so. This continued appearance of talking about temperature standards and temperature TMDLs without any concurrent action that actually provides protection to the fish is hypocritical and unseemly. Finally, EPA should make clear that under the circumstances it has identified with regard to climate change, the water quality goal for this refuge is not to meet existing water quality standards. It should be to exceed them to the maximum extent possible. This goal should be reflected in Washington's (and Oregon's) water quality standards, which should be revised. Anything else is merely acquiescence in the warming that will occur, warming that will reduce the efficacy of this waterbody's acting like a thermal refuge from the ever-increasing temperatures of the Columbia River. EPA should make recommendations for different approaches that could be used to effect that goal, and not a goal that shows up merely on paper. For example, Washington could make all or parts of the watershed a Tier III Outstanding Natural Resource Water. However, stopping with that designation, rather than spelling out specifically how it would be implemented, would be a meaningless gesture as ONRW status has no implications for nonpoint sources in the absence of specific and deliberate actions. ONRW status also does not address restoration needs.

Page 87 – EPA recommends that someone (passive voice) should "[i]Implement under Washington State Forest Practice Rules for riparian management on state and private forest lands." *See* comments for page 85 above.

Page 87 – EPA's "plan" to "protect and enhance" this cold water refuge is to implement plans that have already been written or are being drafted; we count four such plans for this particular refuge. Big picture, what is EPA doing here? What value added is there to EPA's enumerating these plans and implying, without any apparent review, that they are sufficient to protect and enhance this refuge? Why if the lower part of this refuge is violating water quality standards, does EPA say nothing about the need to "restore" it? The NMFS Biological Opinion stated that the purpose of this plan was to "adequately interpret the narrative criterion to allow for implementation of the criterion through DEQ's Clean Water Act authorities" and to "identify and prioritize potential actions by DEQ and/or other parties to protect, restore or enhance CWR."

NMFS Biological Opinion at 270-271. Yet, nothing in the EPA recommendations for this refuge identifies any priorities for potential action other than to say that two of the existing watershed management plans "detail key priorities contributing to recovery and mitigation in the basin, such as managing regulated stream flows through the hydropower system and restoring floodplain and riparian function." EPA does not even state that the priorities already identified in those plans are key to protecting the coldest possible water in this refuge. EPA does not even assert that the cited plans are consistent with the goal of protecting this cold water refugia. Although one might assume that to be the case, there is no basis for concluding it is so. Such watershed plans could, for example, be more focused on spawning habitat. There is no discussion anywhere in the plan that discusses, in general, Ecology's or DEQ's Clean Water Act authorities, a discussion that could and should be the jumping off point for EPA's recommendations as to specifically which of those authorities could be used in what specific fashion to accomplish the end desired for this refuge or any of the identified refugia. There is nothing in this Washington refuge recommendations that explains what EPA or Oregon DEQ could do to obtain improvements by Washington using its Clean Water Act or other authorities.

With regard to Oregon's authorities, for example, in this plan EPA does not recognize that EPA itself has concluded that Oregon's logging practices are inadequate to meet water quality standards. EPA/ National Oceanic and Atmospheric Administration, *NOAA/EPA Finding that Oregon has Not Submitted a Fully Approvable Coastal Nonpoint Program* 4 (Jan. 30, 2015) ("the State has not identified or applied additional management measures that fully address the program weaknesses the federal agencies noted in the January 13, 1998, Findings for Oregon's Coastal Nonpoint Program. Specifically, the State has not implemented or revised management measures, backed by enforceable authorities, to (1) protect riparian areas for medium-sized and small fish-bearing (type "F") streams and non-fish-bearing (type "N") streams; (2) address the impacts of forest roads, particularly on so-called "legacy" roads; (3) protect high-risk landslide areas; and (4) ensure adequate stream buffers for the application of herbicides, particularly on non-fish-bearing streams."). EPA is also well aware that Oregon DEQ has authority over logging practices in several ways, one of which is by having the DEQ's Environmental Quality Commission petition the Board of Forestry if it believes the state Forest Practices Act rules are not adequate for achieving water quality standards. *Id*. at 3 – 4. Another is that DEQ has the authority to develop and implement load allocations for forestlands in TMDLs. *See* Memorandum from Larry Knudsen, Senior Assistant Attorney General, Natural Resources Section, Oregon Department of Justice, to Neil Mullane, Water Quality Division Administrator, Oregon DEQ, Re: *DEQ Authority to Develop and Implement Load Allocations for Forestland Sources* 2 (July 2, 2010) ("If the BOF [Board of Forestry] does not adopt basin-specific BMPs or if the DEQ finds that the BOF's BMPs are not as protective as the safe harbor BMPs, the DEQ will require the forestland owner to comply with the safe harbor BMPs [developed by DEQ to be adequate to meet the load allocation in a TMDL], or to develop its own BMPs and submit them to the DEQ for review and approval."). Rather than to suggest that DEQ should continue to defer to the Oregon Board of Forestry on logging practices that according to EPA do not meet water quality standards, let alone load allocations in TMDLs, EPA could specifically recommend the steps that DEQ could and should take to achieve the goal of protecting and enhancing, and possibly even restoring, thermal refugia. Or, perhaps, logging practices are not the top priority for a specific refuge, in which case EPA should identify the priorities, whether they are for agricultural practices, instream water flows, dam operation, etc. and then spell out specifically what steps need to be taken and by whom.

Going back to Washington, although EPA states that "[t]he Cowlitz River watershed is one of the most intensely farmed basins in western Washington," *Plan* at 86, the recommendations include precisely zero actions that any Washington agency could take to address riparian buffers along waters that move through farmland. The section instead, discusses water rights and water consumption, an obviously highly important issue to achieving sufficient and sufficiently cold water in the refuge. *See id.* Notwithstanding an EPA conclusion in the text that, given the absence of instream flow rules and the lower mainstem's being open to new water rights, "[l]imiting additional water use will help maintain CWR plume volumes and colder water temperatures," EPA does not include any reference to water rights in its recommendations. There is no sense from the text whether EPA reviewed the other plans to which it defers to see if they are based on science or based on compromise (e.g., fail to mention riparian vegetation needed on agricultural lands), whether they are consistent with the protection and restoration of this water as a thermal refugia, whether the priorities are consistent with that aim, and whether there is anything in the plans that are specific and clear. For all we know, these plans are as vague as the EPA draft plan we are looking at here, a plan that, for example, says to implement logging practices established by the states that EPA knows are not sufficient to provide the maximum thermal protection. In short, as a plan, this is a travesty.

7.4 Lewis River (River Mile 84) – Protect and Enhance

Page 88 – *See* comments for page 83 of the Plan above with regard to the discussion of the applicable criteria, the "maximum water temperature," and 303(d) listing.

Page 90 – *See* comments for page 85 above with regard to Figure 7-8 and accompanying text.

Page 90 – On what basis is this helpful: "Further, the East Fork Lewis is currently listed as impaired for temperature. Having already developed a Quality Assurance Project Plan, Washington Department of Ecology is scheduled to develop a watershed action plan for temperature for the East Fork Lewis in 2019." Please explain why this future plan will lead to actual actions that will protect and enhance—to say nothing of restore—temperatures in this refuge. *See* comments for pages 83–87 above.

Page 91 – EPA states: "The Washington Department of Ecology is developing a watershed plan to address high levels of coliform bacteria and temperature in the East Fork Lewis River. Both plans provide excellent analysis and recommendations for prioritized restoration actions in the watershed. The 2010 plan meets Endangered Species Act and state habitat and salmon recovery requirements. Recommended actions include mitigating the effects of diking and channelization, increasing water discharge from dams in times of low flow, and increasing riparian protections." *See* comment for page 90; *see also* comments for pages 83–87 above.

Page 92 – EPA states that someone should "[i]mplement Washington's Forest Practice Rules on state and private forests on the lower Lewis River, as noted in the Washington Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan appendix on the Lewis River. This includes road maintenance and bank stabilization to reduce sediment build-up at the confluence." *See* comments for pages 83–87 above. EPA also states that riparian shading would be particularly helpful in rivermiles 0 – 15 but fails to identify the steps to make that happen. EPA also states that a future plan for the East Fork Lewis River should include actions "that maintain high flows and cold temperature downstream." This is not helpful; it's stating the obvious. EPA should explain the steps needed to make this outcome take place.

7.5 SANDY RIVER (RIVER MILE 117) – PROTECT AND ENHANCE

Page 95 – EPA states that: "[w]ater quality modeling in ODEQ's Sandy River Basin TMDL (2005) predicted a temperature increase of approximately 0.5ºC with maximum potential vegetation under low flow conditions. Increased riparian shade can help to reduce sedimentation and maintain CWR volumes and temperatures." *See* comments for page 77 (and Appendix 12.20) above about relying on TMDLs.

Page 97 – EPA recommends that someone should "[i]Implement Oregon's Forest Practices Act on state and private forest lands throughout the watershed." *See* comments for pages 77, 83–87 above.

7.6 TANNER CREEK (RIVER MILE 141) – PROTECT AND ENHANCE

Page 102 – EPA states that "[a]ctions to protect and enhance the Tanner River CWR include: . . . [c]onsider[ing] special designations, antidegradation policies, and/or narrative water quality criteria as appropriate to prevent warming of the creek above current temperatures and maintain existing flows." *See* comments for pages 83–87 above. EPA's suggestion is so vague as to be meaningless. Even if EPA elaborated a little more, to suggest for example that Tier III of the antidegradation policy could be applied, it could still be as meaningless to the fish. For a plan to have meaning to the designated uses, it must explain how precisely an action will be helpful. In that example, a Tier III status would not be helpful absent specific policies intended to protect water quality from nonpoint sources.

7.7 Eagle Creek (River Mile 143) – Protect and Enhance

Page 103 – *See* comments for page 83 of the Plan above with regard to the discussion of the applicable criteria and the "maximum water temperature."

Page 107 – EPA urges someone to "[i]mplement Oregon's Forest Practices Act at the mouth of Eagle Creek" as well as the generic "[c]onsider[ation of] special designations, antidegradation policies, and/or narrative water quality criteria as appropriate to prevent warming of the creek above current temperatures and maintain existing flows." *See* comments for pages 83–87, 102 above.

7. 9 Herman Creek (River Mile 147.5) – Protect and Enhance

Page 112 – Once again, EPA offers up the generic actions to protect and enhance Herman Creek and Herman Creek Cove to include consideration of "special designations, antidegradation policies, and/or narrative water quality criteria as appropriate to prevent warming of the creek above current temperatures and maintain existing flows." *See* comments for pages 83–87, 102 above.

7.9 Wind River (River Mile 151) – Protect and Enhance

Page 113 – *See* comments for page 83 of the Plan above with regard to the discussion of the applicable criteria, the "maximum water temperature," and 303(d) listing.

Page 115 – EPA states that "[w]ater quality modeling in Washington Department of Ecology's Wind River Watershed Temperature TMDL (2001) predicted that maximum potential vegetation could decrease water temperatures at the mouth from 18°C to 14°C under average flow conditions." It is likely that this undercalculates the temperature that could be achieved but EPA cannot know without examining the assumptions that Ecology used in its modeling calculations. *See* discussion about OregonTMDLs for page 77 (and Appendix 12.20) above.

Pages 115–116 – EPA states that "[w]ater rights are heavily allocated for agricultural uses" and "[b]ecause water use is high and supply is limited, more water use may reduce the CWR plume volume and increase temperatures in the CWR," but offers nothing more than a tepid recommendation to "[c]onsider additional SWSLs and instream flow rules, given current limited stream flows."

Page 116 – EPA states, without any useful comment, that "[f]urther, there currently exists a temperature TMDL, developed in 2002." It would be useful if EPA told us how much that TMDL has accomplished in the 17 years since it was completed. That would set the foundation for any recommendations EPA might make about the states' using their 303(d) programs and authorities to actually protect and restore thermal refugia. Instead, EPA is silent. Evaluation of the science without a concurrent evaluation of the regulatory structure that either works is not working to protect and restore refugia should be key to this plan. *See* comments for pages 83–87 above.

Page 117 – EPA recommends that someone "[i]mplement Washington's Forest Practice Rules on state and private forest lands on the middle and lower Wind River" along with "actions in the mainstem Wind River, Panther Creek, and Upper and Lower Trout Creek noted in the Wind River Habitat Restoration Strategy and Wind River Temperature TMDL." EPA does not explain what "actions" are set out in the cited TMDL, whether they are adequate, whether there is any history of acted on the actions, and whether the purported actions are specific and clear enough to rely on. EPA merely tells the reader this is a plan to implement a plan the sufficiency of and ambiguity in which we have not bothered to investigate. Further, despite noting that "[w]ater rights are heavily allocated for agricultural uses," *Plan* at 115, the recommendations are silent on what might be necessary to ensure shading of streams traversing agricultural lands.

7.10 Little White Salmon River (River Mile 158.7) – Protect and Enhance

Pages 118–122 – *See* comments for pages 83–87 above.

7.11 White Salmon River (River Mile 165) – Protect and Enhance

Pages 123–127 – *See* comments for pages 83–87 above.

7.12 Hood River (River Mile 166) – Protect and Enhance

Pages 128 –132 – *See* comments for pages 83–87 above.

7.13 Klickitat River (River Mile 177) – Protect and Enhance

Pages 133–137 – *See* comments for pages 83–87 above.

Page 137 – EPA recommends that someone "[i]mplement Little Klickitat River Temperature TMDL targets for increased riparian shade in the Little Klickitat River." Published in 2002, roughly 17 years ago, EPA should evaluate whether anybody has, in fact, implemented anything in this TMDL since it was published. Such analysis would inform EPA as to the degree that it can or should rely on states' 303(d) programs and what kind of recommendations are required that are more than simply citing to other plans as the solution to the problem. What does EPA mean by implementing "TMDL targets for increased riparian shade"? The TMDL showed that "an increase in effective shade from riparian vegetation buffers have the potential to significantly decrease the water temperatures in the mainstem of the Little Klickitat River." Ecology, *Little*

Klickitat River Watershed Temperature Total Maximum Daily Load (July 2002) at 51. It also showed that "[d]ecreasing the channel average wetted W/D ratio decreases the water temperature further, with the exception of the section below Bloodgood Creek which has a low W/D ratio due to mechanical channelization." *Id*. No offense to the modelers who did this work but the impact of shade and width:depth ratio is not rocket science and it does not instruct as to what actions must be taken to meet water quality standards. The TMDL goes on to make essentially the same observations about various prongs of the Little Klickitat River. *See id.* at 53. The TMDL sets out "effective shade targets" in Table 10 and summarizes the load allocations for nonpoint sources as the need for effective shade and, in some instances, a width:depth ratio. *Id*. at 58–59. It then wraps up with a laundry list of what one might call allusions to BMPs, or pre-BMPs, namely vague references to various types of best management practices without any quantification, without any clarity of what implementation is necessary or required. So when EPA says in this plan that someone should implement the TMDL targets for increased riparian shade, it first ignores the other random list of non-quantifiable actions the TMDL seemingly recommends. Second, EPA cites only to a set of effective shade targets that, while expressed numerically, are not translated into anything clear. What do these shade targets mean for not cutting down trees or the need to plant trees? Specifically, they have not been translated into the height, width, and density of riparian buffers that are needed to be maintained on lands used for farming and logging. It is not clear that Ecology has used these shade targets in any of its work. And third, would the effective shade targets once translated into numeric riparian buffers also control sediment such that the width:depth ratios could be restored or protected from degradation? In short, in its plan EPA cites to a plan that, while being a TMDL, is similarly meaningless and without teeth or substance and certainly does not readily translate into any meaningful actions on the ground or in the water.

7.14 Fifteen Mile Creek (River Mile 188.9) – Restore

Page 138 – *See* comments for page 83 of the Plan above with regard to the discussion of the applicable criteria, the "maximum water temperature," and 303(d) listing.

Pages 139–142 – EPA states:

> Fed by snow-melt runoff and groundwater contributions, Fifteenmile Creek could potentially deliver cold water down to the confluence, providing additional CWR for migrating salmonids with continued water quantity and riparian habitat restoration. However, agriculture is vital to the local economy, valued at roughly $22 million per year. Agricultural land types include orchards, vineyards, and pasture. Primary agricultural products include wheat, cattle, and cherries.

* * *

> There is a substantial area for additional riparian vegetation restoration in the lower watershed along the tributary streams and creeks on the mainstem (Figure 7-44). The lower watershed was widely denuded for use as agricultural land.
>
> * * *
>
> The conversion of riparian areas to agricultural lands has resulted in the removal of tall grasses and small trees. Water quality modeling in ODEQ's Middle Columbia-Hood (Miles Creek) Subbasin TMDL (2008) predicted that maximum potential vegetation and increased flows could decrease water temperatures at the mouth from 25°C to 18°C under low flow conditions, a significant decrease.

Despite this description of the significant improvement in temperature that could be achieved and noting that agriculture is the primary reason why it is not, EPA recommends only that someone should:

> Maintain the riparian restoration work done in previous years as noted in the Fifteen Mile Creek Basin Aquatic Habitat Restoration Strategy and Middle Columbia-Hood (Miles Creek) TMDL. . . . [and] [e]ncourage private landowners to enter riparian buffer programs. Fund fencing projects for pasture lands near riparian areas to minimize the impacts of grazing.

This is not a plan; it's a statement that if shade and other attributes that come from forested riparian buffers are not present, temperatures will remain high and if they are installed and protected, temperatures will decrease. This is mere musing by EPA and is not a plan to protect or restore cold water refugia to save salmon on the Columbia River and meet water quality standards. *See also* comments for pages 83–87 above.

What is really obnoxious about EPA's description of this watershed is its implied assumption that use of the land and water by agriculture means that nothing can or will be done. EPA says: "However, agriculture is vital to the local economy, valued at roughly $22 million per year." "However" is like the "though" in the sentence "I would like you to do us a favor, though." "However" here means "nothing is going to happen here for salmon and in fact, we, the EPA, don't even think it should happen," just as "though" means a *quid pro quo*. From that statement likely springs the fact that EPA does not even recommend that the state consider regulating farmland to require riparian buffers, let alone actually use its legal authorities. Rather, it says, the state should encourage landowners to get paid to protect public waters from their private activities. EPA does not even recommend an additional funding program to make sure that cold water refugia exist for salmon in the future.

7.15 Deschutes River (River Mile 201) – Protect and Enhance

Page 143–147 – *See* comments for pages 83–87 above.

7.16 Umatilla River (River Mile 284.7) – Restore

Page 148 – *See* comments for page 83 of the Plan above with regard to the discussion of the applicable criteria, the "maximum water temperature," and 303(d) listing.

Pages 149–150 – *See* comments for pages 77, 83–87, 137, 139–142 above.

Pages 151–152 – EPA's comments that "[e]fforts to conserve and increase water flows will help to cool water temperatures and increase CWR volume" is really not helpful and not a plan. It's merely a statement of the obvious. Citing other plans or general propositions that are laid out in other plans that may or may not be implemented—and EPA can be sure that the TMDLs are not implemented—also is not a plan. In this context, the least EPA could do is to identify the barriers to implementing TMDLs and other plans and make recommendations to address them. EPA could also state what it will do if the states fail to use their existing legal authority to make the needed changes.

7.17 Summary of Actions to Protect and Restore Cold Water Refuges

Protect Through Regulatory Programs

Page 153 – As explained above, an EPA plan that says keep on implementing, even if you aren't, all the "existing programs and regulatory actions that help keep waters cool" is not a recipe for success and neither is using the "state forest practice regulations" that EPA knows are not adequate to meet water quality standards and therefore are not adequate to protect, enhance, or restore the thermal refugia upon which EPA has shown in this document the salmonids migrating in the Columbia River rely. Being silent on the lack of agricultural practices to protect water temperatures is not a plan. Reiterating that "minimizing additional water withdrawals will help" is not helpful or a plan. Neither is reiterating the extremely unhelpful and vague comment that "[w]ater quality standard updates, such as special designations, antidegradation policies, or narrative criteria could be a means for helping maintain current river temperatures in the primary CWR tributaries." Yes, they "could be" but if EPA doesn't explicitly recommend some changes that it thinks will be helpful, they probably won't be. Moreover, EPA does not address the disconnect between water quality standards, millions of dollars of studies for TMDLs etc., and thousands of pages of all sorts of plans and . . . the fish. EPA does not even go so far as to recommend that state actually protect cold water at the temperatures current achieved. What is horribly missing from a section entitled "protect through regulatory programs" is any discussion of, you know, actual regulatory programs and how they might be made to work.

Restore Riparian Shade, Stream Morphology, and Instream Flow

This is more of the same that EPA has already spent scores of pages reiterating: it would be nice if someone implemented all the existing plans. EPA states that:

> Restoration of the CWR in all primary and "restore" tributaries can be accomplished by the following actions, many of which are outlined in the salmon recovery plans and TMDLs:
>
> 1) Restoring riparian shade: Restoration of riparian shade should be targeted to those areas that have the greatest potential for increased shade in the watershed and are river reaches important for salmon habitat restoration.
> 2) Restoring stream morphology and complexity, including narrower channels and increased pools: Increasing the amount of instream large woody debris to create pools of cold water and trap sediment that would otherwise reach the river mouth will aid in keeping waters cool as they reach the tributary mouth and join the Columbia River.

But this is what every temperature TMDL says to one degree or the other. EPA has added absolutely nothing new to the equation. It has not set out any recommendation to take steps to actually implement the TMDLs. We reiterate: none of this material about how to protect and restore stream temperature is rocket science. Such basic statements by EPA cannot possibly be what NMFS had in mind when it instructed EPA to develop a plan to actually protect refugia for the salmonids that actually depend upon them to migrate through the hot temperatures of the Columbia River.

7.18 Action to Address Fishing in Cold Water Refuges

Page 154 – As we commented above, EPA should include the citation(s) regarding the data that show that "fishing in CWR reduces the survival of steelhead that use CWR compared to those that do not, offsetting the benefits to fish using CWR." Hiding the ball here make it only harder to achieve the goal of updating the fishing regulations that EPA suggested "could be considered," with emphasis on the word "could" because it would apparently be too extreme for EPA to say "should" even as it admits that would protect the fish, the designated use for which this entire exercise has been to support.

8 Uncertainties and Additional Research Needs

Density Effects and Carrying Capacity of Cold Water Refuges

Page 157 – EPA admits that "[t]here is no research on the carrying capacity of CWR for adult salmon or steelhead" and "[i]t is therefore fairly speculative as to what densities cause fish to avoid or leave CWR." Notwithstanding this conclusion, EPA has determined that there are sufficiently distributed refugia. Stunningly, while noting that "[a]lso, high densities of adult fish are known to contribute to the spread of disease." EPA concludes only that "[t]his could be a concern for CWR that are colder than the Columbia River but are in the 18-20°C range, which are temperatures at which disease risk is elevated (e.g., Deschutes River)." It certainly is a concern and will increasingly be one. EPA's conclusion that "[t]he extent to which CWR use at varying densities contributes to increase disease (and associated mortality) is unknown," should be followed by the acknowledgment that in fact EPA does not know and on that basis cannot determine if there are currently sufficient refugia to mitigate the effects of a 20º C criterion let alone the actual temperatures in the Columbia River. The issue of disease has been well documented by EPA itself in the scientific papers that supported the Region 10 guidance for temperature standards. This should have been a major factor in its evaluation.

9 Summary and Recommendations

Pages 158–162 – Our comments on this section are short because we have said most of what is necessary above and do not choose to repeat it. That should not be read as an endorsement of the extremely thin recommendations found in this section, which are a reflection of those found throughout the document.

Pages 158–162 – EPA purports to set out the water quality standards for temperature for the Columbia River:

> The water quality standard for the Lower Columbia River is 20°C, which is intended to minimize the risk of adverse effects to migrating salmon and steelhead from exposure to river temperatures that are warmer than 20°C.

As explained above, this is incorrect and should be fixed. A standard is not a criterion.

Sufficiency of Cold Water Refuges to Support Migrating Adult Salmon and Steelhead

EPA concludes that "the spatial and temporal extent of existing CWR appears to be sufficient under current and 20°C Columbia River temperatures but may not be in the future." We find this to be misleading. EPA found quite clearly that they would not be in the future and at best found that it cannot determine if there are sufficient refugia in the present. Moreover, "maintaining the current temperatures, flows, and volumes of the 12 primary CWR in the Lower Columbia River" is more than "important to limit significant adverse effects to migrating adult salmon and steelhead from higher water temperatures elsewhere in the water body," it is critical to those adverse effects. That is EPA's conclusion but its summary of its conclusion suffers from the same passive view and passive voice found throughout the entire document. EPA continues to say that "[a]dditional CWR in the Lower Columbia River may be needed due to the predicted continued gradual warming of the Columbia River," when it can only be concluded that, based on the climate change evaluation set forth in the document, there is no "may" about the need. Again, it is a necessity. Whether the fish will survive even if EPA and the states made their best efforts is another question. In that matter, EPA can afford to not be definitive and can tell us the truth: they may not survive although it is our legal and moral obligation to try to save them.

Watershed Characteristics of 12 Primary Cold Water Refuges

EPA makes the following observation regarding the importance of dams on four of the refuges:

> Four of the primary tributaries (Cowlitz, Lewis, Sandy, Deschutes Rivers) have upstream storage dams that can influence summer temperatures by releasing water from cooler depth within the storage reservoir and by controlling summer release flows.

But EPA fails to go beyond making this observation, namely to suggesting that it will itself, or ask some other agency to, take actual steps to order or negotiate changes in the operation of these dams. A "plan" should be a plan for action, not a set of musings. And then, EPA muses some more:

> Although the 12 primary CWR tributaries are relatively cool, there are impacts within the watershed that can warm the tributary, including floodplain degradation, water withdrawals and reduced summer flow, sedimentation, and loss of riparian shade. Climate change has already warmed all tributaries to some extent and is predicted to continue to warm these tributaries in the future. Restoration of the anthropogenic impacts within the watershed can help offset predicted warming.

Recommended Actions to Protect and Restore Cold Water Refuges

This musing leads to some extremely limited comments on what could be done to protect, enhance, and restore the maximum amount of cold water available in these refuges. As its "Recommended Actions to Protect and Restore Cold Water Refuges," EPA states that someone should:

> 26. Protect existing 12 primary CWR through the implementation of existing programs and regulatory actions that help keep waters cool.
>   a. Since extensive portions of the priority CWR tributaries include forest lands, important protective actions include continued implementation of U.S. Forest Service plans and State Forest practice regulations.

b. Since additional water withdrawal during the summer can diminish the size and function of the primary 12 CWR tributaries, minimize additional water withdrawals that would decrease summer flows.
c. Consider special designations, antidegradation policies, and/or narrative water quality criteria as appropriate to prevent warming above current temperatures and maintain existing flows in the 12 priority CWR tributaries.

In addition, EPA suggests that someone should:

27. Restore degraded portions of the 12 primary CWR watersheds to enhance the quality of the CWR and to counteract predicted future increases in tributary river temperature by: 1) restoring riparian shade, 2) restoring stream morphology and complexity, including narrower channels and increased pools, and 3) implementing watershed conservation measures to restore summer flows.

And then someone should act on the fact that,

30. [B]ased on information provided in completed temperature TMDLs, EPA identified the Umatilla River and Fifteenmile Creek as having the potential to provide increased CWR in the Lower Columbia River if thermally-degrading features of the watersheds were restored.

EPA is remarkably mealymouthed in this set of recommendations, the summary of which takes up less than one page in the document. The word “consider” and the overall use of the passive voice could not make these recommendations sound less urgent. The lack of specificity guarantees that they will be ignored, taking up more room on the bookshelves along with all of the other plans. We trust that by now in these comments we need not say more to make the point.

Recommended Action Regarding Fishing in Cold Water Refuges

This recommendation that information “could be considered” is more of the same, no urgency, no actual plan, just more musing. Instead, EPA should recommend that the fishing agencies make this a priority. There is certainly no point in taking all of the expensive, time-consuming and difficult actions proposed or hinted at throughout this plan and then letting recreational fishing people harass the very fish that are attempting to see “refuge” from dangerously high water temperatures.

II. What is Fundamentally Missing from EPA's Plan

The comments above explain what is largely the problem with this plan, namely that it is not a plan. But here, we add a little bit more, certainly well short of writing a plan ourselves.

A. The Biological Opinion and the Reasonable and Prudent Alternative

EPA had asserted to NMFS that it "expects the cold water refugia provision to be primarily considered in NPDES permits and TMDLs." *NMFS Biological Opinion* at 173. As NMFS subsequently found, EPA was sadly and profoundly mistaken in its assumption, expectation, or general cop-out, whichever it was. In fact, NMFS found that:

> Overall, the narrative criterion pertaining to CWR does not, to date, appear to be an effective means for minimizing the adverse effects likely to be experienced by migrating salmon and steelhead under the 20°C migration corridor criterion. In the Willamette River TMDL, the DEQ mentions only two specific streams as possibly providing refugia, even though substantial research on off-channel habitats that may provide such refugia has been done in this river. The John Day River TMDL does not even attempt to directly address the narrative criterion. Also, according to EPA, the state has not provided any analyses of or determinations as to the part of the narrative criterion that requires that CWR "are sufficiently distributed so as to allow salmon and steelhead migration without significant adverse effects from higher water temperatures elsewhere in the water body". The DEQ apparently has not released any work on CWR in the Columbia River.

Id. at 176 (footnotes omitted). As a consequence, NMFS set out the primary intended outcome of the Reasonable and Prudent Alternative that required this plan: "The purpose of the CWR plan is to <u>adequately interpret</u> the narrative criterion <u>to allow for implementation</u> of the criterion through DEQ's Clean Water Act authorities [including to] identify and prioritize potential actions by DEQ and/or other parties to protect, restore or enhance CWR." *NMFS Biological Opinion* at 270–271 (emphasis added). Without the "implementation . . . through Clean Water Act authorities" specifically called for by NMFS, this would be like any other plan: much paper with no benefit to fish. But that is not what NMFS required. It is clear that EPA has not met the terms of the Reasonable and Prudent Alternative.

B. Some Suggestions

In addition to addressing our comments set out above, EPA should:

- Drop the passive voice.

- Direct the states to rewrite all the relevant temperature TMDLs with specific direction that each establish clear, measurable actions, including quantitative BMPs, that are tied to meeting the TMDLs' load allocations. It is well past time to make sure that state agencies and private land owners are held accountable for the measures that are necessary to implement the TMDLs. They cannot be if the measures are not clear. For example, the ambiguity of the TMDLs precludes a pathway to their use to ensure adequate logging practices. It allows for the continued failure of states to regulate agriculture. It precludes a willing landowner from knowing what actions to take. A heavy reliance on TMDLs to protect and restore the refugia of the Columbia River by EPA points in one direction: TMDLs that do not need translation to understand what actions are required by whom in order to meet water quality standards.
- Require Oregon and Washington to meet the precise terms of the Clean Water Act section 319(b)(2), namely to identify the BMPs that are necessary to meet water quality standards (including load allocations), the programs through which those BMPs will be implemented, and a schedule with annual milestones for implementing them at the earliest possible date.
- Call for immediate forest practices rule changes to protect these refugia.
- Call for the states to use their legal authority to ensure that agricultural BMPs are put in place.
- Identify the means by which dam operations can be regulated to protect thermal refugia.
- Set out a list of actions that EPA will take if states fail to make schedules to implement nonpoint source controls and carry out that implementation including NPDES actions and withholding section 319 funds.
- Not use this document to count on TMDLs that are based on illegal and now vacated water quality standards and flawed analysis that fails to evaluate purely natural conditions when identifying the temperatures that could be achieved.
- Add page numbers to appendixes.
- Place more emphasis in its summary and conclusions on the uncertainty inherent in this exercise, such as the complete lack of knowledge about the carrying capacity and concerns about disease transmission within refugia.
- Express some modicum of urgency to its findings and recommendations.
- Distinctly call out the fact that the Columbia River water temperatures do not support healthy salmon populations including because some species do not use thermal refugia, because there is no assurance that the refugia are sufficiently well distributed, and because temperatures are not meeting water quality standards.
- Call out the fact that the sockeye require different criteria at different times of year than are currently in Oregon and Washington standards.
- Not leave the casual reader with the impression that there is no reason to be concerned about either the 20º C criterion or current water temperatures in the Columbia River because EPA has concluded that there appear to be sufficient cold water refugia created by the tributaries.

- Say something about the Willamette River.
- Note clearly that implementation of the Oregon temperature standards must mirror the basis for EPA's approval and NMFS's Biological Opinion of the numeric criteria for salmonid rearing—that are themselves the water quality goals for the thermal refugia in Oregon as tributaries—namely that those criteria would be met at the farthest point downstream where the uses are designated, *see e.g. NMFS Biological Opinion* at 193, and set out the ways in which this implementation must take place, for example in evaluating waters pursuant to 303(d), developing TMDLs, and in establishing BMPs for nonpoint sources.
- Provide some analysis of the other narrative provision associated with the Oregon 20º C criterion for the Columbia River, to the extent that EPA has developed information about it: "the seasonal thermal pattern in Columbia and Snake Rivers must reflect the natural seasonal thermal pattern." OAR 340-041-0028(4)(d). While it is a separate criterion, it is also linked to the refugia criterion as the content of this plan shows. It would be helpful for that information to be pulled into a separate section. Note that EPA's extensive discussion of timing and use should explain the role of the existing use protection for designated uses provided by the antidegradation policy. In failing to address the intersection of migration timing and use of cold water refugia, EPA misses the boat because both criteria are required in order to protect the designated uses. One without the other leaves a two-legged stool that does not protect the uses.
- Recognize, discuss, and make recommendations pertaining to the fact that Oregon has a provision in its temperature standards that is intended to protect existing temperatures that are below numeric criteria called the Protecting Cold Water criteria. *See* OAR 340-041-0028(11).

In conclusion, EPA has a lot of work to do to turn this report into a plan that will allow for the implementation of the thermal refugia criterion through Oregon DEQ's Clean Water Act authorities.

Sincerely,

Nina Bell

Nina Bell
Executive Director

Attachments:

Washington Department of Ecology, *2009 Clean Water Act Assurances Review for Washington's Forest Practices Program* (July 15, 2009)

Memorandum from Mark Hicks, Ecology, to Forest Practices Board, Re: *Clean Water Act Milestone Update* (April 22, 2019)

William Ehinger and Stephanie Estrella, Ecology, and Greg Steward, Northwest Indian Fisheries Commission, *Type N Hard Rock Study Stream Temperature/Shade*, presentation to the TFW Committee Meeting (Oct. 5, 2017)

Memorandum from Larry Knudsen, Senior Assistant Attorney General, Natural Resources Section, Oregon Department of Justice, to Neil Mullane, Water Quality Division Administrator, Oregon DEQ, Re: *DEQ Authority to Develop and Implement Load Allocations for Forestland Sources* (July 2, 2010)

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MEMORANDUM

TO: Charles Morrill, WDFW
Erick VanDyke, ODFW
Steven Hawley, citizen

Michele DeHart

FROM: Michele DeHart

DATE: October 28, 2015

RE: Requested data summaries and actions regarding sockeye adult fish passage and water temperature issues in the Columbia and Snake rivers.

The Fish Passage Center (FPC) staff received two similar requests for summaries of water temperature data, management actions, and adult sockeye passage in 2015. One request was submitted by Oregon Department of Fish and Wildlife and Washington Department of Fish and Wildlife technical staff, and one was a citizen request precipitated by a Seattle Times Article on adult sockeye passage, water temperatures, and management discussions and actions (http://www.seattletimes.com/seattle-news/environment/snowpack-drought-has-salmon-dying-in-overheated-rivers/). Because these requests were similar, we developed the following single response to both requests. Our response is divided into the following sections:

- Historical Context, Analyses and Water Temperature Standards;
- Recent Research Findings, Water Temperature and Effects on Adult Salmon;
- 2015 Flow and Water Temperature Data with Comparisons to Past Years;
- Documentation of Historical Water Temperature Problems in the Federal Columbia River Power System (FCRPS) Affecting Fish Passage; and,
- Analyses of 2015 PIT-tag Adult Sockeye Passage, Travel Time, and Survival with Comparisons to Past Years.

As a result of this review, **our overall conclusion is that elevated water temperatures in the Columbia and Snake rivers, including adult fishways, is a long-recognized problem that to date remains largely unmitigated.** Significant long-term actions to address these temperature issues are necessary for the continued survival of salmon populations, particularly sockeye.

The FPC staff participates in Fish Passage Advisory Committee (FPAC) meetings, Fish Passage Operations and Maintenance Committee (FPOM) meetings, and Technical Management Team (TMT) meetings as technical support staff. The FPC does not represent any state, federal or tribal fishery management agency. To that end, we have relied on actual operations data, adult fish passage count data, water temperature data, and PIT-tag recapture data and analyses in developing this summary. We have relied on notes from FPAC meetings, FPOM meetings, and TMT meetings. Following are the conclusions from each of the sections that were outlined above.

- Historical Context, Analyses and Water Temperature Standards.
    - Hydrosystem development has had a significant effect on temperature in the mainstem Columbia and Snake rivers. By slowing water flow and increasing surface area for solar radiation, dams caused increased water temperatures in the reservoirs.
    - The inability to meet water quality standards with respect to temperature was initially identified as an issue beginning with the 1995 Biological Opinion (BiOp).
    - Efforts were underway by the EPA to develop TMDL for the mainstem Snake and Columbia rivers, resulting in a draft Temperature Total Maximum Daily Load (TMDL) in 2003.
    - The melding of the two processes (TMDL Development and BiOp Water Quality Plans) resulted in the termination of the temperature TMDL process in favor of the water quality approach outlined in the BiOp. The 2003 Draft TMDL was never finalized and a maximum load allocation was never established for temperature.
    - Despite continued development of Water Quality Plans (WQPs) over the years, the BiOp process has fallen short of ever really making an impact on water temperature beyond the actions initially identified in the 1990s. Over thirty measures were considered to address temperature, but due to identified issues were dropped from the WQP.

- Recent Research Findings, Water Temperature and Effects on Adult Salmon.
    - Higher water temperatures have a number of negative effects on adult sockeye migration, including migration delays and reduced survival.
    - These negative effects on migration have been observed at temperatures less than the 20°C (68°F) water quality standard.
    - Adult ladders often exhibit temperature gradients because the water sources differ throughout the ladder. At temperature gradients greater than 1°C, Chinook and steelhead adults have a higher likelihood of significantly delayed migration to spawning grounds, increased total thermal exposure, depletion of energetic resources, and decreased migration success.
    - Cumulative temperature exposure time is critical to adult salmon survival.

- 2015 Flow and Water Temperature Data with Comparisons to Past Years.
    - The 2015 water year produced the second lowest spring flows at both Lower Granite (LGR) and McNary (MCN) dams since the 1995 BiOp.
    - The 2015 summer flows at LGR were the second lowest since 1995 and fifth lowest at MCN.

- Drum gate maintenance at Grand Coulee dam exacerbated the low flow conditions on the Columbia during the spring of 2015.
- The summer low flow situation in the Columbia was somewhat alleviated by the Columbia River Treaty provision of the proportional draft of reservoirs under low flow conditions, providing approximately 5 million acre feet of water from Canadian Reservoirs in 2015.
- In 2015, temperatures at Middle Columbia, Snake River, and Upper Columbia projects were higher, earlier in the season, than the previous ten years
- In 2015, temperatures at nearly all FCRPS projects exceeded the 20°C (68°F) standard for 35%–46% of the passage season (April–August). The one exception was LGR, which is due to the temperature augmentation water that is provided from Dworshak Reservoir.
- Over the previous ten years (2005–2014), temperatures exceeded the 20°C (68°F) standard for 20%–30% of the passage season (April–August) at FCRPS projects, except at LGR.
- Overall, exceedances of the 20°C (68°F) standard in the Upper Columbia are less common. However, 2015 had the highest proportion of days exceeding the 20°C (68°F) standard at many of these sites, when compared to the previous ten years.

- Documentation of Historical Water Temperature Problems in the FCRPS Affecting Fish Passage.
  - The need to address elevated temperatures in the adult ladders was identified as early as the 1994 BiOp.
  - In the present adult fishway configuration, there appears to be some potential for improving ladder water temperatures at LGR and LGS using axillary pumps. However, sockeye adult survival observed in 2015 would not have been mitigated by these measures at LGR and LGS since most mortality occurred prior to adults reaching LGS.

- Analyses of 2015 PIT-tag Adult Sockeye passage, Travel Time, and Survival with Comparisons to Past Years.
  - In 2015, Snake River sockeye adult survival (BON-LGR) was 0.04, which was much lower than previous years (2009 to 2014), ranging from 0.44 and 0.77.
  - Snake River sockeye adults that were transported as juveniles had lower adult survival rates through the FCRPS than did adults that migrated in-river as juveniles.
  - Upper Columbia adult sockeye survival (BON-RIS) in 2015 was 0.46, the lowest among the years analyzed (2009–2015).
  - Based on PIT-tag detections, arrival timing at BON is generally earlier for Upper Columbia sockeye than for Snake River sockeye.
  - Snake River adult sockeye that migrated in-river as juveniles and Upper Columbia River adult sockeye had similar adult fallback rates at BON. However, Snake River adult sockeye that were transported as juveniles exhibited much higher fallback rates than both of the Snake River and Upper Columbia River non-transported groups.

- Snake River sockeye adults took longer to pass through the ladders at BON than Upper Columbia adults, especially in 2015. Much of this difference was attributed to Snake River adults that were transported as juveniles.
- The higher water temperatures, earlier in the year, contributed to the poor adult survivals in 2015 for both Snake River and Upper Columbia sockeye.
- The combination of the earlier high water temperatures and later arrival timing for Snake River sockeye adults resulted in longer exposure to temperatures in excess of 20°C (68°F).
- In 2015, both Snake River and Upper Columbia sockeye showed a decline in adult survival and migration speed (BON-MCN) as temperatures increased.
- At similar temperatures, Snake River sockeye that were transported as smolts had a much lower migration speed (BON-MCN) than did non-transported individuals from both the Snake and Upper Columbia rivers.
- Accounting for smolt transportation and adult arrival timing at BON helps to explain some of the observed differences in BON-MCN adult survival between Snake and Upper Columbia sockeye

Historical Context, Analyses and Water Temperature Standards

Hydrosystem development has had a significant effect on temperature in the mainstem Columbia and Snake rivers. This impact goes beyond the effect caused by naturally high temperatures that may have historically occurred in the mainstem and the tributaries (Note: while naturally high temperatures are often cited to have occurred, there is little consistent water temperature data available to document pre-development river temperatures). By slowing water flow and increasing surface area for solar radiation, dams increase water temperatures in the reservoirs created. The major impact on the daily-average, cross-section water temperature is due to the increase in width and depth resulting from the construction and operation of the impoundments (Yearsley et al., 2001).

In 1995, the National Marine Fisheries Service (NMFS) issued a BiOp concluding that modifications to FCRPS operations were needed to ensure long-term survival of salmon stocks in the Snake River that were protected by the Endangered Species Act (ESA) (NMFS, 1995). The inability to meet water quality standards with respect to temperature was identified as an issue. A temperature of 20°C (68°F) was established as a reference temperature, considered the upper incipient lethal limit for salmon. Focus was on the prioritization of cool water releases from Dworshak and Brownlee dams for juveniles, evaluation and improvement of water prediction temperature models, the development of surface passage routes to decrease forebay delay, and the provision of water temperature control in fish ladders. At that time the Corps of Engineers (COE) agreed to coordinate with the Environmental Protection Agency (EPA) regarding their concerns on water temperature.

The net effect of hydro development in the Columbia and Snake hydrosystem was described by EPA. In October 2000, the states of Oregon, Washington and Idaho signed a Memorandum of Understanding with the U.S. Environmental Protection Agency Region 10 that established EPA as the lead agency for the development of a Columbia/Snake TMDL. TMDL development is usually a state responsibility, but considering the interstate and international nature of the waters, EPA's technical expertise in the modeling effort, and EPA's Tribal Trust responsibilities, EPA agreed to take responsibility for the technical development of this TMDL.

EPA conducted a series of modeling exercises (Yearsley, 2003) designed to develop the TMDL. In the analysis the impact of the presence of each dam was assessed, relative to the background that would naturally occur. These modeling exercises also assessed the relative importance of point source pollutants and tributary inputs. The modeling exercises discounted point source pollutants as having any effect on mainstem water temperatures, and identified only the major tributaries as having any impact on mainstem temperatures. Only the Spokane, Snake and Willamette rivers were deemed large enough to potentially alter the temperature of the Columbia River by a measurable amount (0.14°C). And, only the Salmon, Grande Ronde and Clearwater rivers are large enough to potentially alter the temperature of the Snake River by a measurable amount (0.14°C). The modeling exercises also identified the impacts on temperatures of each hydroproject and the maximum impact ranges from negligible to large, depending on the dam. Based on the modeling, the impact of Grand Coulee alone could be as great as 6.23°C, and the Snake River dams collectively can have a maximum impact as large as 6.8°C (EPA, 2003).

Based on the estimated impact that the Lower Snake River impoundments alone could collectively contribute to an increase in river temperature that could exceed 6°F (EPA 2003), it was expected that this could be demonstrated with actual data. To determine if there was an observable trend in temperature pre- and post-Snake River impoundment we compared the maximum scroll case temperature at Bonneville Dam (BON) for the period 1950 to 2015. It can be noted that there was an increase in temperature that began around 1977, which coincided with the completion of the four Snake River dams (Figure 1).

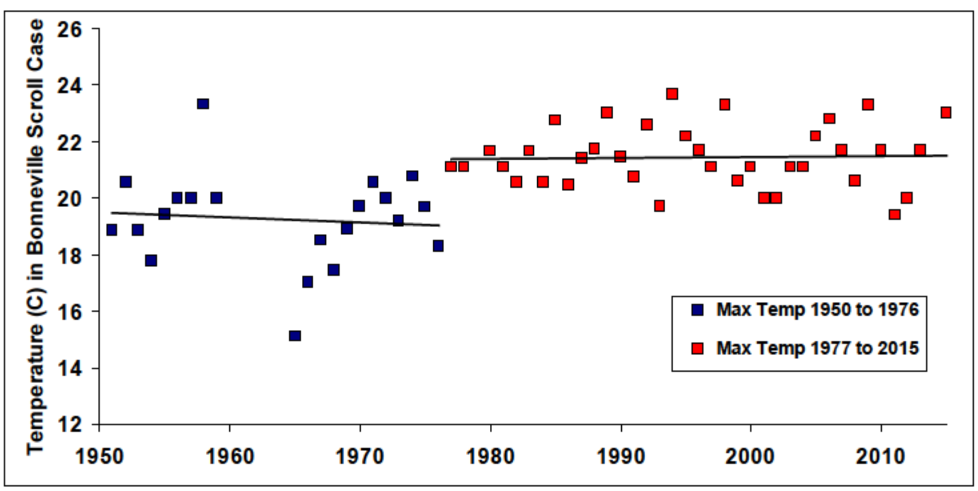

Figure 1. Maximum scroll case temperatures at Bonneville Dam in June and July for the years 1950 to 2015, with a break point at 1977 showing increased temperature coincident with the completion of the four Lower Snake River dams. Data source: Columbia River DART.

With the development of the call for the WQP in the 2000 BiOp (NMFS, 2000), a concurrent process was set to address both temperature and total dissolved gas. With time, the two processes merged and the Temperature TMDL process was no longer pursued in favor of the water quality approach outlined in BiOp. The 2003 Preliminary Draft TMDL (EPA, 2003) was never finalized and a maximum load allocation was never established for temperature.

Between the 2000 BiOp and 2004 BiOp, a Water Quality Team was established consisting of senior policy analysts supported by technical staff from the federal and state agencies, the tribal governments, and non-federal entities. The Water Quality Team developed the first WQP to incorporate the traditional TMDL development and implementation process with the new effort to improve water quality standards on the mainstem Columbia River.

Although initially supportive of developing the TMDL and also addressing adult ladder temperatures, the COE moderated their stance regarding the role of the hydrosystem in temperature occurrences above the States' criteria, or the 20°C (68°F) salmon reference temperature. The COE's official position (NMFS, 2004) was included as an appendix to the WQP that was part of the proposed Actions of the 2004 BiOp remand. The COE's position asserted that high mainstem temperatures occurred both pre- and post-impoundment and that, while the hydrosystem development and operation bore some responsibility for increasing mainstem water temperatures, they also wanted to recognize upstream influences (including the construction and operation of upstream dams, point source returns, agriculture practices, forestry practices and urban development) as well as climate change.

Despite continued development of WQPs over the years, the BiOp process has fallen short of ever really making an impact on water temperature beyond the actions initially identified in the 1990s. WQPs were developed in 2003, 2004, 2006, 2009 and 2014. The 2009 WQP included over thirty measures that could be considered to address temperature and identified issues, feasibility and timelines for implementation. By the 2014 WQP most actions were dropped and the WQP included only four actions for addressing temperature: Dworshak cool water releases; temperature modeling; temperature monitoring; and studies to identify thermal refugia. A more complete chronology of the process associated with temperature is included in Appendix A.

Recent Research Findings, Water Temperature and Effects on Adult Salmon

The 1995 BiOp included a river temperature upper limit of 20°C (68°F) (NMFS, 1995). This limit was set as the lethal limit for adult salmonids in the Columbia Basin. Temperatures have risen above this limit on many occasions since then, and negative impacts of high temperature on sockeye have been observed both above and below the BiOp standard.

Adult Sockeye Water Temperature Tolerances

The effects of high temperature on adult sockeye migration most obviously include direct mortality and migration delay, but can also include the depletion of energy resources for spawning (through delay and increased respiration), reduced gamete viability, and increased rates of disease (McCullough et al., 2001). Local adaptation for various source populations has created wide variations in thermal limits. Fraser River sockeye populations encounter river temperatures from 9°C (48°F) to 22°C (72°F), depending on the timing of migration (Eliason et al., 2011). Weaver Creek sockeye, a population that migrates in the cooler fall temperatures, has an optimal migration temperature of 14.5°C (58°F) (Eliason et al., 2011), with a significant decrease in survival at temperatures above 18°C (64°F) and no successful migrations at temperatures above 20.4°C (69°F) (Farrell et al., 2008). In contrast, summer migrating populations in the Fraser River have an optimal migration temperature of 17.2°C (63°F) (Eliason et al., 2011) with a 20% reduction in swimming ability at temperatures over 21°C (70°F) (McCullough et al., 2001).

Observations of thermal limits for sockeye are often observations of migration behavior at dams. In the Okanogan River, migration past the Zosel Dam stopped when temperatures were above 21.1°C (70°F) (Major and Mighell, 1967) or above 23°C (73°F) (Johnson et al., 2007). Migration appears to resume when temperatures decrease. High temperatures can also cause mortality in addition to a pause in migration. Weaver Creek sockeye (Fraser River) had reduced survival of 50% after being held in tanks at 18°C (64°F) when compared to 10°C (50°F) (Crossin et al., 2008). In the Columbia River, reduced survival was observed at temperatures exceeding 20°C (68°F) (Naughton et al., 2005). Crozier et al. (2014) observed reduced sockeye survivals at temperatures above 18°C (64°F), and Keefer et al. (2008) observed 100% mortality at 22°C (72°F).

Rather than observations of the effects of peak temperatures, a cumulative measure of thermal exposure may be the most appropriate measure of the effects of high water temperatures on sockeye migration and survival. From 2008 through 2013, Crozier et al. (2014) found that the cumulative thermal exposure can have more effect on adult survival than single point estimates of temperature through the migration period. However, uncertainty around thermal exposure measurements means the full impact is difficult to establish. Further studies with finer thermal resolution may clarify the impact of cumulative exposure to high temperatures rather than the peak temperatures experienced during migration.

Ladder Temperatures and Upstream Salmon Migration

Fish ladders often expose migrating adults to the highest temperatures and thermal stress encountered in the hydrosystem, due to warm surface water used for ladder flow (Keefer and Caudill, 2015). These high temperatures cause thermoregulatory behavior, such as exiting the ladder into the tailrace repeatedly. Additionally, ladders that use warm surface waters that flow into a cooler tailrace have a high thermal gradient, which also affects migration through the ladders. At temperature gradients of greater than 1^{o}C, Chinook and steelhead have a higher likelihood of entering the ladder multiple times followed by exits back into the tailrace (Caudill et al., 2013). This "in-and-out" movement in the ladder will significantly delay migration to spawning grounds, increase total thermal exposure, consume energetic resources, and decrease migration success (Caudill et al., 2013; Keefer and Caudill, 2015). The potential synergistic effects of high ladder temperatures combined with a high thermal gradient have not been studied.

2015 Flow and Water Temperature Data with Comparisons to Past Years

Biological Opinion Flow Targets in 2015

The 2015 water year produced the second lowest spring flows at both Lower Granite (LGR) and McNary (MCN) dams since the 1995 BiOp. The 2015 summer flows at LGR were the second lowest since 1995 and at MCN were the fifth lowest.

The spring low flow conditions at MCN were exacerbated by the need to draft Grand Coulee reservoir below its April 10th BiOp elevation of 1,283 feet to 1,255 feet in order to conduct drum gate maintenance at the project. This caused spring inflow to be diverted to refilling an additional 30 feet, rather than passing inflows downstream to the lower river. BiOp spring flow objectives were not met at either LGR or MCN.

The BOP (Best Operational Point) summer flow objectives were also not met at either LGR or MCN. The 2015 flows are shown in comparison to the BiOp flow objectives in Figure 2. However, while summer average flow at MCN averaged only 142.6 Kcfs, it could have been much lower. The Columbia River Treaty between the United States and Canada provides for the proportional summer draft of Canadian Reservoirs during dry periods to maintain power reliability for customers in the United States. Treaty operations/flows into the U.S. are established based upon the Treaty Storage Regulation Study (TSR) as modified by any supplemental operating agreements in effect. In 2015, based on the TSR, over 5 million acre feet of water was released from Canadian reservoirs during the summer period aiding the low summer flows in the Columbia River.

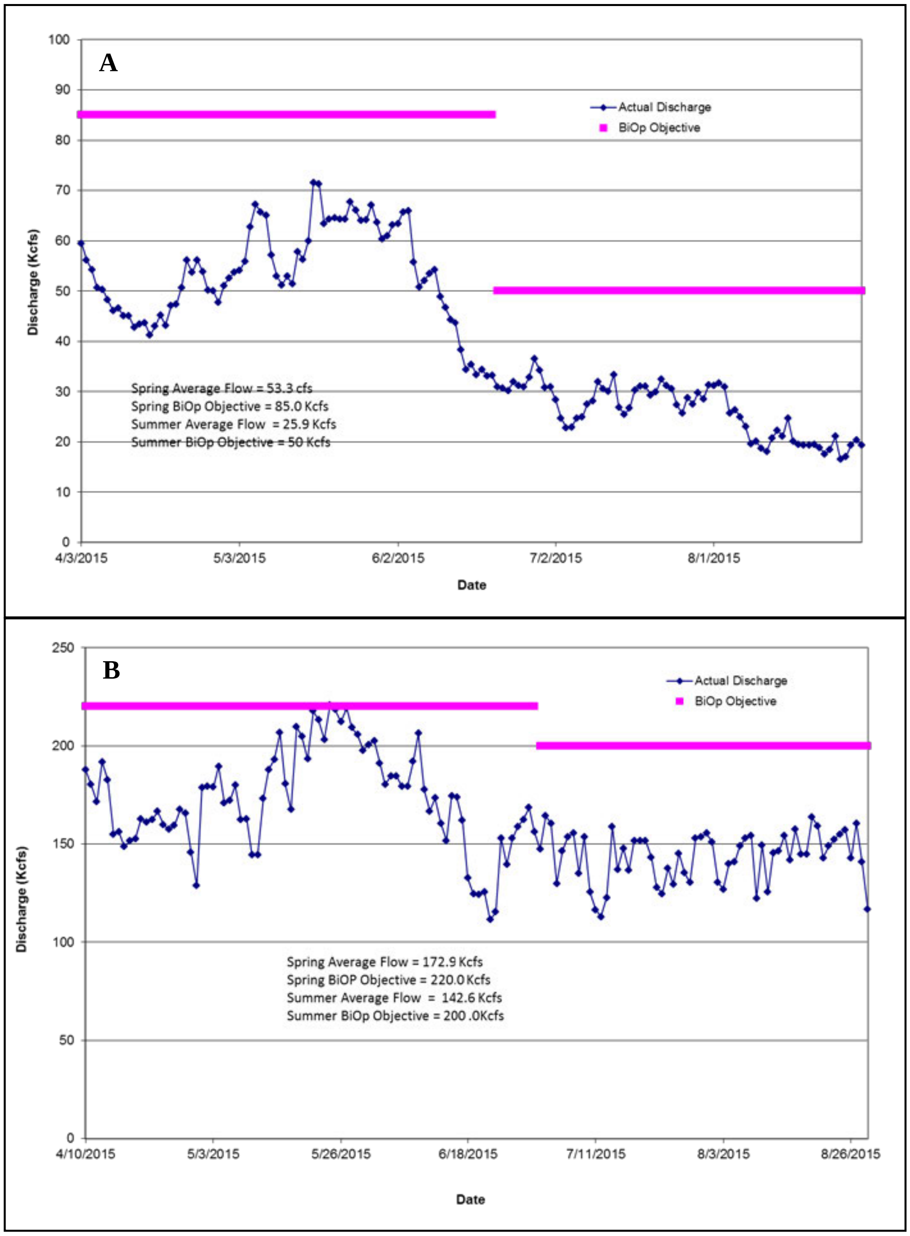

Figure 2. 2015 spring and summer flows at Lower Granite (A) and McNary (B) dams, in comparison to the 2014 Biological Opinion flow objectives.

2015 and Historical Water Temperatures

To put 2015 temperatures into context relative to the 20°C (68°F) water temperature criteria, temperature data from each of the eight FCRPS projects on the Middle Columbia and Snake rivers and the five Public Utility District (PUD) and two Bureau of Reclamation (BOR) projects on the Upper Columbia over the last eleven years (2005–2015) are presented below. The temperature data presented below are from the water quality monitors that are located both in the forebay and tailrace at each project, for the passage period of April 1st through August 31st. Below is a brief summary of the findings from this review.

In 2015, temperatures at Middle Columbia, Snake River, and Upper Columbia projects were higher, earlier in the season, than the previous ten years. Figures 3–5 are provided below to illustrate this pattern at three projects, one for each of the Middle Columbia, Snake, and Upper Columbia rivers (Appendix B provides figures for all projects reviewed).

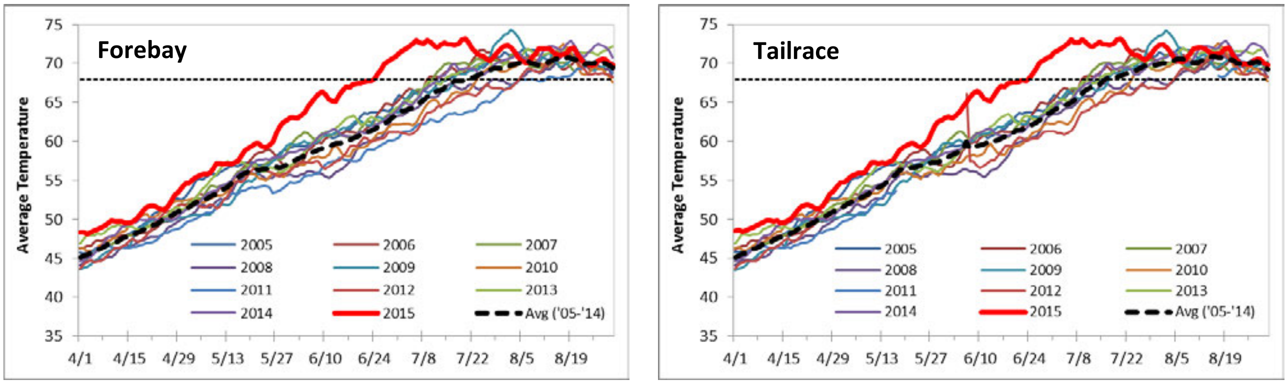

Figure 3. Daily average temperature (°F) at the Bonneville Dam water quality monitors in the forebay and tailrace (at Cascade Island) (B), April 1–August 31, 2005–2015. Dashed line represents the 10-year average (2005–2014). Horizontal dashed line is provided at 68°F for perspective relative to the water quality standard.

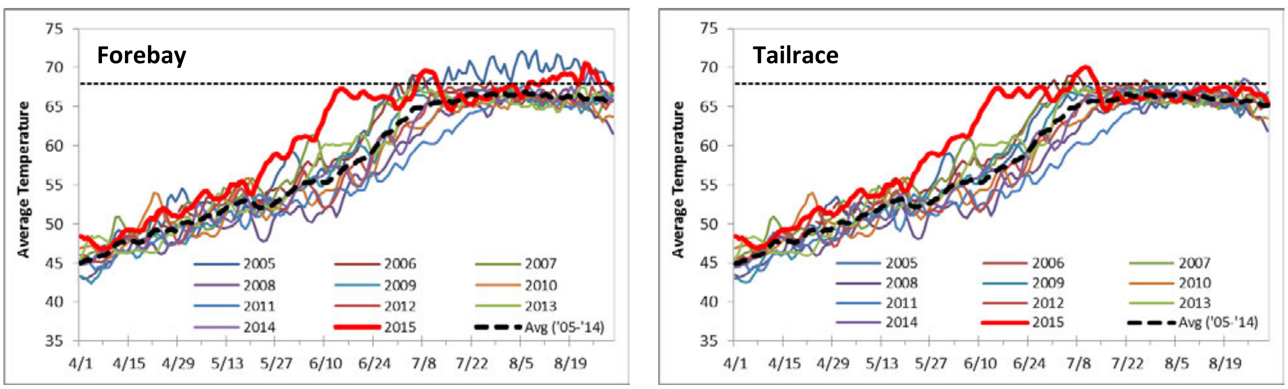

Figure 4. Daily average temperature (°F) at the Lower Granite Dam water quality monitors in the forebay and tailrace, April 1–August 31, 2005–2015. Dashed line represents the 10-year average (2005–2014). Horizontal dashed line is provided at 68°F for perspective relative to the water quality standard.

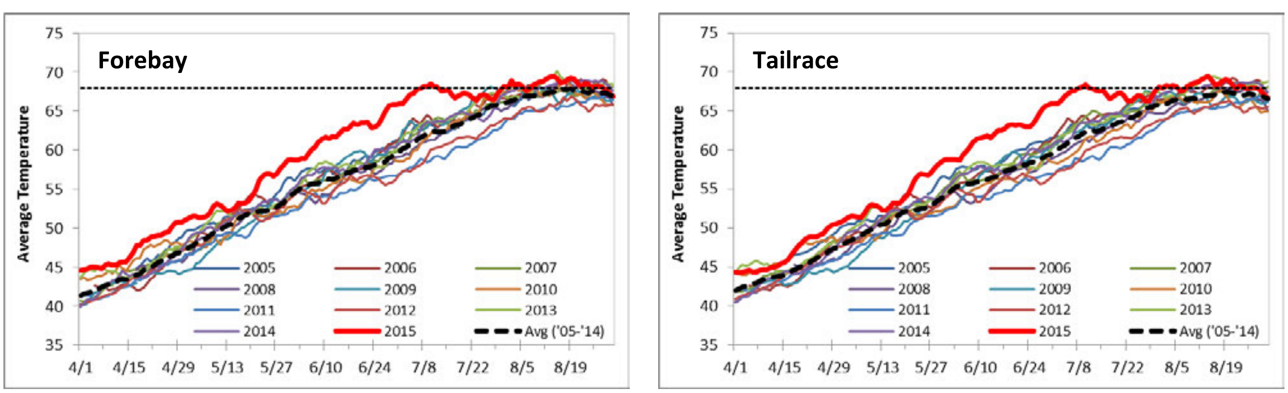

Figure 5. Daily average temperature (°F) at the Priest Rapids Dam water quality monitors in the forebay and tailrace, April 1–August 31, 2005–2015. Dashed line represents the 10-year average (2005–2014). Horizontal dashed line is provided at 68°F for perspective relative to the water quality standard.

In 2015 (April–August), temperatures exceeded the 20°C (68°F) standard at the Middle Columbia sites 43%–46% of the passage season (Tables B.1–B.4). While 2015 had the highest proportion of days exceeding the 20°C (68°F) standard, Middle Columbia sites commonly exceeded the 20°C (68°F) standard for 20%–30% of the passage season over the previous ten years (Figures B.1–B.4). These exceedances typically begin in mid-July or August whereas in 2015 exceedances began in late June.

In 2015 (April–August), temperatures exceeded the 20°C (68°F) standard 35%–45% of the season at Ice Harbor (IHR), Lower Monumental (LMN), and Little Goose (LGS) dams, but only 16% of the passage season in the forebay and 5% in the tailrace at Lower Granite Dam (LGR) (Tables B.5–B.8). The discrepancy in temperature standard exceedances between LGR and the other Snake River sites is due to the temperature augmentation water that is provided from Dworshak Reservoir (DWR). The effectiveness of temperature augmentation water from DWR is measured at the LGR tailrace. As with the Middle Columbia sites, it was common for LGS, LMN, and IHR to exceed the 20°C (68°F) standard for 20%–30% of the passage season (Figures B.5–B.7).

Overall, exceedances of the 20°C (68°F) standard in the Upper Columbia were much less common than what was observed at the Middle Columbia and Snake river sites (Tables B.9–B.15, Figures B.9–B.15). However, 2015 had the highest proportion of days exceeding 20°C (68°F) at many of the Upper Columbia sites, when compared to the previous ten years. In fact, at Priest Rapids (PRD) and Wanapum (WAN) dams, approximately 10%–20% of the days in 2015 exceeded the 20°C (68°F) standard.

Documentation of Historical Water Temperature Problems in the FCRPS Affecting Fish Passage

Historically, elevated temperatures in adult ladders have been documented as a significant issue for adult migration success. The 1992 Northwest Power Planning Council (NPPC) Strategy for Salmon (NPPC, 1992), Adult Salmon Measures #7 states:

> *Evaluate potential methods for decreasing water temperature in mainstem fish ladders and apply where appropriate.*

The 1994 and 1995 FCRPS BiOps that cover the 1994–1998 period recognized and included several references pertaining to high temperatures in the adult ladders. The following paragraph from these opinions (NMFS, 1994: pages 35, 37, and 39; NMFS, 1995: pages 54, 55, and 56) state:

> *High adult fish ladder temperatures at the Snake River projects during low water conditions may cause increases in adult salmon mortality. Reductions in ladder water temperatures as a result of ladder improvements are projected to begin in 1998. However, because no specific ladder modifications have been proposed, it is not possible to quantify the benefit to adult salmon passage.*

Furthermore, in Section IX (Conservation Recommendations) of the 1994 BiOp (NMFS 1994, pg. 76), NOAA directs the COE to address high water temperatures in adult fishways on an expedited basis with the following:

> *The COEs should develop and evaluate potential modifications for decreasing summer water temperatures in main stem Snake River project fish ladders. Effective modifications should be implemented on an expedited basis. This recommendation coincides with measures identified in NPPC Strategy for Salmon.*

Appendix A provides extensive detail regarding the transition from specific ladder water temperature criteria to an overall water quality/water temperature approach undertaken by the federal agencies.

More recently, in 2011, the COE issued a report (USACE, 2011) that outlines several alternatives to aid in reducing ladder temperatures at LGR. However, no action was taken to address the elevated ladder temperature at LGR until summer 2013 when adult passage at LGR was impeded by excessive temperatures in the ladder. The upper fishway at LGR reported water temperatures between 22°C (72°F) and 24°C (76°F), while the tailrace at the dam was reporting temperatures below 20°C (68ºF). The thermal gradient within the ladder restricted adult passage for all species. Of particular importance were the very low daily passage numbers for sockeye and the discrepancy between the counts of sockeye reported at LGS as compared to those reported at LGR.

In response to these concerns, three TMT calls were initiated between July 22, 2013, and July 24, 2013. After the initial call on July 22nd, the Action Agencies implemented an operation that prioritized Unit #1, effectively moving more water through the powerhouse and less water over the spillway, with all spilled water moving over the Removable Spillway Weir (RSW). Adult fish counts did not show a response to this operation.

On July 23, 2013, FPAC submitted SOR 2013-4 which asked the Action Agencies to immediately take actions that may increase adult passage and decrease the water temperature in the adult ladder. The proposed actions included: (1) cycling the navigation locks, (2) reducing the contribution of warm water from Diffuser #14, (3) utilizing additional pumps to provide cooler water to the ladder, (4) extending the intake to Diffuser #14 to draw cooler water to the ladder, and (5) modifying operations to facilitate adult passage during daytime hours and to provide juvenile protections during nighttime hours. These alternatives were consistent with the 1994 and 1995 BiOp Conservation Recommendations (NMFS, 1994; NMFS, 1995). In response, the COE agreed to implement the modified project operations outlined in the last bullet of SOR 2014-4 for a period of two days. The COE also agreed to investigate upper ladder options that would potentially aid in the reduction of warmest water contributions to the ladder. Subsequently, the COE utilized the emergency pumping system to draw cooler water from deeper in the forebay in an effort to reduce the temperature gradient in the ladder. Adults passing through the ladder did respond to the initiation of the emergency pumps.

A change to the Fish Passage Plan (FPP) was submitted by NOAA Fisheries in 2014 concerning temperatures and adult delay at LGR. This change form was not approved. However, in early August 2014, a combination of emergency pumps and rental pumps were utilized at LGR to facilitate the operation of the adult trap.

In 2015, sockeye passage throughout the Columbia and Snake rivers was impaired by high water temperatures and the only site with alternatives to address these high temperatures was LGR. Therefore, measures to address water temperature concerns and adult passage were primarily focused on LGR. Later, operations at LGS were modified to attempt to address adult passage delay. A full discussion on the actions considered at LGR and LGS to address elevated temperatures and adult passage issues at LGR and adult passage issues at LGS in 2015 are provided in Appendix C.

Analyses of 2015 PIT-tag Adult Sockeye Passage, Travel time, and Survival with Comparisons to Past Years

Methods

Currently, the COE collects ladder water temperatures at all FCRPS projects. However, there is no publically available database of these ladder water temperatures. Although requested, historical ladder temperatures were not provided for all projects and all years. In order to conduct the analyses of sockeye adult survival and effects of temperature, the relationship between forebay temperature and ladder temperature was investigated using the limited ladder temperature datasets we were able to obtain. Ladder temperatures were highly correlated with forebay temperatures (Figure 6). Therefore, forebay temperatures were utilized for these analyses. However, the use of forebay temperatures does not address high temperature spikes that were observed in the limited ladder temperature data provided by the COE, which would affect adult passage.

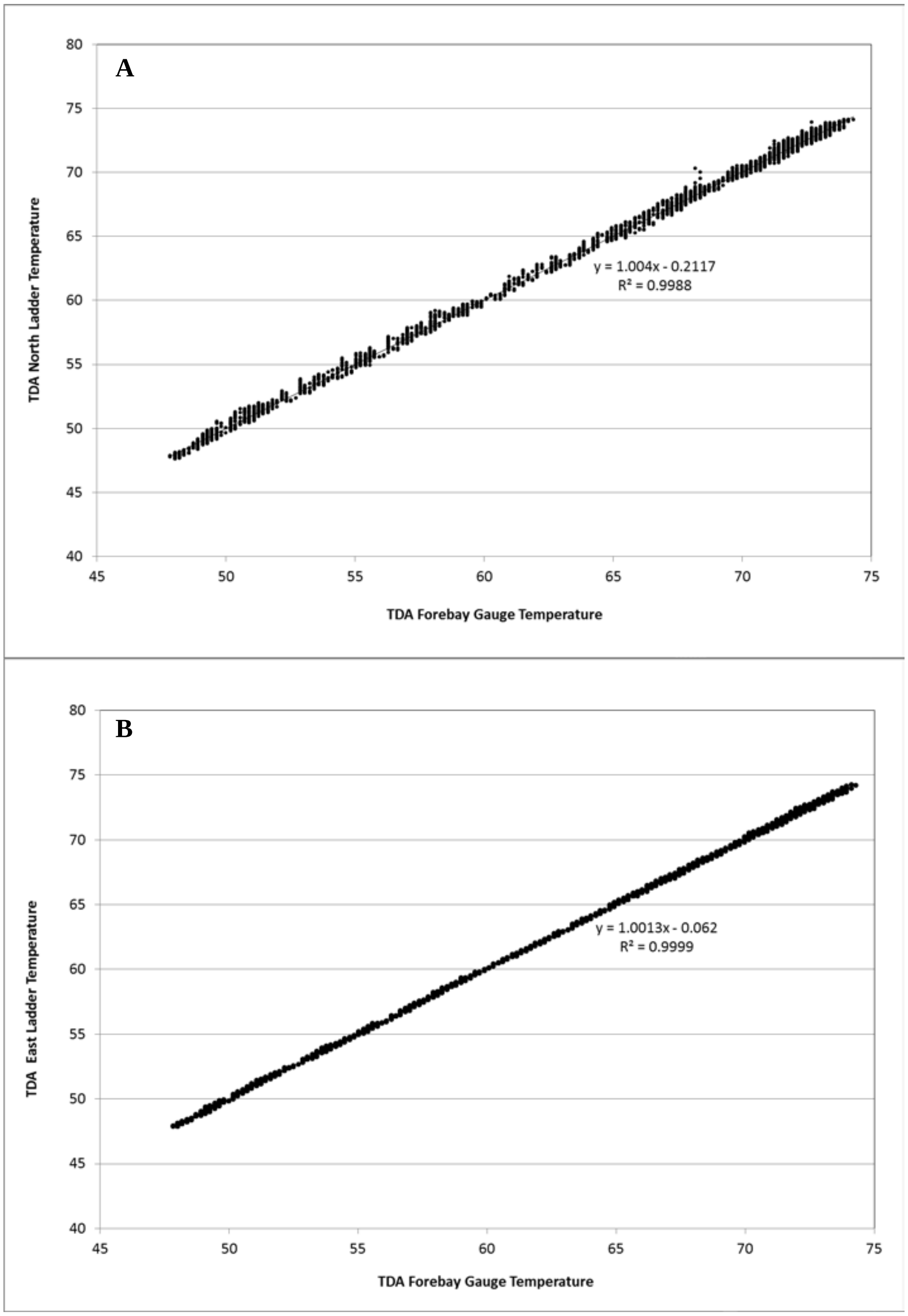

Figure 6. Relationship between forebay temperature and ladder temperatures in the North (A) and East (B) ladders at The Dalles Dam, 2015.

In this section, summaries of survival, migration and ladder travel times based on returning adult sockeye PIT-tagged as juvenile are presented. PIT-tag data from adults tagged at the BON adult fish facility are not included because summaries rely on previous juvenile migration history and ESU-origin which can only be determined from individuals PIT-tagged as juveniles.

Snake River Sockeye Adult Survival Estimates

Cormack-Jolly-Seber (CJS) estimates of adult survival from PIT-tagged sockeye are available starting in 2009. Prior to 2015, Snake River origin adult survival estimates from BON-LGR ranged from 0.44 (95% CI: 0.36–0.51) in 2013 to 0.77 (0.64–0.91) in 2010 (Table 1). In 2015, BON-LGR survival was 0.04 (0.02–0.05). Most of these returning adults never made it to MCN. In 2015, BON-MCN survival was 0.15 (0.12–0.18) and MCN-LGR survival was 0.25 (0.15–0.33). When standardizing for distance (i.e., survival per 100 river miles), the survival rate was nearly the same in the BON-MCN and MCN-LGR reaches, at 0.27 (0.23–0.31) and 0.24 (0.14–0.32), respectively.

Adult sockeye survival estimates above LGR are available only back to 2009. From 2009 to 2014, these estimates ranged from 0.32 (0.22–0.43) in 2013 to 0.77 (0.60–0.89) in 2010. In 2015, adult survival above LGR was 0.26 (0.06–0.46). The wider confidence interval for this estimate is due to very few PIT-tagged individuals (seven total) detected in the Sawtooth Valley in 2015. This resulted in an overall survival of 0.01 (0.00–0.02) from Bonneville Dam to the Sawtooth Valley in 2015. This extremely low estimate is also reflected by the extremely low returns of sockeye adults to the Sawtooth Valley (45 total PIT-tagged and non-PIT-tagged) (http://fishandgame.idaho.gov/public/fish/?getPage=29).

Table 1. Reach survival estimates with 95% confidence intervals in parenthesis of returning PIT-tagged Snake River sockeye salmon.

	Bonneville to McNary Dam	McNary to Lower Granite Dam	Lower Granite to Sawtooth Valley†	Bonneville to Lower Granite Dam	Bonneville Dam to Sawtooth Valley†
2009	0.74 (0.53-0.88)	1.00 (1.00-1.00)	0.65 (0.40-0.83)	0.74 (0.56-0.92)	0.48 (0.27-0.68)
2010	0.85 (0.70-0.93)	0.91 (0.80-1.02)	0.77 (0.60-0.89)	0.77 (0.64-0.91)	0.60 (0.44-0.76)
2011	0.67 (0.63-0.71)	0.97 (0.95-0.99)	0.74 (0.69-0.79)	0.65 (0.61-0.70)	0.48 (0.44-0.53)
2012	0.58 (0.49-0.67)	0.91 (0.83-0.99)	0.60 (0.48-0.72)	0.53 (0.44-0.62)	0.32 (0.24-0.40)
2013	0.68 (0.62-0.74)	0.65 (0.56-0.74)	0.32 (0.22-0.43)	0.44 (0.36-0.51)	0.14 (0.09-0.19)
2014	0.64 (0.59-0.69)	0.89 (0.85-0.93)	0.60 (0.53-0.68)	0.57 (0.51-0.62)	0.34 (0.29-0.39)
2015	0.15 (0.12-0.18)	0.27 (0.18-0.35)	0.29 (0.07-0.51)	0.04 (0.02-0.05)	0.01 (0.00-0.02)

† Survival estimates to Sawtooth Valley are based on detections of PIT-tagged sockeye adults in the Sawtooth Valley and does not include individuals that were collected for broodstock at LGR.

In recent adult return years (2013–2015), a seasonal survival effect has been evident, wherein the later arriving cohorts of the run survive much worse than those arriving earlier (Figure 7). This pattern was not evident from 2011–2012, and there were insufficient numbers of PIT-tagged returning adults to divide the run into quartiles in 2009 and 2010. In 2015, survival decreased from the first to third quartile of the run and remained flat thereafter, whereas in 2013 and 2014 there was no distinguishable trend in survival during the first three quartiles of the run followed by decline in survival in the fourth quartile of the run.

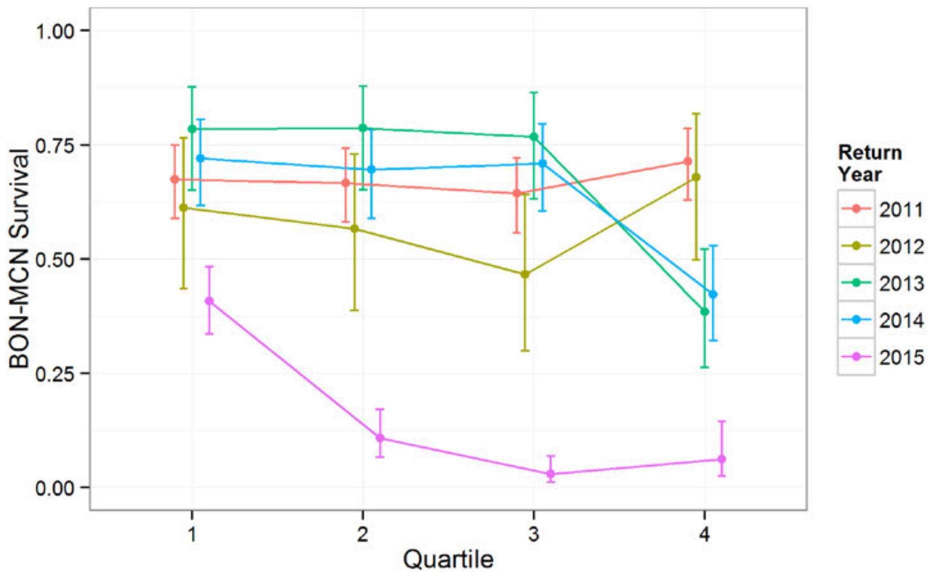

Figure 7. Survival from Bonneville to McNary Dam by run grouping determined by quartiles (i.e., first 25% of the run (1), 26%–50% of the run (2), etc.).

As documented in other studies (Keefer et al., 2008; Crozier et al., 2014), Snake River sockeye adults that were transported as juveniles did not survive as well, when compared to juveniles that migrated in-river (Figure 8). Return year 2011 was the one exception to this pattern, as differences in survival for transported and non-transported groups were indistinguishable in this year. As evidenced by non-overlapping confidence intervals, Snake River sockeye transported as juveniles had significantly lower survival than the non-transported groups in the BON-MCN reach in 2013, 2014 and 2015. This effect was also observed in the MCN-LGR reach in 2013 and 2015. Survival from MCN-LGR for sockeye that were transported as juveniles was 0.00 in 2015. This is based on the fact that eighteen sockeye adults that were transported as juveniles were detected at MCN in 2015 and none of these adults were detected at LGR. However, generating this survival estimate was still possible by assuming that non-transported and transported individuals have the same detection probability at and above Lower Granite Dam. There were insufficient numbers of PIT-tagged returning adult sockeye to estimate survival by juvenile migration history before 2011.

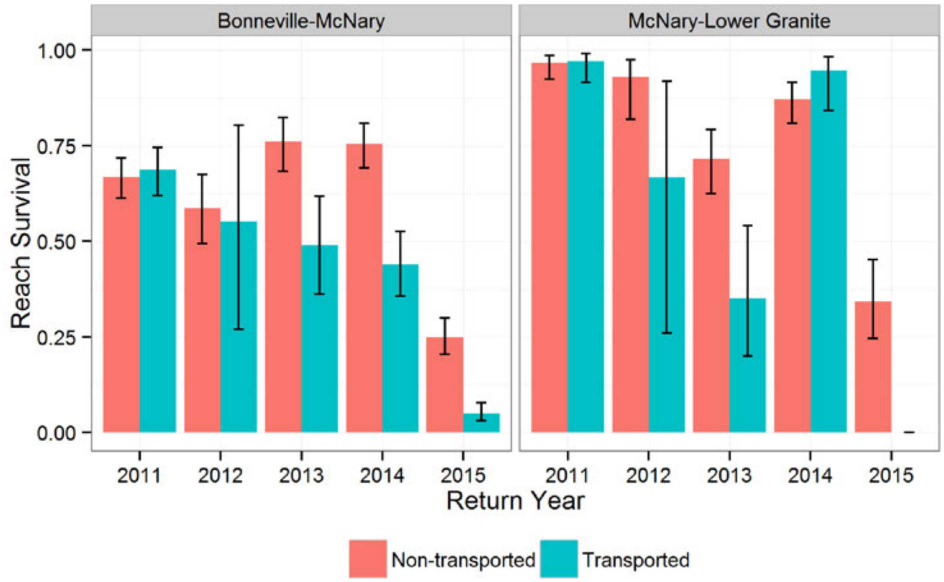

Figure 8. Snake River sockeye adult survival (95% confidence interval), from Bonneville to McNary, and McNary to Lower Granite Dam by return year and migration history.

Upper Columbia Sockeye Adult Survival Estimates

Adult sockeye survival in 2015 for Upper Columbia origin fish was also the smallest on record since 2009 (Table 2). Survival from BON-MCN was 0.61 (0.56–0.66) in 2015, where previous estimates ranged from 0.69 (0.65–0.72) in 2011 to 0.87 (0.83–0.91) in 2014. Survival from McNary to Rock Island Dam (RIS) in 2015 was 0.76 (0.71–0.81, which was also the lowest among the years analyzed.

Table 2. Reach survival estimates with 95% confidence intervals in parenthesis of returning PIT-tagged Upper Columbia sockeye salmon.

	Bonneville to McNary Dam	McNary to Rock Island Dam	Bonneville to Rock Island Dam
2009	0.80 (0.75-0.84)	0.94 (0.91-0.98)	0.75 (0.71-0.80)
2010	0.82 (0.79-0.84)	0.95 (0.93-0.96)	0.77 (0.75-0.80)
2011	0.69 (0.65-0.72)	0.86 (0.83-0.90)	0.59 (0.55-0.63)
2012	0.72 (0.68-0.75)	0.93 (0.91-0.96)	0.67 (0.63-0.71)
2013	0.79 (0.72-0.85)	0.89 (0.83-0.94)	0.70 (0.63-0.77)
2014	0.87 (0.83-0.91)	0.91 (0.86-0.96)	0.80 (0.74-0.85)
2015	0.61 (0.56-0.66)	0.76 (0.71-0.81)	0.46 (0.41-0.51)

A seasonal variation pattern in adult survival for Upper Columbia sockeye was evident in 2015, but this effect was not observed in previous return years (Figure 9). From 2011 to 2014, there was no distinguishable trend in adult survival from BON-MCN. In 2015, BON-MCN survivals steadily declined starting from the 2^{nd} quartile of the run. There were insufficient numbers of PIT-tagged returning adults in 2009 and 2010 to divide the run into quartiles.

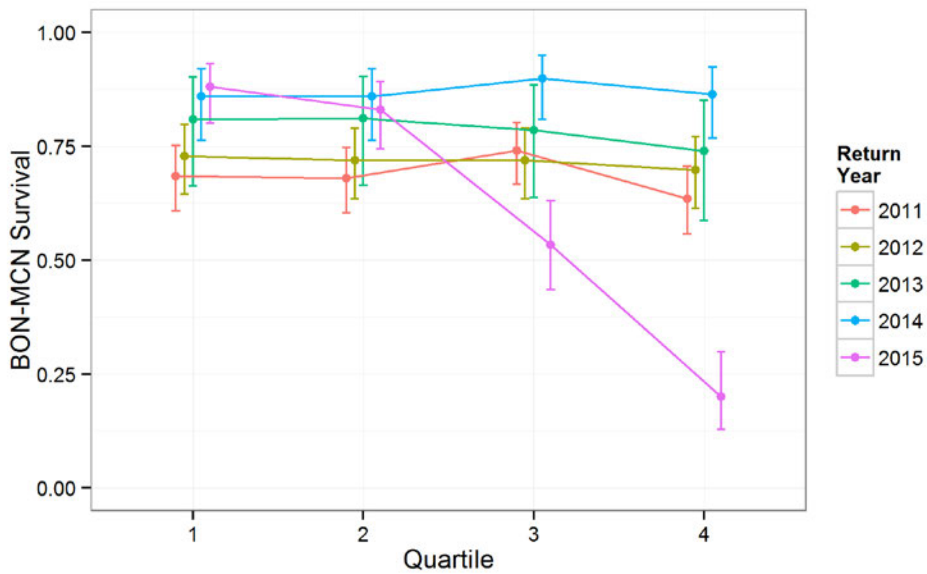

Figure 9. Survival from Bonneville to McNary Dam by run grouping determined by quartiles (i.e., first 25% of the run, 26%–50% of the run, etc.).

Snake River and Upper Columbia River Comparisons

In this section, summaries of timing, ladder delay and temperature are presented side-by-side for Snake River and Upper Columbia adult sockeye. These summaries are intended to help identify potential differences in survival for these two ESUs. It should be recognized, however, that there are many other important factors (see Crozier et al., 2014) that aren't considered here.

<u>Arrival Timing</u>

Snake River adult sockeye on average arrive at Bonneville Dam later than Upper Columbia sockeye (Figure 10). Among the years examined, the minimum difference in median arrival timing between Snake (both transported and non-transported) and Upper Columbia sockeye was three days in 2014. The maximum difference in median arrival timing was in 2012, where the median arrival dates for Snake River sockeye that were transported as juveniles versus migrated in-river were seven and 12 days later, respectively, than the median arrival date for Upper Columbia sockeye. In 2015, the median arrival dates for transported and non-transported Snake River sockeye were approximately 8 and 9 days later than that for Upper Columumba Sockeye, respectively. Except for in 2012, there is no indication of a systematic difference in arrival timing between Snake River sockeye that were transported as juveniles versus those that migrated in-river. In all other return years, differences in median arrival timing for these two groups were within a day.

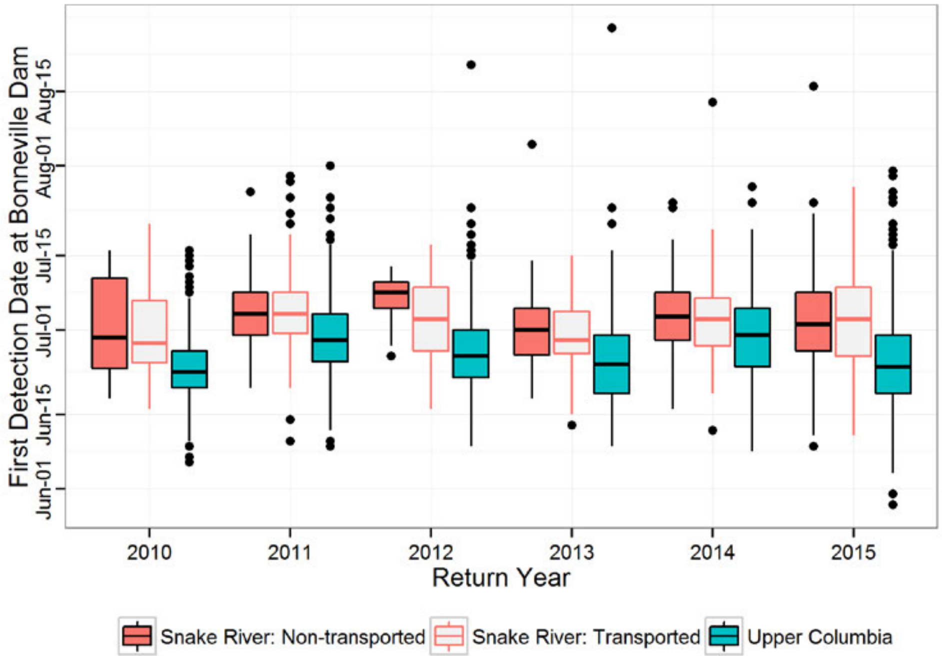

Figure 10. Boxplots of arrival timing at Bonneville Dam based first detection date for transported and non-transported Snake River and Upper Columbia sockeye adults.

<u>Ladder Delay and Fallback</u>

A comparison of adult fallback rates (i.e., re-ascensions through the ladder) at BON showed that Snake River sockeye fell back and re-ascended ladders at a higher rate than Upper Columbia sockeye during the same years (Figure 11). The differences in the percentage of adults that re-ascended between the Snake River and Upper Columbia stocks appeared mostly to do with the relatively high rate of re-detections of PIT-tagged Snake River sockeye adults that were transported as juvenile migrants. Fallback and re-ascension exposes fish to additional high temperatures in the ladders as well as increasing overall migration time.

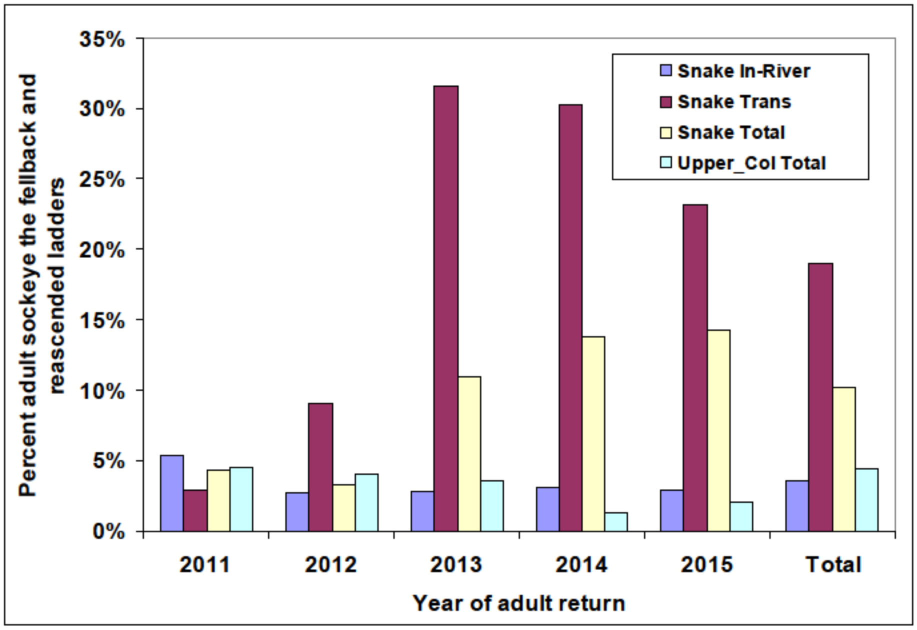

Figure 11. Adult sockeye fallback and re-ascension rates at Bonneville Dam in the years 2011 to 2015.

It appears that PIT-tagged Snake River origin sockeye adults took longer to pass through the ladders at BON than Upper Columbia River sockeye adults, when comparing the same ladders during the same year (Figure 12). Times represent that portion of the ladder between lower and upper PIT-tag coils and do not reflect total time spent in ladders. Increased travel time in ladders has been associated with large temperature differences between ladder entrance and ladder exit (Caudill et al., 2013). Longer ladder transit times result in longer exposure to high ladder temperatures.

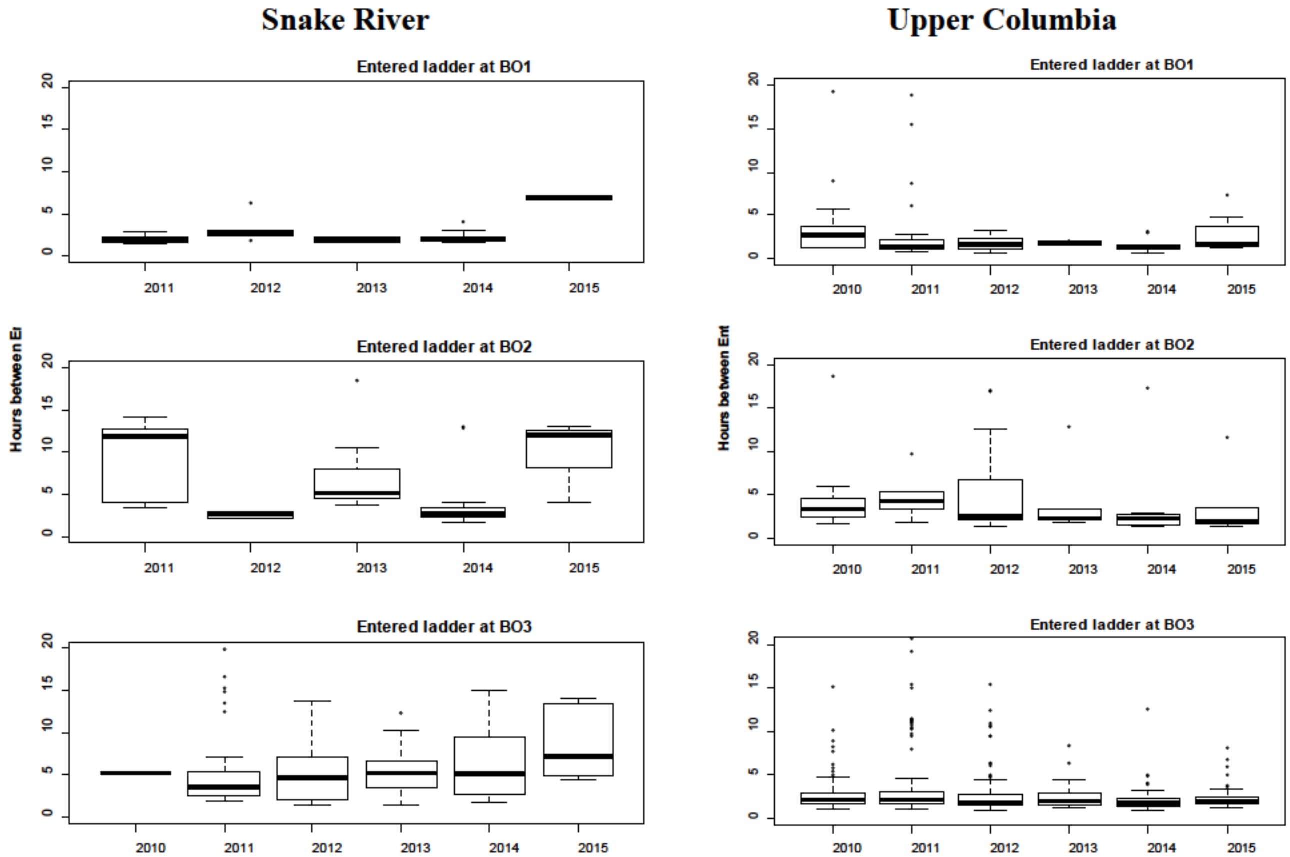

Figure 12. Box plots comparing relative time to pass through the adult ladders at Bonneville Dam for Snake River origin sockeye adults and Upper Columbia River sockeye adults. Passage times were restricted to those PIT-tagged adults that were detected at entrance coils and exit coils in the respective ladders.

<u>Migration Temperatures</u>

Since Snake River sockeye tend to arrive later than Upper Columbia sockeye, these fish should be exposed to higher temperatures at the start of their migration through Middle Columbia reservoirs, under the assumption that temperatures increase over the span of time when sockeye are present. This effect is shown in Figure 13, which displays BON forebay temperatures at the time an individual exited the BON adult ladder (i.e., last detection date). Return years 2014 and 2015 were the most extreme wherein the effect of entering BON reservoir later (characterized by the peak and right tail of the last detection date distribution) resulted in exposures near or above the 20°C (68°F) water temperature criteria.

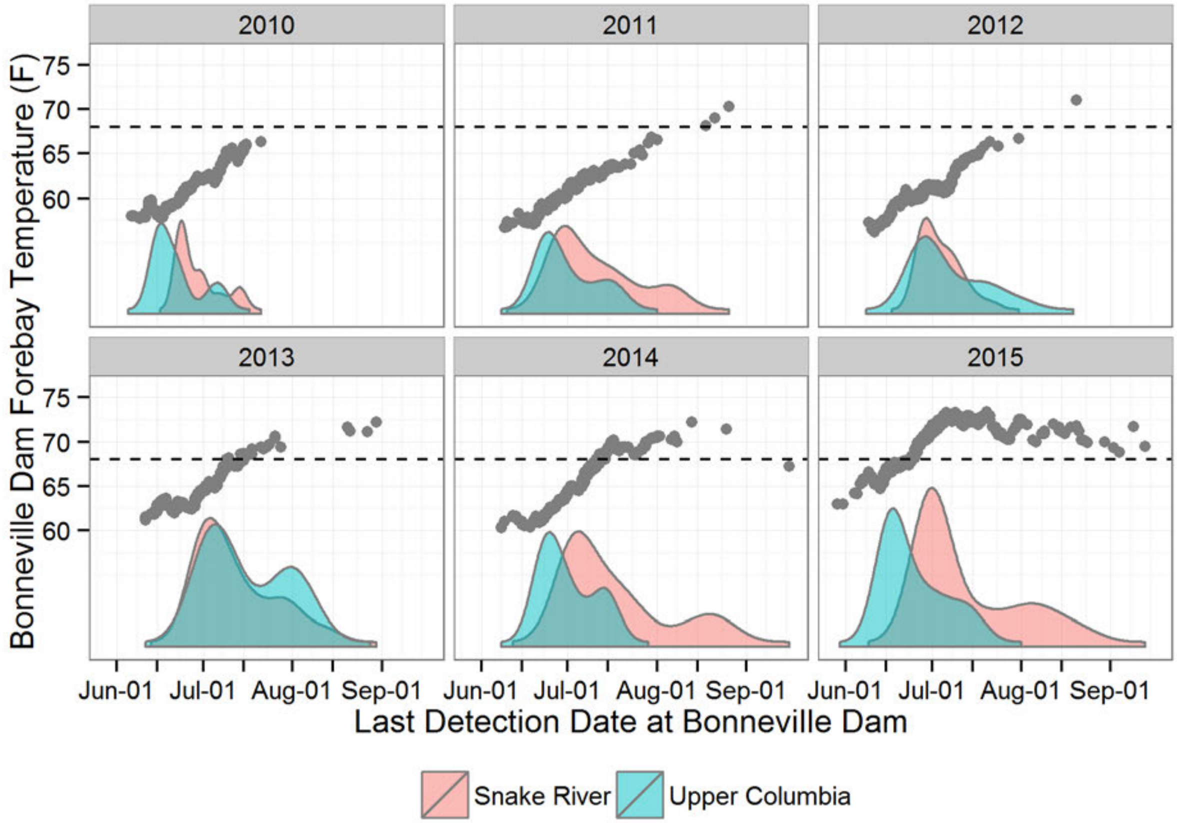

Figure 13. Observed Bonneville Dam forebay temperature upon Bonneville Dam ladder exit (i.e., last detect) (dots). Density plots of the distribution of exit dates for Snake and Upper Columbia River are shown below the scatterplot.

Temperature Exposure

Temperature exposure has been shown to be an important variable affecting adult sockeye survival (Crozier et al., 2014). Figure 14 shows boxplots of temperature exposure for Snake and Upper Columbia river stocks throughout the entire BON-MCN reach. Temperature exposure was calculated similarly as described in Crozier et al. (2014) by multiplying the reach travel time and the average of the downstream forebay and upstream tailrace temperature corresponding to the times forming the travel time estimate. Median temperature exposures were always higher in The Dalles Dam (TDA) to McNary Dam reaches from 2013–2015 for Snake compared to Upper Columbia river sockeye. Median temperature exposures from BON-MCN were also higher in return years 2013–2015 for Snake River sockeye compared to those from the Upper Columbia.

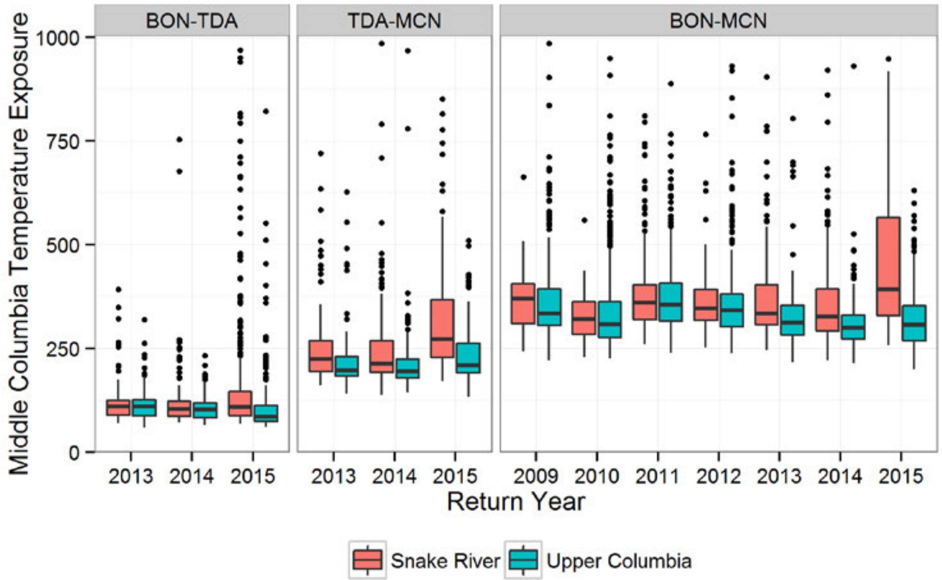

Figure 14. Temperature exposure from Bonneville to The Dalles, The Dalles to McNary, and Bonneville to McNary Dam by return year and origin. The y-axis was truncated at 1,000 for clarity.

<u>Temperature and Survival Relationship</u>

The relationship between temperature and BON-MCN survival for Upper Columbia and Snake River sockeye is shown in Figure 15. The temperature in the BON forebay associated with the last detection time at BON was used in order to examine this relationship. This temperature metric was chosen because it can be assigned to every PIT-tagged individual in this data set. The survival relationship was estimated from a CJS model with individual covariates. Return years 2014 and 2015 provided the greatest contrast between Snake River and Upper Columbia stocks (determined by visually examining non-overlapping confidence intervals). Upper Columbia sockeye survival did not change with increasing temperatures in 2014, whereas Snake River sockeye survival declined with increasing temperature. In the 2015 return year, both Snake River and Upper Columbia sockeye survival precipitately decreased with increasing BON forebay temperatures.

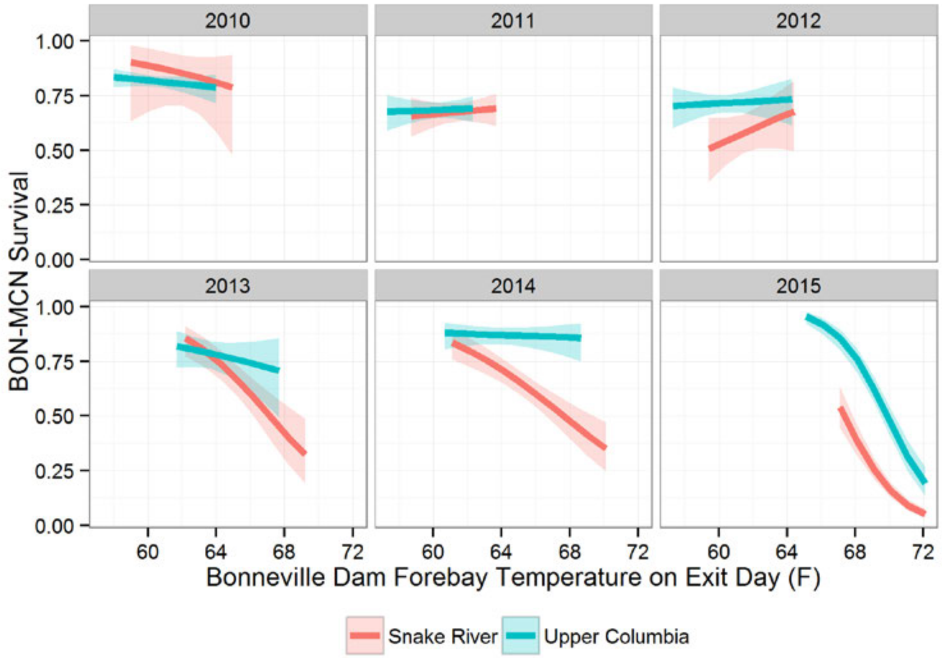

Figure 15. Estimated relationship between Bonneville Dam forebay temperature and Bonneville to McNary Dam survival by return year for Snake and Upper Columbia River adult sockeye. The shaded portion of the curves indicates 95% confidence intervals. All available data are used for the fitted relationship, but only the 2.5th to the 97.5th percentiles of observed temperatures in each return year are shown.

Temperature and Migration Speed Relationship

Previous analyses (Salinger and Anderson, 2006) showed that the swim speed of Chinook salmon increased with temperature below an optimal temperature, and decreased with temperature above the optimum. The relationship between temperature and migration speed for Snake River and Upper Columbia sockeye in 2015 is shown in Figure 16, where a quadratic relationship is fit to the observed MCN tailrace temperature (upon entrance) versus BON-MCN migration speed (miles per day). Only the 2015 return year was examined because this year provided the necessary contrast to examine a quadratic effect. With increasing temperatures beyond some optimum temperature, migration speeds decreased for both Snake River and Upper Columbia stocks. Furthermore, at similar temperatures, Snake River sockeye that were transported as smolts had a much lower migration speed than did non-transported individuals. This observation is consistent with previous observations showing that transported Snake River sockeye spend more time in the ladders than do non-transported Snake River sockeye and Upper Columbia sockeye.

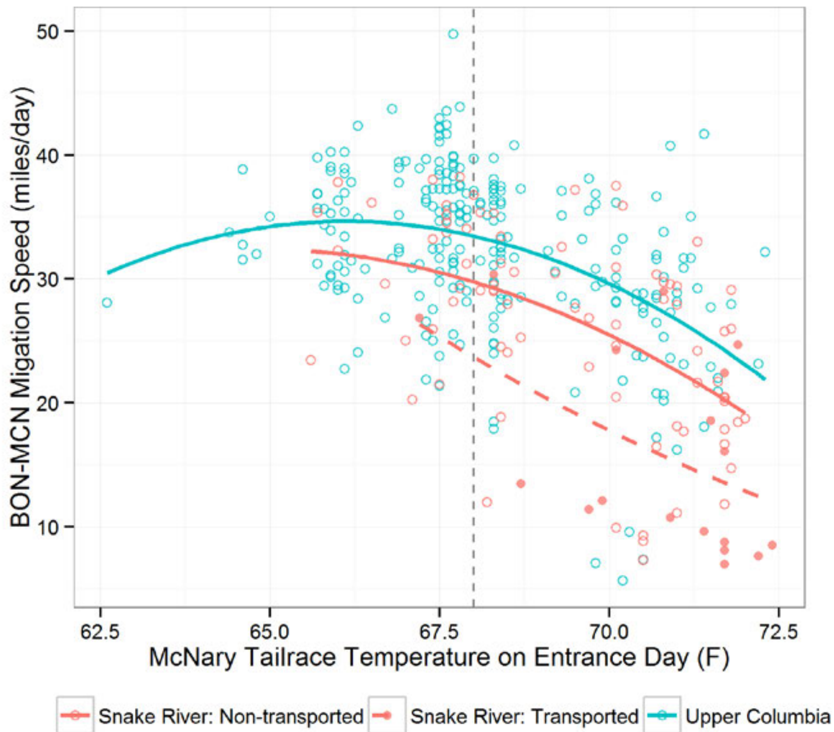

Figure 16. Estimated relationship between temperature and migration speed for PIT-tagged non-transported Snake River and Upper Columbia fish (solid lines and unfilled circles) and transported Snake River fish (dotted lines and filled circles) during the 2015 return year.

Weekly Comparisons

As presented above, Snake River sockeye adults that were transported as juveniles do not survive as well as those who were not transported as juveniles. In addition, Snake River sockeye tend to arrive later than Upper Columbia sockeye and are consequently exposed to higher temperatures. If transportation, later arrival, and exposure to higher temperatures are the primary mechanisms leading to reduced survival of Snake River adults compared to Upper Columbia River adults, then removing these effects should result in roughly equal survival for these two groups. In order to make this comparison, non-transported Snake River sockeye weekly and daily survival is compared to Upper Columbia sockeye survival. Temporal comparisons standardize for arrival effects and ensure that the two groups are exposed to the same environmental conditions upon arrival at BON.

Figure 17 shows weekly survival from BON-MCN of cohorts of 20 or more individuals exiting the BON adult ladder. Since not all return weeks have 20 or more individuals, a CJS model that used BON exit day as an individual covariate was also fit (Figure 18). This model assumes a linear relationship between the logit survival and BON exit day, whereas weekly survival estimates are allowed to vary freely. Results from these analyses indicate that accounting for smolt transportation and adult arrival timing at BON largely helps to explain much of the observed differences in BON-MCN adult survival between Snake and Upper

Columbia sockeye. However, there still may be other unexplained factors that contributed to the observed differences in survival between these two stocks, particularly in 2014 and 2015.

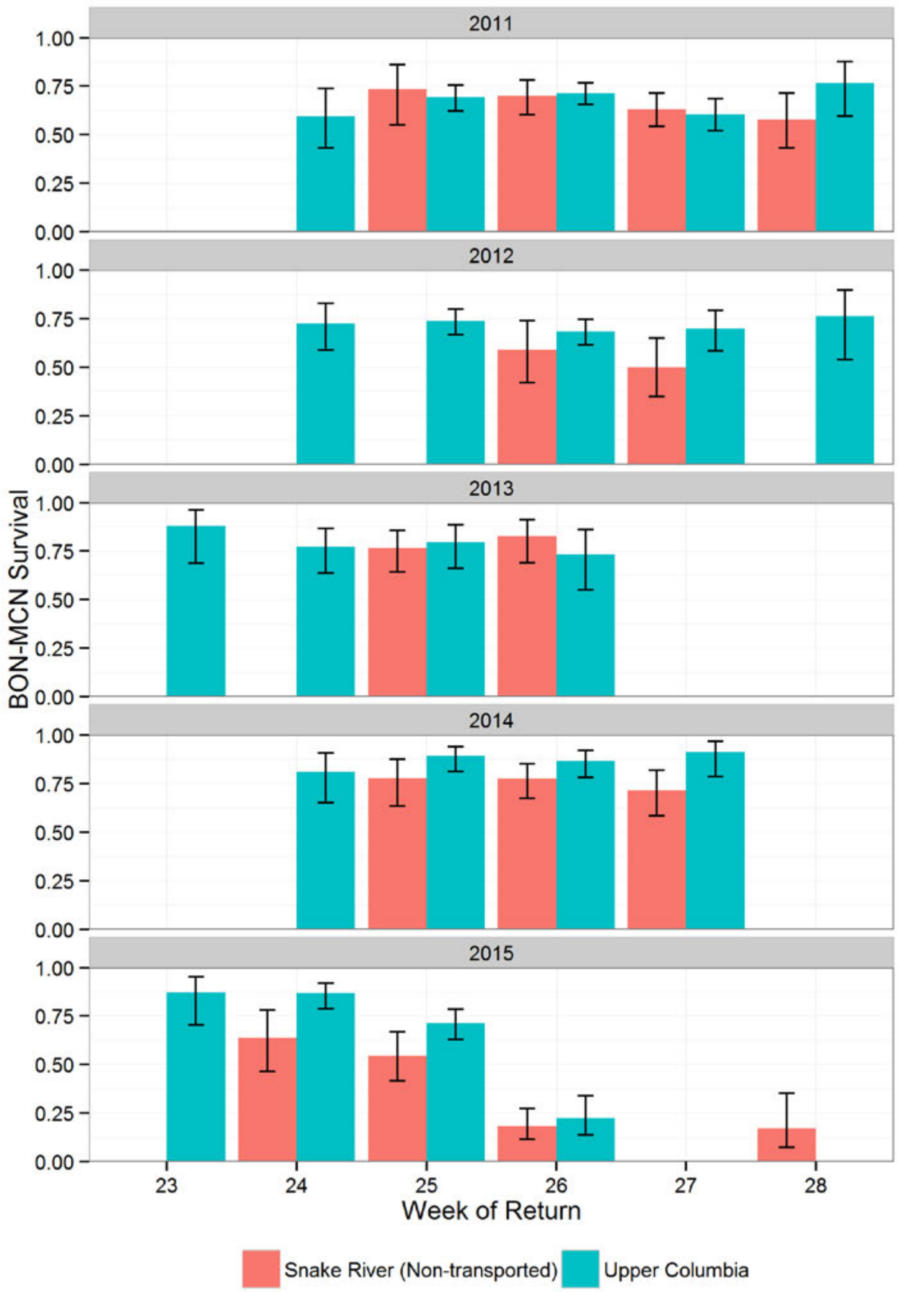

Figure 17. Survival (Bonneville to McNary) (95% confidence intervals) of non-transported Snake River and Upper Columbia sockeye adults by return week. Only return weeks with at least 20 individuals are displayed.

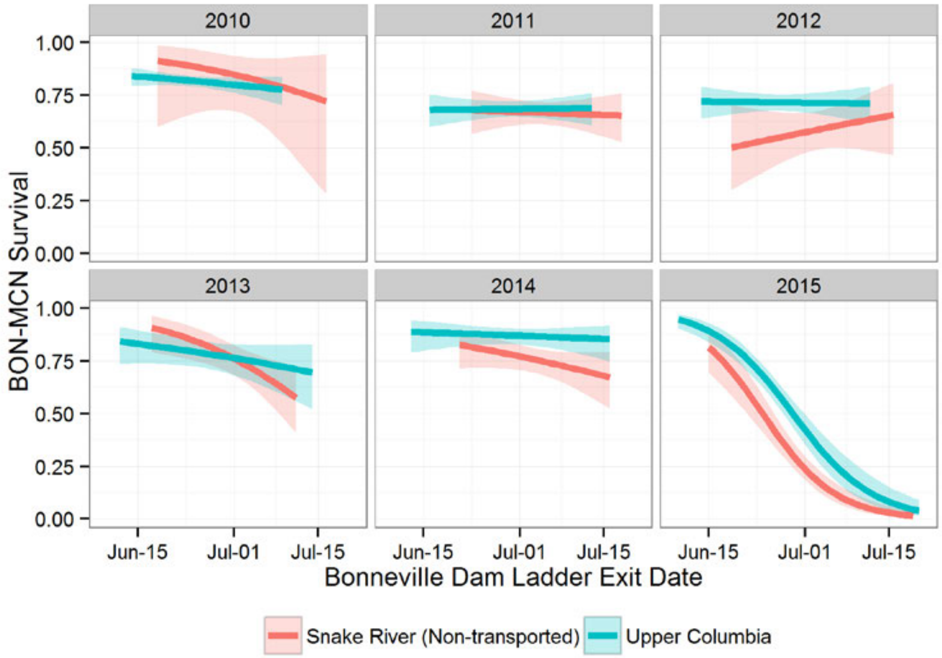

Figure 18. Estimated relationship between Bonneville Dam ladder exit date and Bonneville to McNary Dam survival by return year for non-transported Snake River and Upper Columbia adult sockeye. The shaded portion of the curves indicates 95% confidence intervals. All available data are used for the fitted relationship, but only the 2.5th to the 97.5th percentiles of exit dates in each return year are shown.

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Appendix A

The Historical Recognition of the Effect of FCRPS development and Operation on Water Temperatures

The issue of increased temperatures and the potential impacts to salmonid survival have long been recognized in the Columbia River hydrosystem. An early workshop occurred in 1963 recognizing the issues and the potential impacts that might occur from further hydrosystem expansion (Eldridge, 1963[1]). This review is intended to show the evolution of actions that were taken relative to temperature in the Snake and Columbia rivers under the implementation of the Clean Water Act (CWA) and the Endangered Species Act (ESA). The documents are voluminous and there are many. Consequently, some topics may have been overlooked. This appendix represents our best compilation of the various documents describing the process that occurred over the time span from the mid-1990s to the present.

1995–1999

In 1995, the National Marine Fisheries Service (NMFS) issued a Biological Opinion (BiOp) concluding that modifications to Federal Columbia River Power System (FCRPS) operations were needed to ensure long-term survival of salmon stocks in the Snake River that were protected by the ESA. The recommendations of the 1995 NMFS BiOp were adopted by the U. S. Army Corps of Engineers (COE) in a 1995 Record of Decision (ROD). In 1998, NMFS issued a supplemental BiOp for steelhead recommending further actions to the COE. The COE adopted these recommendations in a 1998 ROD. The 1998 ROD includes discussion of new information on continuing unresolved issues. They identify water quality standards with respect to total dissolved gas and temperature as one of these issues and, relative to temperature, offer: the prioritization of cool water releases from Dworshak for juveniles, the development of surface passage routes to decrease forebay delay, and to investigate adult ladder water temperature by collecting more information and evaluating engineering fixes. The COE states that they will coordinate with EPA regarding their concerns on water temperature.

In March of 1999, the National Wildlife Federation (NWF) filed a lawsuit with the district court contending that the COE's 1995 and 1998 RODs were arbitrary and capricious and contrary to law, since they did not address the COE's obligation to comply with state water quality requirements for temperature under the CWA. The plaintiffs contended that the documents failed to assure that the operation of the dams will comply with State water quality standards. The district court issued an opinion on February 16, 2001, stating that the COE had not addressed adequately in the 1995 and 1998 RODs the issue of the COE's obligation to comply with the CWA. The district court remanded the CWA issue to the COE for further consideration.

[1] Eldridge, Edward F., ed. Proceedings: Water temperature: influences, effects and control. US Dept. of Health, Education, and Welfare, Public Health Service, Pacific Northwest Water Laboratory, 1963.

In the late 1990s the EPA began studying the impacts of dams on the mainstem Snake and Columbia rivers temperature. They stated, “The presence of hydroelectric dams has modified natural temperature regimes in the mainstem Columbia River. Snake River basin reservoirs are known to affect water temperatures in the river (Yearsley 1999) by extending water residence times and by altering the heat exchange characteristics of affected river reaches.”

2000–2004

2000 Biological Opinion

The 2000 BiOp recognized the effect of water quality, both total dissolved gas (TDG) and temperature, on federally listed anadromous fish. The BiOp lays out a path for the federal agencies (EPA, NMFS, USFWS, COE, BOR and BPA) to undertake efforts to address listed species under ESA, and create a tie to the water quality improvements under the CWA. Under the CWA, the Total Maximum Daily Loads (TMDLs) were being developed. The 2000 BiOp called for the development of a Water Quality Plan that incorporates the actions for achieving the standards outlined in the TMDL.

The 2000 BiOp states that:

> NMFS, in coordination with EPA, USFS, and the Action Agencies (the COE, BOR and BPA), has considered the respective ecological objectives of the ESA and the CWA. In many instances, actions implemented for the conservation of ESA listed species will also move toward attainment of water quality standards (e.g., reducing TDG and temperature). The overlap of statutory purpose is extensive; however, there are additional actions that are appropriate in a water quality plan, but are nonessential for the survival and recovery of the listed species. Thus, such actions are not required components of the ESA RPA. Further the water quality plan is likely to require lengthy study and implementation exceeding the duration of this biological opinion.

The 2000 BiOp calls for the federal agencies to address both TDG and water temperature. Most actions outlined to address TDG are not considered here. The following actions relate to the proposed actions for water temperature. The BiOp states that the federal agencies are committing to the establishment of a new Water Quality Team (senior policy level) and to the development of a Water Quality Plan (WQP) that is part of the annual planning process for the mainstem Columbia and Snake rivers. At the same time, it was recognized that the EPA and the states of ID, WA and OR, in coordination with the Columbia River tribes, are developing a Columbia and Snake river TMDL under court order. The water quality plan was to be integrated and consistent with TMDL limits and ongoing TMDL activities. The WQP was expected to include the following actions with respect to temperature:

- Make operational and capital investments;
- Reach consensus on offsite mitigation to attain water temp standards;
- Identify adequate physical and biological temperature monitoring;
- Implement and model to better assess and act on thermal problems;

- Develop emergency measures to address immediate and acute water temperature problems.

The WQP was also expected to consider specific reservoir operations for temperature regulation including Dworshak Reservoir cool water releases; Brownlee Reservoir cool water releases established through FERC relicensing; and McNary Dam operation and configuration to address thermal issues in the forebay and juvenile fish impacts. The WQP was also to address, among other things, improvements in long-term temperature monitoring and modeling, an evaluation of fish ladder temps, an evaluation of temperature effects on juvenile passage behavior and survival, and to identify adult passage losses

However, the 2000 BiOp specifically states that the development of neither a Draft TMDL, nor providing funding to develop tributary TMDLs, are included as 2000 BiOp Reasonable and Prudent Alternative (RPA) actions.

2001

In May of 2001, the COE issued the 2001 Record of Consultation and Statement of Decision (ROD). In the document the COE acknowledges that "the construction and existence of the dams may contribute to a shift in the temperature regime of the Snake River." The COE said it would take additional steps, consistent with the recommendations in the NMFS 2000 BiOp, to improve its operations for compliance with state water quality standards stating:

> The Corps has implemented several actions to help alleviate adverse water temperature conditions in the Columbia River Basin. Selective withdrawal systems to release water from one or more specific depths are present at Libby and Dworshak dams. Operation of Dworshak dam for flow augmentation for juvenile fish in the summer months has also aided in reducing water temperatures in the lower Snake River.

Other than the steps mentioned above, however, the COE said that it did not have reliable information that structural modification would reduce water temperature in the reservoirs or have a significant effect on temperature water quality standard exceedances. The COE concluded that the operation of the mainstem COE dams on the Snake and Columbia rivers has no significant impact on water temperatures.

The National Wildlife Federation (NWF) filed an amended complaint on August 24, 2001, challenging the 2001 ROD. In its amended complaint, the NWF contended that the 2001 ROD violated the Administrative Procedures Act since it failed to address adequately the issue of exceedances of state water temperature standards. The district court concluded that the 2001 ROD implemented "each of the specific operational actions prescribed in the NMFS 2000 BiOp intended to reduce water temperatures and that the 2001 ROD evaluated properly the COE's obligation to comply with state water quality standards as required by the CWA," and that "[t]here [was] no evidence in the record that the measures adopted in the [2001] ROD to reduce water temperatures in order to comply with the Endangered Species Act [were] not consistent with the COE's obligations under the Clean Water Act to mitigate temperature exceedances." The district court concluded that the 2001 ROD did not violate the Administrative Procedures Act. Both the NWF and the Nez Perce Tribe appealed the decision. The court however concluded that "the COE was not arbitrary and capricious and did not act contrary to law in concluding that there were no further steps it could take to reduce temperature exceedances in the lower Snake River."

2003 July Draft Temperature Total Maximum Daily Load

In October 2000, the States of Oregon, Washington and Idaho signed a Memorandum of Understanding with the U.S. Environmental Protection Agency-Region 10 (EPA) that established EPA as the lead agency for the development of a Columbia/Snake Mainstem Temperature TMDL. TMDL development is usually a state responsibility, but considering the interstate and international nature of the waters, EPA's technical expertise in the modeling effort, and EPA's Tribal Trust responsibilities, EPA agreed to take responsibility for the technical development of this TMDL. Once the EPA developed the TMDL, it was to be up to the states to develop a plan to implement the TMDL.

The EPA modeled the Columbia system using RBM10 (a peer reviewed, one dimensional energy budget model (Yearsley et al., 2001)) and assessed the impacts on natural water temperature (no human caused pollution or alterations) of point sources, tributary inputs and dams. They determined that:

1. The effect of existing point sources is very small and do not lead to water quality exceedances when averaged in with the total river flow;
2. Most of the tributaries have a negligible effect on the cross sectional average temperatures, with exception of the Spokane, Snake and Willamette, which are large enough to affect the temperature of the Columbia River and only the Grande Ronde, Salmon and Clearwater are large enough to potentially alter the Snake River. The magnitude of the effect is a function of temperature differential and flow volume.
3. Dams do have an effect on temperature in the mainstem. The maximum impact ranges from negligible to large, depending on the dam. Based on the modeling, the impact of Grand Coulee alone could be as great as 6.23°C, and the Snake River dams together can have a maximum impact as large as 6.8°C.

The TMDL was to provide a total increase within each reach within target sites to develop waste load allocations. However, the draft TMDL was never finalized and all activity on the TMDL ceased at this time. According to the WA Department of Ecology website (http://www.ecy.wa.gov/programs/wq/tmdl/TMDLsbyWria/tmdlColumbiaRvr.html), the status of the TMDL is **"Delayed to allow necessary discussions and information exchange."**

2004 Biological Opinion

The development of a WQP was initiated by the 2000 BiOp. Work on that Plan occurred between 2000 and 2004, when the Plan was incorporated into the 2004 BiOp as Appendix A.

The WQP addresses both total dissolved gas and temperature. The mainstem Snake and Columbia river water temperature was composed of five categories:

1. The background of water temperature issues in the Columbia and Snake rivers, the goal of the NMFS 2000 FCRPS BiOp and the TMDL process,
2. The monitoring of water temperature in the area covered by the plan,
3. A brief discussion addressing the RPAs in the BiOp that address water temperature and the long-term non BiOp (Clean Water Act) strategy to get temperature levels below 20°C.
4. A description of operational, structural and other changes that have been proposed that may have potential to lower water temperature levels or provide a better understanding of water temperature impacts to aquatic species.
5. A final summary and appendix.

The background section discusses the overlap of ESA and CWA and the responsibilities of the federal agencies. It also lays out the standards for temperatures for each of the states and the tribes. There is also a disclaimer from the COE stating that the historic temperatures exceeded 20°C (68°F) prior to the dams and hydropower can't be characterized as the only issue, citing climate change and upstream influences. A separate appendix (Appendix F) is also included in the BiOp that addresses the COE's perspective. The COE believes that water temperatures in the Snake and Columbia mainstem rivers are warmer today than they were historically. However, the Corps also believes that hydropower is not solely responsible for the change and implicates climate change and upstream influences for responsibility.

2005 to Present

2008 Biological Opinion

In the 2008 BiOp, the Action Agencies proposed to continue to operate the FCRPS to reduce water temperatures during periods of juvenile and adult fish migration, particularly in the lower Snake River, and to minimize the harmful effects of elevated levels of spill-generated TDG on anadromous and resident fish.

The BiOp continued the operation of Dworshak Dam to regulate outflow temperatures to attempt to maintain water temperatures at Lower Granite tailwater at or below the water quality standard of 20°C (68°F). Also, under RPA 1515 the Action Agencies agreed to continue to update the WQP for TDG and water temperature in the Mainstem Columbia and Snake rivers and implement water quality measures to enhance ESA-listed juvenile and adult fish survival, and mainstem spawning and rearing habitat. The WQP was to contain water quality measures needed to meet both ESA and CWA responsibilities. For purposes of the 2004 RPA that addressed the WQP, the WQP was to include the following measures to address water temperature to meet ESA responsibilities:

- Continued development of the CE-QUAL-W2 model for estimating river temperatures from Dworshak Dam on the Clearwater and Upper Snake River near the confluence with the Grand Ronde River (USGS Anatone gauge) through the lower Snake River (all four COE lower Snake River projects) to assist in real-time decision making for Dworshak Dam operations;

- Expansion of water temperature modeling capabilities to include the Columbia River from Grand Coulee to Bonneville dams to better assess the effect of operations or flow depletions on summer temperatures;
- Investigation of alternatives to reduce total mass loading of TDG at Bonneville Dam while maintaining juvenile survival performance, and
- Continued operation of lower Snake River projects at MOP (Minimum Operational Pool).

In the 2008 BiOp only the Lower Granite Dam ladder is addressed regarding the issue of increased temperatures and potential impacts to salmonid survival. RPA 28 calls for the modification of the Lower Granite fishway to improve upstream adult passage conditions impaired by temperature differential. A prototype was expected to be in place by 2011.

Water Quality Plan (WQP)

The WQP has been revised every few years. Despite continued development of WQPs over the years, the BiOp process has fallen short of ever really making any significant progress on actions to address water temperature beyond the actions initially identified in the 1990s. WQPs were developed in 2003, 2004, 2006, 2009 and 2014. The 2009 WQP included over thirty measures that could be considered to address temperature, and identified issues, feasibility and timelines for implementation. By the 2014 WQP most actions were dropped and the WQP only includes four actions for addressing temperature: Dworshak cool water releases; temperature modeling; temperature monitoring; and studies to identify thermal refugia.

2014 Biological Opinion

In this BiOp, water temperature is consistently identified as a limiting factor for salmonid survival. The BiOp acknowledges temperatures have increased, but seems to place more emphasis on the climate change rather than on the impact of dams. While climate change is undoubtedly a contributing measure, the impacts of the dams will only further exacerbate those effects.

The 2014 BiOp specifically discusses the issues that were observed in 2013 regarding passage at Lower Granite Dam. The emphasis is on Lower Granite ladder and developing a longer-term engineering fix beyond the presently implemented (since 2013) pump system. No other ladders appear to be discussed. It is interesting to note, however, the language shifts blame to co-managers for ranking other projects higher than fixing the ladder at LGR, stating “Since 2008, the co-managing agencies (including NOAA Fisheries) have generally ranked other activities higher than the Lower Granite adult ladder (called for in RPA Action 28) in the Corps' annual prioritization process.”

Appendix B

Historical Water Temperatures at Middle Columbia, Lower Snake, and Upper Columbia Projects

Table B.1 – Summary of temperature data at Bonneville Dam collected at water quality monitors in the forebay and tailrace (Cascade Island). Data are summarized for the April 1–August 31 period, 2005–2015. Fill colors indicate magnitude of Proportion of Days Exceeding 68°F water quality standard (white = lowest values, yellow = 50th percentile, red = highest values).

	Bonneville Forebay Monitors					Bonneville Tailrace Monitors				
Year	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F
2005	153	47	0.31	71.9	16-Jul	153	47	0.31	72.0	16-Jul
2006	153	53	0.35	71.8	10-Jul	153	53	0.35	71.9	10-Jul
2007	153	52	0.34	71.2	11-Jul	153	52	0.34	71.1	11-Jul
2008	153	27	0.18	71.2	5-Aug	153	28	0.18	71.3	28-Jul
2009	153	46	0.30	74.3	17-Jul	153	46	0.30	74.2	17-Jul
2010	153	38	0.25	72.5	24-Jul	153	38	0.25	72.6	24-Jul
2011	153	19	0.12	70.7	13-Aug	61[A]	14	0.23	70.6	17-Aug
2012	153	27	0.18	71.3	5-Aug	113[B]	27	0.24	71.4	5-Aug
2013	153	48	0.31	72.2	15-Jul	151	47	0.31	72.0	14-Jul
2014	153	50	0.33	72.9	13-Jul	153	50	0.33	72.9	13-Jul
2015	153	69	0.45	73.2	24-Jun	153	69	0.45	73.2	24-Jun

[A] Due to high flows, the Bonneville tailrace monitor (at Cascade Island) was out of commission from May 18–August 17.
[B] Due to high flows, the Bonneville tailrace monitor (at Cascade Island) was out of commission from April 27–June 5.

Table B.2 – Summary of temperature data at The Dalles Dam collected at water quality monitors in the forebay and tailrace. Data are summarized for the April 1–August 31 period, 2005–2015. Fill colors indicate magnitude of Proportion of Days Exceeding 68°F water quality standard (white = lowest values, yellow = 50th percentile, red = highest values).

	The Dalles Forebay Monitors					The Dalles Tailrace Monitors				
Year	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F
2005	153	48	0.31	72.0	15-Jul	153	48	0.31	72.2	15-Jul
2006	153	54	0.35	72.2	9-Jul	151	54	0.36	72.1	9-Jul
2007	153	53	0.35	71.6	10-Jul	153	53	0.35	71.5	10-Jul
2008	153	31	0.20	71.3	26-Jul	153	32	0.21	71.5	27-Jul
2009	153	46	0.30	73.7	17-Jul	153	47	0.31	73.9	16-Jul
2010	153	39	0.25	72.4	22-Jul	153	39	0.25	72.5	22-Jul
2011	153	25	0.16	70.5	6-Aug	153	27	0.18	70.6	5-Aug
2012	153	27	0.18	71.2	5-Aug	153	28	0.18	71.2	4-Aug
2013	152	49	0.32	72.2	14-Jul	153	49	0.32	72.4	14-Jul
2014	152	50	0.33	72.7	13-Jul	153	51	0.33	72.8	12-Jul
2015	153	71	0.46	73.7	22-Jun	153	71	0.46	73.8	22-Jun

Table B.3 – Summary of temperature data at John Day Dam collected at water quality monitors in the forebay and tailrace. Data are summarized for the April 1–August 31 period, 2005–2015. Fill colors indicate magnitude of Proportion of Days Exceeding 68°F water quality standard (white = lowest values, yellow = 50th percentile, red = highest values).

Year	John Day Forebay Monitors					John Day Tailrace Monitors				
	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F
2005	153	47	0.31	72.0	16-Jul	153	48	0.31	71.9	15-Jul
2006	153	53	0.35	72.2	9-Jul	153	52	0.34	72.1	11-Jul
2007	151	53	0.35	71.4	10-Jul	153	53	0.35	71.3	10-Jul
2008	153	30	0.20	72.3	25-Jul	153	31	0.20	71.2	26-Jul
2009	153	45	0.29	74.7	17-Jul	153	44	0.29	73.8	19-Jul
2010	153	39	0.25	72.2	24-Jul	153	39	0.25	72.0	24-Jul
2011	153	26	0.17	70.7	6-Aug	153	27	0.18	70.5	5-Aug
2012	153	28	0.18	71.1	4-Aug	153	28	0.18	71.2	4-Aug
2013	153	49	0.32	72.7	14-Jul	153	49	0.32	72.5	14-Jul
2014	153	51	0.33	72.7	12-Jul	153	51	0.33	72.5	12-Jul
2015	153	69	0.45	74.3	24-Jun	153	69	0.45	73.8	24-Jun

Table B.4 – Summary of temperature data at McNary Dam collected at water quality monitors in the forebay and tailrace. Data are summarized for the April 1–August 31 period, 2005–2015. Fill colors indicate magnitude of Proportion of Days Exceeding 68°F water quality standard (white = lowest values, yellow = 50th percentile, red = highest values).

Year	McNary Forebay Monitors					McNary Tailrace Monitors				
	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F
2005	153	42	0.27	70.8	21-Jul	153	42	0.27	71.0	21-Jul
2006	153	45	0.29	70.5	17-Jul	153	48	0.31	70.8	12-Jul
2007	153	45	0.29	69.9	12-Jul	153	48	0.31	69.7	11-Jul
2008	153	26	0.17	70.9	5-Aug	153	28	0.18	70.9	4-Aug
2009	153	43	0.28	72.0	20-Jul	153	45	0.29	72.3	18-Jul
2010	152	34	0.22	71.0	27-Jul	153	37	0.24	71.1	24-Jul
2011	153	14	0.09	69.8	18-Aug	153	13	0.08	69.9	19-Aug
2012	153	19	0.12	69.2	6-Aug	153	18	0.12	69.2	6-Aug
2013	153	43	0.28	71.7	20-Jul	153	43	0.28	71.5	20-Jul
2014	153	35	0.23	71.8	22-Jul	153	35	0.23	71.6	22-Jul
2015	153	66	0.43	71.9	27-Jun	153	67	0.44	72.1	26-Jun

Table B.5 – Summary of temperature data at Ice Harbor Dam collected at water quality monitors in the forebay and tailrace. Data are summarized for the April 1–August 31 period, 2005–2015. Fill colors indicate magnitude of Proportion of Days Exceeding 68°F water quality standard (white = lowest values, yellow = 50th percentile, red = highest values).

Year	Ice Harbor Forebay Monitors					Ice Harbor Tailrace Monitors				
	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F
2005	153	49	0.32	71.7	14-Jul	151	52	0.34	71.8	11-Jul
2006	151	57	0.38	71.7	6-Jul	151	58	0.38	72.2	5-Jul
2007	153	54	0.35	72	9-Jul	153	54	0.35	72.4	9-Jul
2008	153	30	0.20	70.9	28-Jul	153	35	0.23	70.6	27-Jul
2009	153	50	0.33	71.9	13-Jul	153	51	0.33	72.3	12-Jul
2010	153	40	0.26	70.8	23-Jul	153	40	0.26	70.8	23-Jul
2011	153	28	0.18	70.0	4-Aug	153	30	0.20	70.2	2-Aug
2012	153	48	0.31	71.2	15-Jul	153	49	0.32	71.7	14-Jul
2013	153	50	0.33	71.2	13-Jul	153	51	0.33	71.6	12-Jul
2014	153	46	0.30	71.6	17-Jul	153	47	0.31	71.6	16-Jul
2015	153	68	0.44	72.8	25-Jun	153	69	0.45	73.0	24-Jun

Table B.6 – Summary of temperature data at Lower Monumental Dam collected at water quality monitors in the forebay and tailrace. Data are summarized for the April 1–August 31 period, 2005–2015. Fill colors indicate magnitude of Proportion of Days Exceeding 68°F water quality standard (white = lowest values, yellow = 50th percentile, red = highest values).

Year	Lower Monumental Forebay Monitors					Lower Monumental Tailrace Monitors				
	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F
2005	153	40	0.26	70.0	14-Jul	153	44	0.29	69.9	14-Jul
2006	148	57	0.39	70.8	5-Jul	151	57	0.38	70.3	5-Jul
2007	153	45	0.29	70.9	10-Jul	153	46	0.30	70.6	9-Jul
2008	153	13	0.08	69.5	15-Aug	153	14	0.09	69.4	14-Aug
2009	153	32	0.21	70.9	13-Jul	152	31	0.20	70.9	15-Jul
2010	153	30	0.20	70.2	28-Jul	153	32	0.21	69.9	24-Jul
2011	153	17	0.11	69.4	6-Aug	153	15	0.10	69.1	7-Aug
2012	153	44	0.29	69.9	16-Jul	152	44	0.29	70.0	16-Jul
2013	153	53	0.35	70.1	10-Jul	152	50	0.33	69.9	12-Jul
2014	153	45	0.29	70.0	18-Jul	153	47	0.31	70.0	16-Jul
2015	153	69	0.45	71.8	24-Jun	153	69	0.45	71.7	24-Jun

Table B.7 – Summary of temperature data at Little Goose Dam collected at water quality monitors in the forebay and tailrace. Data are summarized for the April 1–August 31 period, 2005–2015. Fill colors indicate magnitude of Proportion of Days Exceeding 68°F water quality standard (white = lowest values, yellow = 50th percentile, red = highest values).

Year	Little Goose Forebay Monitors					Little Goose Tailrace Monitors				
	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F
2005	153	19	0.12	69.8	14-Jul	153	19	0.12	69.3	14-Jul
2006	151	51	0.34	70.8	3-Jul	151	45	0.30	70.2	3-Jul
2007	153	35	0.23	70.9	9-Jul	153	34	0.22	69.8	9-Jul
2008	153	7	0.05	69.6	15-Aug	153	6	0.04	68.6	15-Aug
2009	153	23	0.15	70.2	11-Jul	153	18	0.12	70.4	25-Jul
2010	153	12	0.08	71.0	2-Aug	153	11	0.07	69.8	9-Aug
2011	153	11	0.07	69.3	4-Aug	153	7	0.05	68.9	7-Aug
2012	153	32	0.21	69.8	16-Jul	153	30	0.20	69.4	16-Jul
2013	153	33	0.22	69.5	7-Jul	153	30	0.20	69.2	9-Jul
2014	153	40	0.26	69.9	19-Jul	153	39	0.25	69.4	19-Jul
2015	153	56	0.37	71.9	20-Jun	153	54	0.35	71.2	21-Jun

Table B.8 – Summary of temperature data at Lower Granite Dam collected at water quality monitors in the forebay and tailrace. Data are summarized for the April 1–August 31 period, 2005–2015. Fill colors indicate magnitude of Proportion of Days Exceeding 68°F water quality standard (white = lowest values, yellow = 50th percentile, red = highest values).

Year	Lower Granite Forebay Monitors					Lower Granite Tailrace Monitors				
	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F
2005	153	50	0.33	72.2	4-Jul	150	0	0.00	67.6	N/A
2006	151	5	0.03	69.2	5-Jul	151	8	0.05	69.0	1-Jul
2007	153	0	0.00	67.9	N/A	153	1	0.01	68.2	5-Jul
2008	153	0	0.00	67.3	N/A	153	0	0.00	67.1	N/A
2009	153	0	0.00	67.6	N/A	153	0	0.00	67.9	N/A
2010	153	0	0.00	66.8	N/A	153	0	0.00	67.4	N/A
2011	153	0	0.00	67.6	N/A	153	0	0.00	67.9	N/A
2012	153	0	0.00	68.0	N/A	153	0	0.00	67.9	N/A
2013	153	0	0.00	67.5	N/A	153	2	0.01	68.2	22-Aug
2014	153	5	0.03	69.6	22-Aug	153	3	0.02	68.6	24-Aug
2015	152	25	0.16	70.5	7-Jul	153	7	0.05	70.1	7-Jul

Table B.9 – Summary of temperature data at Grand Coulee Dam collected at water quality monitors in the forebay and tailrace. Data are summarized for the April 1–August 31 period, 2005–2015. Fill colors indicate magnitude of Proportion of Days Exceeding 68°F water quality standard (white = lowest values, yellow = 50th percentile, red = highest values).

Year	Grand Coulee Forebay Monitors					Grand Coulee Tailrace Monitors				
	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F
2005	153	18	0.12	70.8	13-Aug	153	0	0.00	66.7	N/A
2006	153	22	0.14	69.7	6-Aug	153	0	0.00	67.5	N/A
2007	153	17	0.11	69.1	7-Aug	153	0	0.00	67.5	N/A
2008	153	1	0.01	70.0	24-Aug	153	0	0.00	66.3	N/A
2009	153	14	0.09	71.2	18-Aug	153	0	0.00	65.7	N/A
2010	153	14	0.09	71.4	16-Aug	153	0	0.00	65.9	N/A
2011	153	0	0.00	66.7	N/A	151	0	0.00	65.7	N/A
2012	153	0	0.00	66.3	N/A	149	0	0.00	64.1	N/A
2013	145	8	0.06	70.8	24-Aug	145	0	0.00	66.7	N/A
2014	153	5	0.03	70.1	24-Aug	153	0	0.00	66.6	N/A
2015	149	3	0.02	69.3	24-Aug	153	0	0.00	67.1	N/A

Table B.10 – Summary of temperature data at Chief Joseph Dam collected at water quality monitors in the forebay and tailrace. Data are summarized for the April 1–August 31 period, 2005–2015. Fill colors indicate magnitude of Proportion of Days Exceeding 68°F water quality standard (white = lowest values, yellow = 50th percentile, red = highest values).

Year	Chief Joseph Forebay Monitors					Chief Joseph Tailrace Monitors				
	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F
2005	152	0	0.00	67.0	N/A	153	0	0.00	66.7	N/A
2006	150	0	0.00	67.3	N/A	153	0	0.00	67.2	N/A
2007	153	0	0.00	67.4	N/A	153	0	0.00	67.2	N/A
2008	134	0	0.00	66.4	N/A	143	0	0.00	65.8	N/A
2009	152	0	0.00	66.1	N/A	153	0	0.00	65.3	N/A
2010	153	0	0.00	66.1	N/A	153	0	0.00	65.3	N/A
2011	152	0	0.00	65.1	N/A	153	0	0.00	64.9	N/A
2012	153	0	0.00	64.3	N/A	153	0	0.00	64.2	N/A
2013	152	0	0.00	67.4	N/A	152	0	0.00	67.1	N/A
2014	153	0	0.00	67.2	N/A	153	0	0.00	66.9	N/A
2015	151	0	0.00	67.5	N/A	152	0	0.00	67.5	N/A

Table B.11 – Summary of temperature data at Wells Dam collected at water quality monitors in the forebay and tailrace. Data are summarized for the April 1–August 31 period, 2005–2015. Fill colors indicate magnitude of Proportion of Days Exceeding 68°F water quality standard (white = lowest values, yellow = 50th percentile, red = highest values).

Year	Wells Forebay Monitors					Wells Tailrace Monitors				
	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F
2005	149	0	0.00	66.9	N/A	149	0	0.00	66.8	N/A
2006	153	0	0.00	67.8	N/A	153	0	0.00	67.6	N/A
2007	148	0	0.00	67.5	N/A	13	0	0.00	42.6	N/A
2008	140	0	0.00	67.4	N/A	61	0	0.00	67.4	N/A
2009	153	0	0.00	66.4	N/A	153	0	0.00	66.3	N/A
2010	135	0	0.00	66.4	N/A	141	0	0.00	66.1	N/A
2011	147	0	0.00	65.8	N/A	145	0	0.00	65.8	N/A
2012	148	0	0.00	64.7	N/A	148	0	0.00	64.6	N/A
2013	152	0	0.00	67.9	N/A	152	0	0.00	67.7	N/A
2014	139	0	0.00	67.2	N/A	109	0	0.00	67.3	N/A
2015	146	0	0.00	67.9	N/A	146	1	0.01	68.1	14-Aug

Table B.12 – Summary of temperature data at Rocky Reach Dam collected at water quality monitors in the forebay and tailrace. Data are summarized for the April 1–August 31 period, 2005–2015. Fill colors indicate magnitude of Proportion of Days Exceeding 68°F water quality standard (white = lowest values, yellow = 50th percentile, red = highest values).

Year	Rocky Reach Forebay Monitors					Rocky Reach Tailrace Monitors				
	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F
2005	153	0	0.00	67.4	N/A	153	0	0.00	67.3	N/A
2006	143	1	0.01	68.1	28-Aug	141	1	0.01	68.1	28-Aug
2007	132	0	0.00	67.7	N/A	132	0	0.00	67.7	N/A
2008	153	0	0.00	67.8	N/A	153	0	0.00	67.7	N/A
2009	153	0	0.00	66.5	N/A	153	0	0.00	66.4	N/A
2010	153	0	0.00	66.5	N/A	153	0	0.00	66.5	N/A
2011	153	0	0.00	66.3	N/A	153	0	0.00	66.1	N/A
2012	153	0	0.00	64.8	N/A	153	0	0.00	64.7	N/A
2013	153	0	0.00	67.7	N/A	143	0	0.00	67.6	N/A
2014	153	0	0.00	68.0	N/A	153	0	0.00	68.0	N/A
2015	153	6	0.04	68.4	13-Aug	153	7	0.05	68.4	13-Aug

Table B.13 – Summary of temperature data at Rock Island Dam collected at water quality monitors in the forebay and tailrace. Data are summarized for the April 1–August 31 period, 2005–2015. Fill colors indicate magnitude of Proportion of Days Exceeding 68°F water quality standard (white = lowest values, yellow = 50th percentile, red = highest values).

	Rock Island Forebay Monitors					Rock Island Tailrace Monitors				
Year	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F
2005	151	0	0.00	67.6	N/A	153	0	0.00	67.6	N/A
2006	143	1	0.01	68.2	28-Aug	143	2	0.01	69.6	28-Aug
2007	143	2	0.01	68.6	30-Aug	132	0	0.00	68.0	N/A
2008	152	0	0.00	67.6	N/A	153	0	0.00	67.9	N/A
2009	153	0	0.00	66.7	N/A	153	0	0.00	66.9	N/A
2010	151	1	0.01	68.8	8-Aug	153	0	0.00	66.8	N/A
2011	153	0	0.00	66.2	N/A	153	0	0.00	66.2	N/A
2012	153	0	0.00	65.0	N/A	153	0	0.00	66.6	N/A
2013	153	0	0.00	67.9	N/A	153	0	0.00	67.9	N/A
2014[A]	152	2	0.01	68.3	19-Aug					
2015	153	11	0.07	68.7	10-Aug	153	12	0.08	68.6	10-Aug

[A] Tailrace temperatures not available due to Wanapum drawdown—gauge was often out of water. Not able to assess exactly when this occurred.

Table B.14 – Summary of temperature data at Wanapum Dam collected at water quality monitors in the forebay and tailrace. Data are summarized for the April 1–August 31 period, 2005–2015. Fill colors indicate magnitude of Proportion of Days Exceeding 68°F water quality standard (white = lowest values, yellow = 50th percentile, red = highest values).

	Wanapum Forebay Monitors					Wanapum Tailrace Monitors				
Year	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F
2005	111	2	0.02	68.3	3-Aug	111	0	0.00	66.9	N/A
2006	149	17	0.11	70.9	5-Aug	148	8	0.05	68.7	18-Aug
2007	150	7	0.05	68.8	14-Aug	153	1	0.01	68.1	31-Aug
2008	135	10	0.07	69.4	14-Aug	135	1	0.01	68.1	20-Aug
2009	153	15	0.10	70.6	25-Jul	153	0	0.00	67.3	N/A
2010	153	6	0.04	69.4	2-Aug	153	0	0.00	67.7	N/A
2011	151	1	0.01	68.1	28-Aug	151	0	0.00	67.0	N/A
2012	153	0	0.00	67.3	N/A	153	0	0.00	66.1	N/A
2013	151	25	0.17	70.7	7-Aug	151	17	0.11	69.0	11-Aug
2014	153	18	0.12	68.8	12-Aug	153	14	0.09	68.5	14-Aug
2015	153	32	0.21	69.9	8-Jul	149	14	0.09	69.0	3-Aug

Table B.15 – Summary of temperature data at Priest Rapids Dam collected at water quality monitors in the forebay and tailrace. Data are summarized for the April 1–August 31 period, 2005–2015. Fill colors indicate magnitude of Proportion of Days Exceeding 68°F water quality standard (white = lowest values, yellow = 50th percentile, red = highest values).

	Priest Rapids Forebay Monitors					Priest Rapids Tailrace Monitors				
Year	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F	Num. Days	Days Exceeding 68°F	Prop. Days Exceeding 68°F	Max. Temp. (°F)	First Day Exceeding 68°F
2005	111	0	0.00	67.3	N/A	109	0	0.00	67.7	N/A
2006	148	13	0.09	69.1	7-Aug	149	11	0.07	69.2	14-Aug
2007	153	1	0.01	68.2	31-Aug	153	1	0.01	68.1	31-Aug
2008	135	11	0.08	68.7	15-Aug	134	0	0.00	68.0	16-Aug
2009	151	4	0.03	68.6	27-Jul	153	0	0.00	67.6	27-Jul
2010	153	5	0.03	68.6	2-Aug	153	0	0.00	67.7	16-Aug
2011	151	0	0.00	67.2	N/A	151	0	0.00	67.0	N/A
2012	153	0	0.00	66.9	N/A	153	0	0.00	66.3	N/A
2013	151	22	0.15	70.1	10-Aug	151	22	0.15	69.4	10-Aug
2014	153	22	0.14	68.9	4-Aug	153	18	0.12	68.8	13-Aug
2015	153	31	0.20	69.4	8-Jul	153	23	0.15	69.4	9-Jul

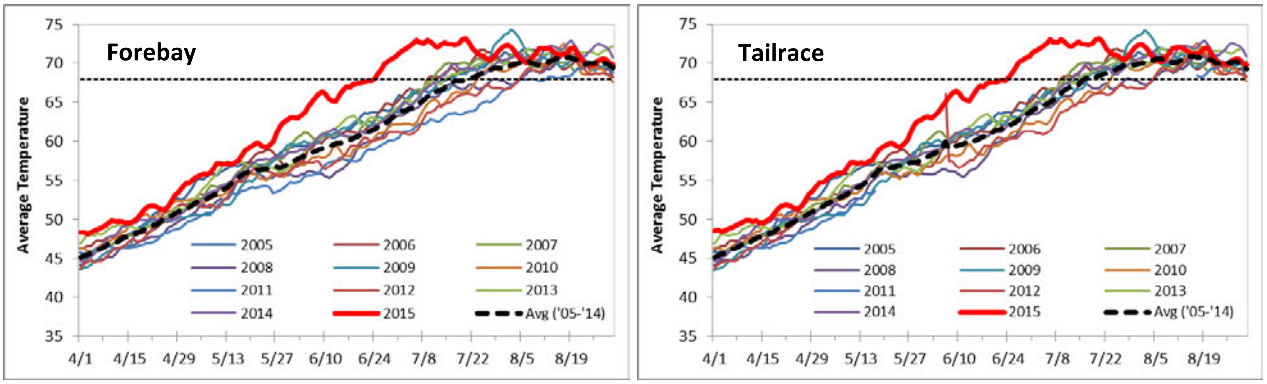

Figure B.1 – Daily average temperature (°F) at the Bonneville Dam water quality monitors in the forebay and tailrace (at Cascade Island), April 1–August 31, 2005–2015. Dashed line represents the 10-year average (2005–2014). Horizontal dashed line is provided at 68°F for perspective relative to the water quality standard.

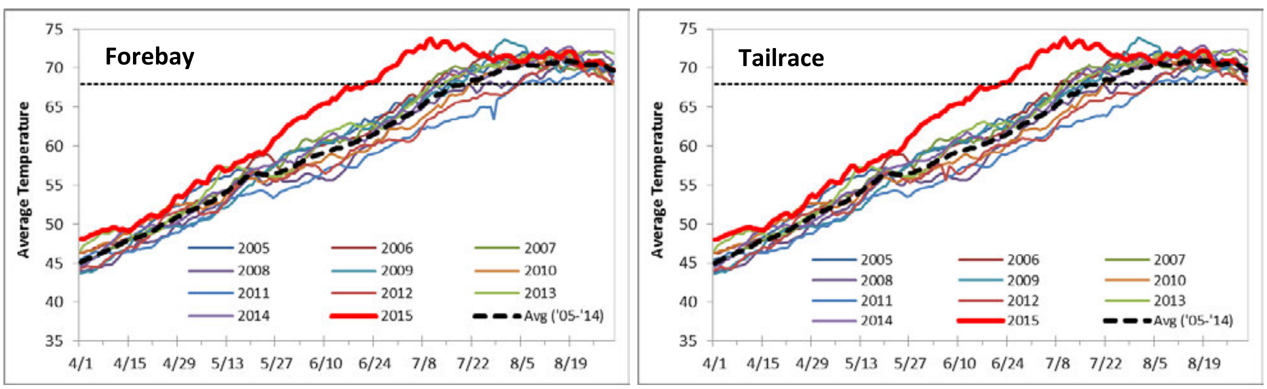

Figure B.2 – Daily average temperature (°F) at The Dalles Dam water quality monitors in the forebay and tailrace, April 1–August 31, 2005–2015. Dashed line represents the 10-year average (2005–2014). Horizontal dashed line is provided at 68°F for perspective relative to the water quality standard.

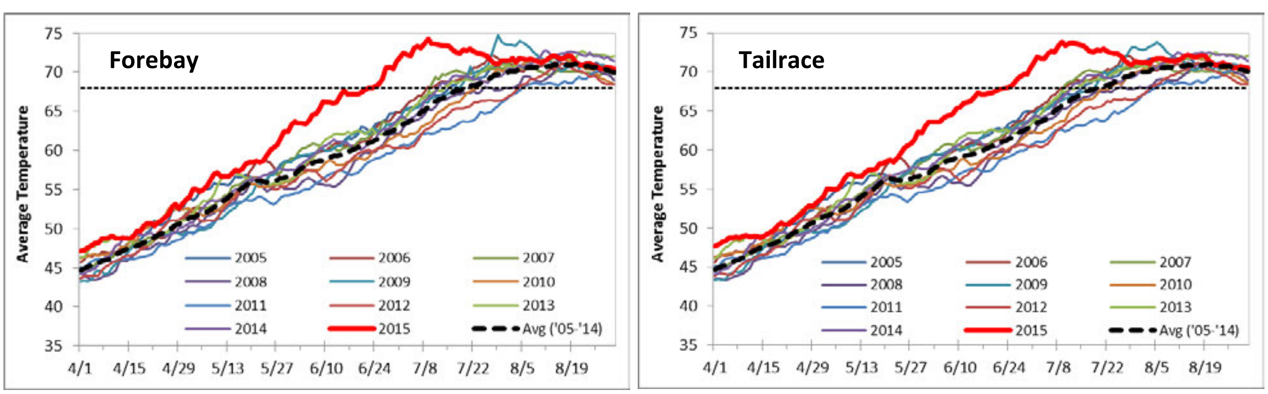

Figure B.3 – Daily average temperature (°F) at the John Day Dam water quality monitors in the forebay and tailrace, April 1–August 31, 2005–2015. Dashed line represents the 10-year average (2005–2014). Horizontal dashed line is provided at 68°F for perspective relative to the water quality standard.

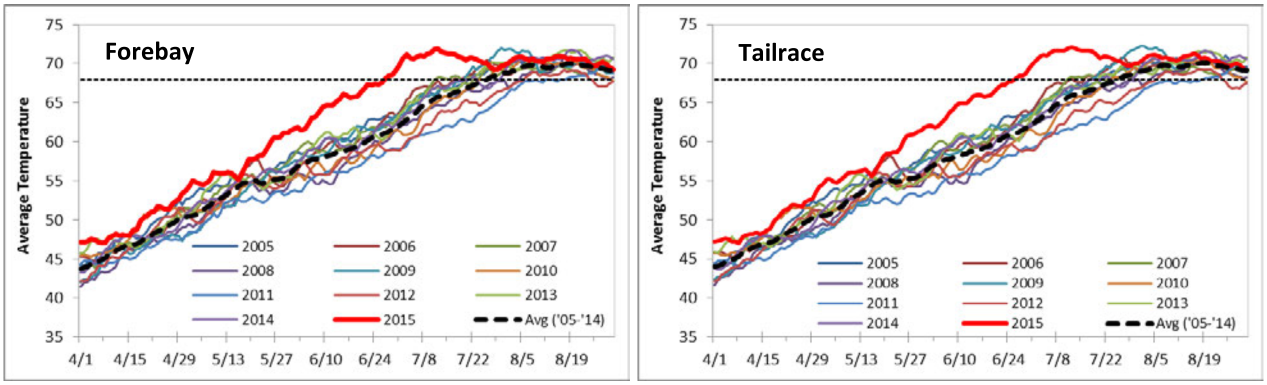

Figure B.4 – Daily average temperature (°F) at the McNary Dam water quality monitors in the forebay and tailrace, April 1–August 31, 2005–2015. Dashed line represents the 10-year average (2005–2014). Horizontal dashed line is provided at 68°F for perspective relative to the water quality standard.

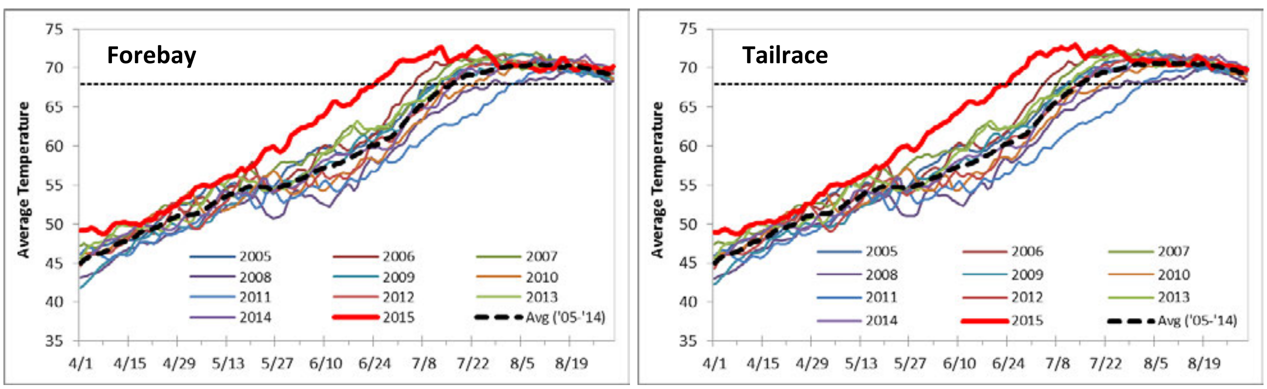

Figure B.5 – Daily average temperature (°F) at the Ice Harbor Dam water quality monitors in the forebay and tailrace, April 1–August 31, 2005–2015. Dashed line represents the 10-year average (2005–2014). Horizontal dashed line is provided at 68°F for perspective relative to the water quality standard.

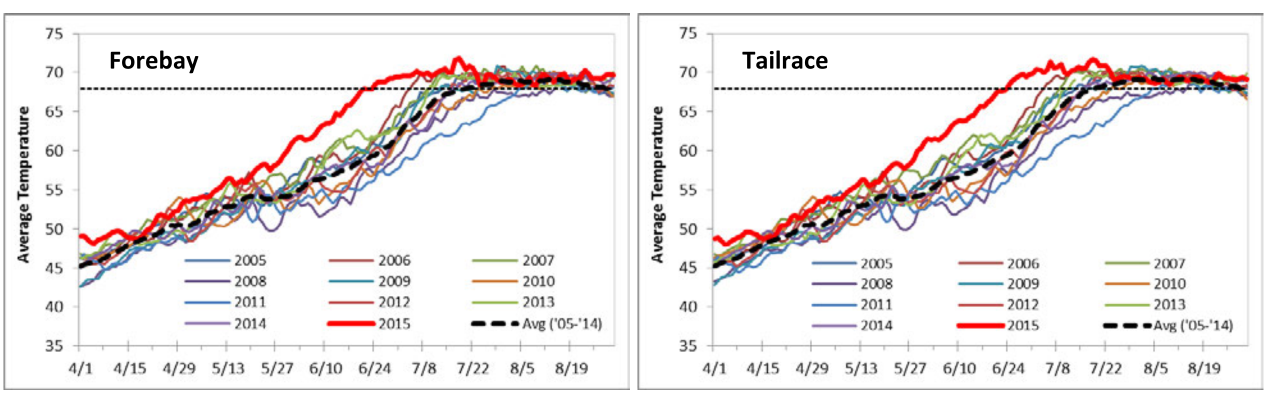

Figure B.6 – Daily average temperature (°F) at the Lower Monumental Dam water quality monitors in the forebay and tailrace, April 1–August 31, 2005–2015. Dashed line represents the 10-year average (2005–2014). Horizontal dashed line is provided at 68°F for perspective relative to the water quality standard.

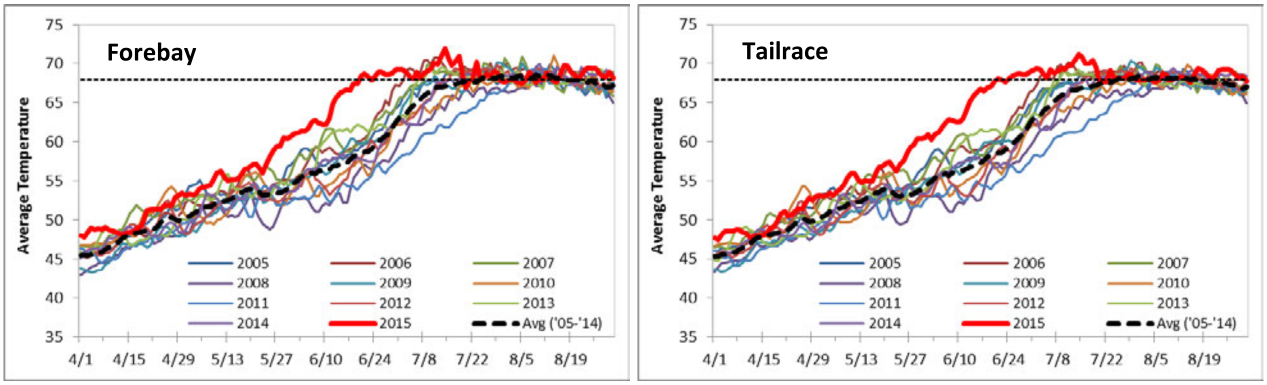

Figure B.7 – Daily average temperature (°F) at the Little Goose Dam water quality monitors in the forebay and tailrace, April 1–August 31, 2005–2015. Dashed line represents the 10-year average (2005–2014). Horizontal dashed line is provided at 68°F for perspective relative to the water quality standard.

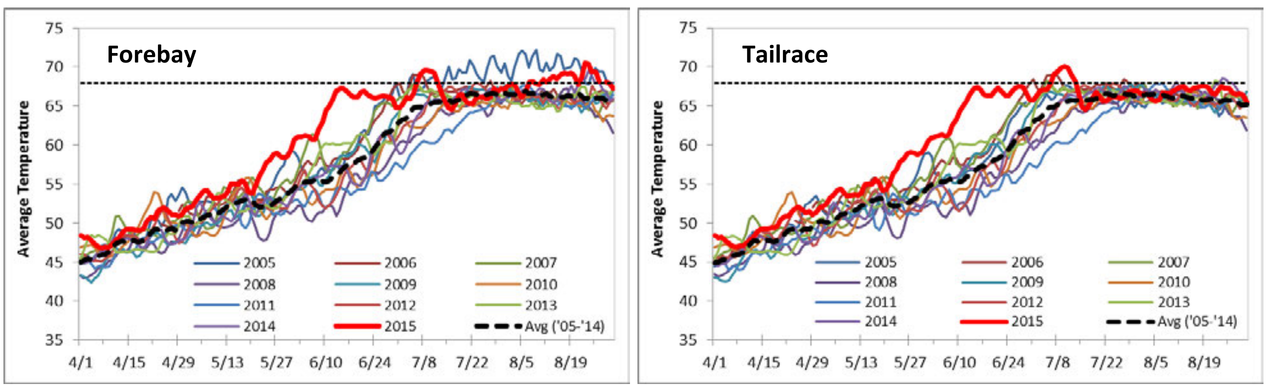

Figure B.8 – Daily average temperature (°F) at the Lower Granite Dam water quality monitors in the forebay and tailrace, April 1–August 31, 2005–2015. Dashed line represents the 10-year average (2005–2014). Horizontal dashed line is provided at 68°F for perspective relative to the water quality standard.

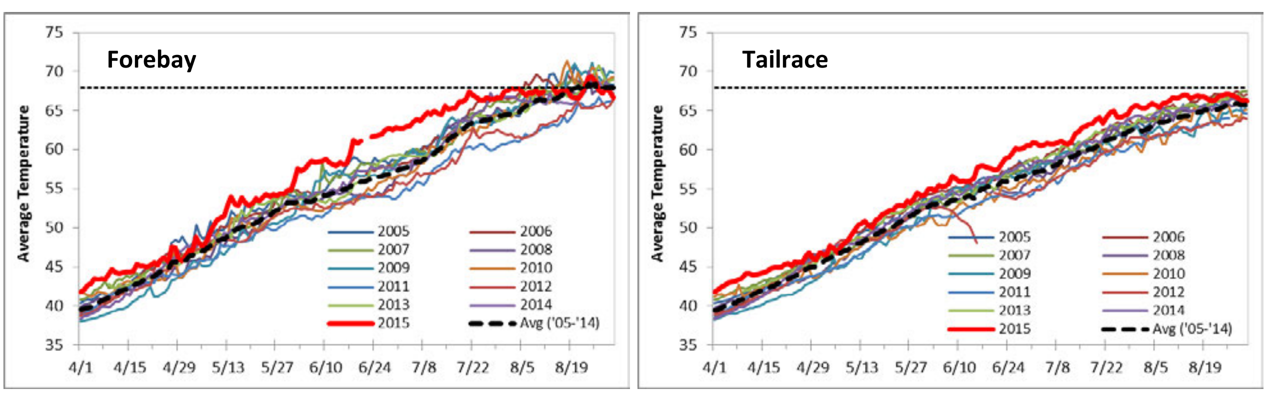

Figure B.9 – Daily average temperature (°F) at the Grand Coulee Dam water quality monitors in the forebay and tailrace, April 1–August 31, 2005–2015. Dashed line represents the 10-year average (2005–2014). Horizontal dashed line is provided at 68°F for perspective relative to the water quality standard.

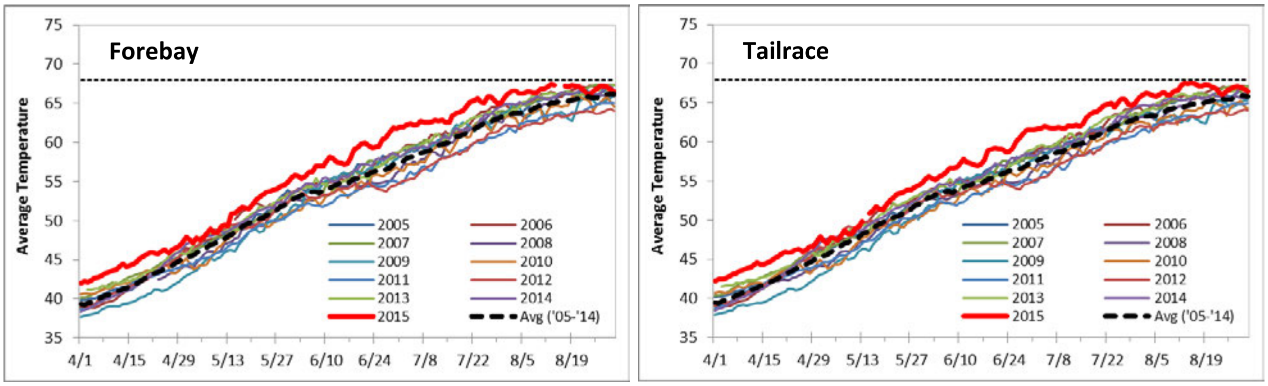

Figure B.10 – Daily average temperature (°F) at the Chief Joseph Dam water quality monitors in the forebay and tailrace, April 1–August 31, 2005–2015. Dashed line represents the 10-year average (2005–2014). Horizontal dashed line is provided at 68°F for perspective relative to the water quality standard.

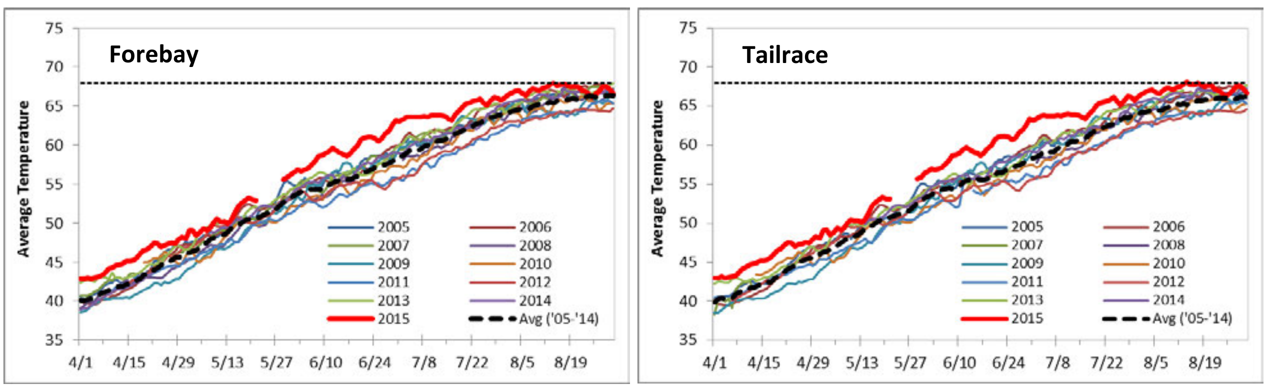

Figure B.11 – Daily average temperature at the Wells Dam water quality monitors in the forebay and tailrace, April 1–August 31, 2005–2015. Dashed line represents the 10-year average (2005–2014). Horizontal dashed line is provided at 68°F for perspective relative to the water quality standard.

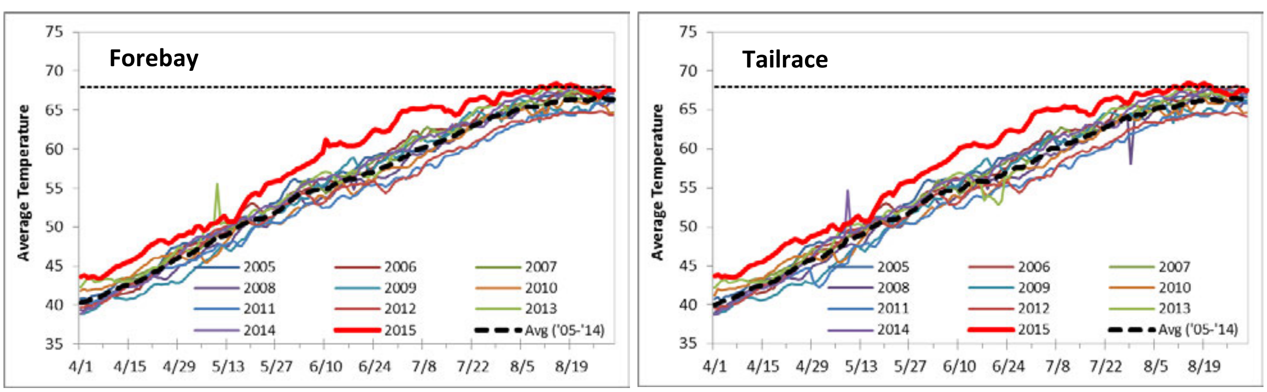

Figure B.12 – Daily average temperature (°F) at the Rocky Reach Dam water quality monitors in the forebay and tailrace, April 1–August 31, 2005–2015. Dashed line represents the 10-year average (2005–2014). Horizontal dashed line is provided at 68°F for perspective relative to the water quality standard.

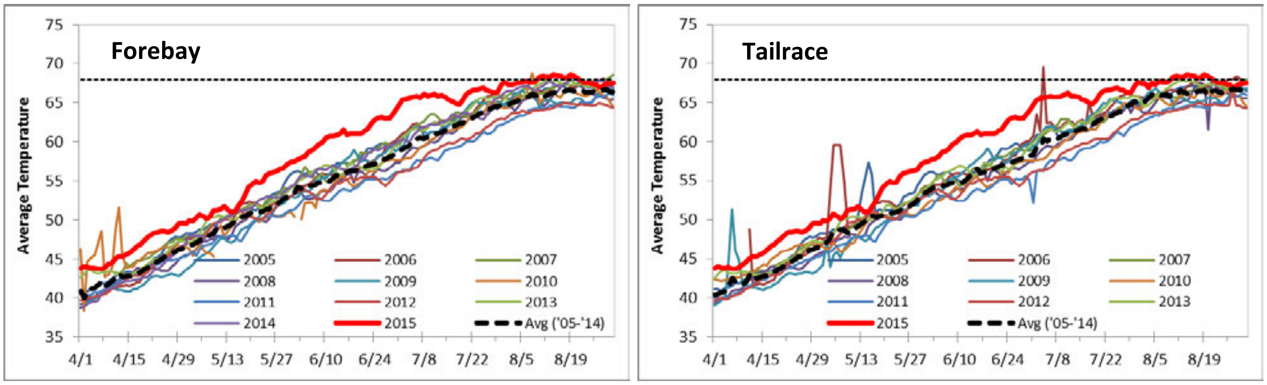

Figure B.13 – Daily average temperature (°F) at the Rock Island Dam water quality monitors in the forebay and tailrace, April 1–August 31, 2005–2015. Dashed line represents the 10-year average (2005–2014). Horizontal dashed line is provided at 68°F for perspective relative to the water quality standard. ***Wanapum drawdown operations in 2014 caused the tailrace monitor to be in and out of the water. Therefore, 2014 data for this monitor are not provided.***

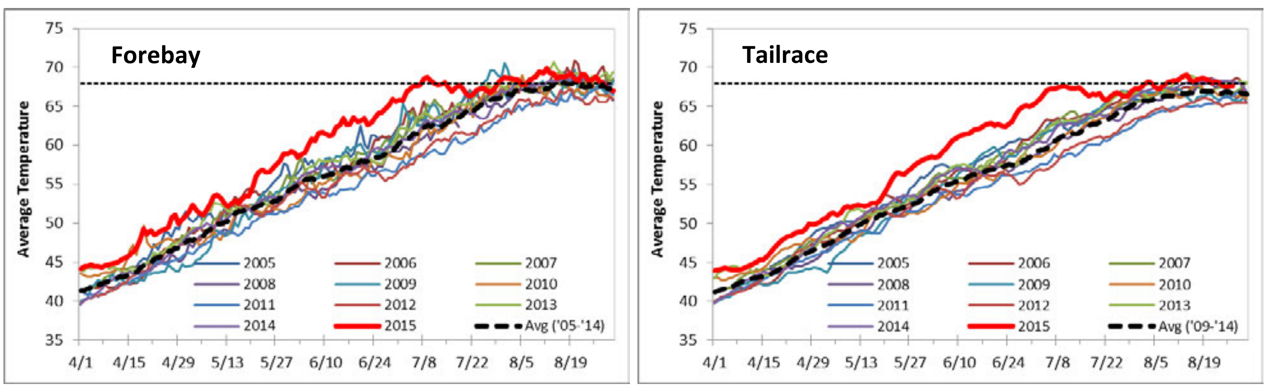

Figure B.14 – Daily average temperature (°F) at the Wanapum Dam water quality monitors in the forebay and tailrace, April 1–August 31, 2005–2015. Dashed line represents the 10-year average (2005–2014). Horizontal dashed line is provided at 68°F for perspective relative to the water quality standard.

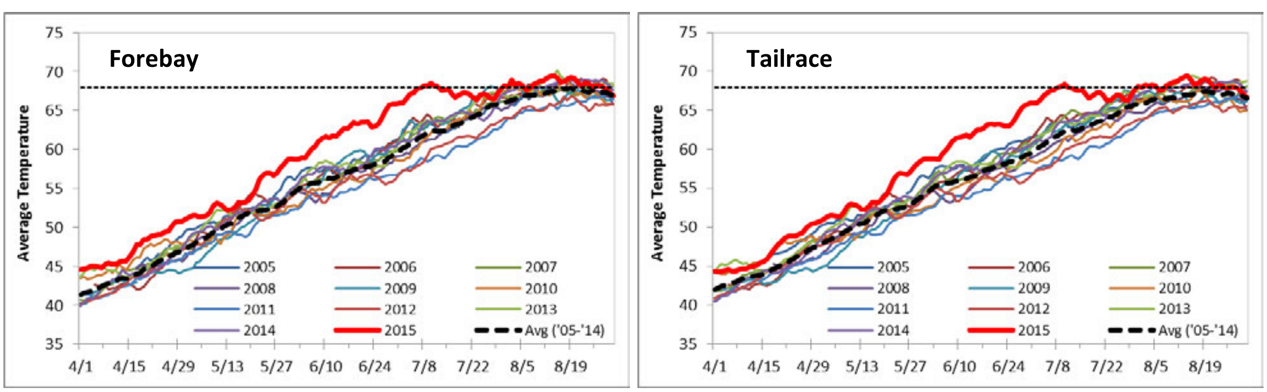

Figure B.15 – Daily average temperature (°F) at the Priest Rapids Dam water quality monitors in the forebay and tailrace, April 1–August 31, 2005–2015. Dashed line represents the 10-year average (2005–2014). Horizontal dashed line is provided at 68°F for perspective relative to the water quality standard.

Appendix C

2015 Chronology of Events Associated with Adult Sockeye

The temperature issues at the Snake River projects began in late June as local temperatures became increasingly hotter. There are few actual tools that can be implemented to address temperature issues. One is the release of cool water from a limited volume in Dworshak Reservoir to ameliorate temperature at Lower Granite Dam tailrace. The second is the implementation of additional fish pumps (at Lower Granite Dam only) to draw deeper, cooler water from the forebay reservoir to decrease adult fish ladder temperatures. These two tools were fully implemented in 2015 and the passage issues and mortality of sockeye continued. This lack of viable alternatives led to the consideration of actions that had an associated cost in juvenile and adult mortality including: emergency trapping and hauling at high water temperatures and changing spill operations that decreased juvenile passage protection. The cost to juvenile and adult survival and the lack of a plan for evaluation of operations led to differences in recommendations among the salmon managers.

Following is a brief summary put together by the Fish Passage staff of the sequence of events regarding the development of alternative operations during what became a declared fish emergency. It is the FPC staff's recollection of the important aspects of each of the conversations that had taken place, and, unintentionally, may not include all points discussed. Not all meetings are recorded and the re-creation is based on staff memory. Additional information can be obtained through the Fish Passage Advisory Committee notes and audio recordings (http://www.fpc.org/documents/fpac_minutes/fpac_minutes_currentyear.html) and the Corps of Engineers (COE) Technical Management notes (http://www.nwd-wc.usace.army.mil/tmt/agendas/2015/). Notes for the COE's Fish Passage Operations and Maintenance meetings that occur outside of the scheduled monthly meeting are not publicly available.

July 1 - Technical Management Team Meeting

Prior to July 1st, the usual Dworshak operations are for the project to be filling over June to its "full" elevation (1,600 feet) by or about June 30th. A portion of that water (to elevation 1,535 feet by August 31st or 1,520 feet by mid-September) is then available for flow augmentation and temperature regulation. At the July 1st meeting the COE reported that on June 27th DWR discharge was increased to 12.5 Kcfs based on predicted "soaring temps." However, these temperatures did not materialize and DWR was decreased on June 29th to full powerhouse discharge.

Based on their model results the COE predicted that discharges of 5.3 Kcfs were good enough to maintain Lower Granite temperatures below 68°F through the July 4th weekend. At this meeting there was some concern expressed by the Salmon Managers regarding sockeye conversion through the Snake River and advised they were monitoring the passage numbers.

July 8 - Technical Management Team Meeting

On July 7th DWR discharge increased to 7.5 Kcfs to address the fact that Lower Granite temperatures increased considerably over the July 4th weekend with the decreased outflow from Dworshak. Conditions did not occur as COE had expected on July 1st (i.e., weather hotter and no storms as predicted).

July 8 - Fish Passage Operations and Maintenance Conference Call

Concern had been expressed regarding sockeye passage. The RSW was said to be causing the formation of an eddy near the ladder entrance that may be impeding passage. The recommendation was made to implement an operation with the RSW off and the provision of uniform spill pattern through the conventional spill bays. This spill was to be implemented through Monday July 13th. This was not opposed by the parties. ***On July 8th at 1:00 PM, the COE closed the Lower Granite RSW based on TMT and FPOM coordination. The project operated with spill in a uniform pattern with no RSW.***

July 10 - Fish Passage Operations and Maintenance Conference Call

Visual counts at LGR appeared to increase (July 1st to July 7th counts ranged from 2 to 25 and the July 8th and 9th counts were 12 and 17). However, at this point, concern was expressed by the Nez Perce Tribe, USFWS and ODFW that they were uncertain whether this was a natural variability observed in the dam counts or a response of the LGR operational change (Unit 2, RSW off).

IDFG mentioned normal adult conversion BON-LGR is 70%; 2015 so far was 25%. IDFG believed warm temperatures were stalling fish and, therefore, declared an adult emergency. Due to the declared fish emergency, the trap at Lower Granite Dam could be operated at temperatures that are above the operational limit if permitted by NOAA. IDFG initiated a trap and haul operation at LGR on July 13th to collect adult sockeye and transport them to Eagle Hatchery as captive broodstock (trapping to occur 5 days/week for four hours during the cooler morning period). They intended to collect 400 fish and were working with NOAA on the permit.

At this meeting a discussion occurred regarding the use of the Ice Harbor Dam trap, and the COE agreed to look into its operation. All parties agreed to continue Unit 2, with no RSW operation until after an FPOM discussion that was scheduled for Monday, July 13th.

July 13 - Fish Passage Operations and Maintenance Conference Call

IDFG announced that they had looked into operating the trap at IHR, but because of personnel and transport vehicle limitations had decided they would not pursue this operation further. At this meeting NOAA recommended that in addition to the RSW change, they would like to switch the priority unit operation from Unit 2 to Unit 1. After the counts during the first two days of 12 and 17, the next three days had counts of 8, 5 and 6. NOAA and the COE expressed concern that operating Unit 2 causes an eddy to form near the adult ladder entrance that may be impeding passage. They verbally presented information they said showed that Unit 1 operation in 2013 had much higher passage than Unit 2 operation. IDFG researchers believed that any change in operation causes a change in ladder counts and were supportive of this operation. The Nez Perce and ODFW did not support the change. Unit 1 is a fixed blade unit that operates at a higher hydraulic capacity and, therefore, decreases spill and juvenile passage protection when flows are low. The FPC requested an explanation of what criteria would be used to determine the success of an operation. The COE responded that they did not have a criterion, but would be able to determine if a change was positive after they saw the adult ladder counts.

In spite of the lack of consensus, since NOAA recommended the change, the COE agreed to make the change. ***On July 13th at 4:00 PM, the project switched to Unit 1 priority****.* ***The project operated with more flow through the powerhouse and decreased spill in a uniform pattern, with no RSW.***

July 17 - Fish Passage Operations and Maintenance Conference Call

This call was held to check on the operation at Lower Granite Dam. The adult sockeye counts for the past four days were 13, 17, 19 and 25. There was claim of successfully increasing adult sockeye passage under the Unit 1 operation. However, there was caution expressed regarding the fact that at the same time the ambient temperatures cooled and it was likely that ladder temperatures also cooled, leading to the increase in adult passage. The COE was asked to supply the ladder temperatures. They claimed they would have to see because there were limited resources and they may not be able to collect the data. The COE continued operation of Unit 1 with the RSW off and uniform spill.

Note: A formal request was made by the FPC via e-mail to COE for the ladder temperature data at all the ladders for this year and any historic data as well.

July 20 - Fish Passage Operations and Maintenance Conference Call

Prior to the meeting FPC had distributed a short memo to FPAC outlining the results of the Unit 1 operation and ending with a recommendation to return to Unit 2 operation. The adult sockeye counts for the previous three days were 13, 2 and 2. In addition to a discussion regarding whether Unit 1 operation was successful, or whether we were just observing changes in ladder temperatures, NOAA initiated a discussion of switching to full powerhouse/no spill at LGR, instead of Unit 1/Spill rest.

The operation was left unchanged based on NOAA's recommendation. The same parties (ODFW, NPT, WDFW and USFWS) did not agree with this operation. At this point, while agencies did not agree, they did not announce that they would formally object to the operation and initiate a policy-level review.

July 21 - Fish Passage Advisory Committee Meeting

IDFG made a proposal to change to Unit 2 at LGR for two days plus deep spill. At LGS they proposed a no spill operation for 24 hours alternating with two day blocks of FOP operations. CRITFC/Umatilla suggested modifying the LGS operations to no spill during daylight hours and spill everything in excess of one unit during nighttime hours. The Nez Perce, ODFW and USFWS supported change to Unit 2 at LGR, but they were waiting for ladder temperatures before making any decision at LGS.

July 21 – Fish Passage Operations and Maintenance Conference Call

A special FPOM conference call was requested after the FPAC meeting. At the meeting IDFG presented their modified proposal. The USFWS discussed an analysis that they had just conducted on the temperature data that had been released an hour before the meeting. USFWS pointed out that there is a relation between the ladder exit temperature and adult counts. After the discussion, the COE stated they were continuing Unit 1 at LGR as per the NOAA recommendation and agreed to the LGS test. USFWS, ODFW and Nez Pierce objected to the LGS operations. WDFW did not agree, but would not object. At this point Walla Walla was going to proceed with LGR, but not LGS due to disagreement, but the COE RCC (Reservoir control center) asked if people were objecting, but not elevating to RIOG. It was made clear that the objecting parties would be discussing with their policy staff to determine if the issue would be elevated.

Later that afternoon the COE sent an e-mail (see below) saying they were not going to implement the operations.

July 21 - COE e-mail 5:48 p.m.
TMT Members and Alternates,
Upon further coordination with Corps Legal and Policy Staff and NOAA Fisheries the Corps will not be implementing The Little Goose Dam operation discussed during today's unscheduled FPOM Emergency Call (daytime no spill and nighttime one unit minimum generation spill the remainder of inflow). The Corps will provide additional coordination with Regional Salmon Managers regarding potential operations to improve sockeye passage in the Snake River. Regarding operations at Lower Granite Dam we are continuing with the current operation with unit 1 as the priority unit and spilling a uniform pattern without operation of the RSW until further notice. The Corps will provide an update on this operation during the TMT meeting scheduled for tomorrow at 9am. Conference call information for the TMT meeting may be found on the following website:
http://www.nwd-wc.usace.army.mil/tmt/agendas/2015/0722_Agenda.html
Regards,
Doug
Doug Baus
US Army Corps of Engineers
Northwestern Division
Fisheries Biologist

July 22 – Technical Management Team Meeting and Subsequent e-mail Conversations

The proposed operations were discussed. Prior to the meeting USFWS distributed to FPAC a memo describing the analysis conducted between ladder temperatures and LGS passage. This analysis was discussed at the meeting. The following poll was taken and recorded at the TMT meeting regarding the proposed operations:

- Idaho – Support.
- Montana – Support.
- NOAA – Support.
- Washington – Does not support; no objection.
- Colville – Does not support; no objection.
- Nez Perce – Object.
- USFWS – Object.
- Oregon – Object.
- Umatilla – Object.
- BPA [not polled at TMT, however, supports the Corps decision].
- Corps [not polled at TMT, support].
- Bureau of Reclamation [not polled at TMT]

After the poll the COE summarized their intent to maintain Unit 1 priority at Lower Granite with uniform spill and the RSW shut off:

> In accordance with NOAA's request, the COE will consider operating Little Goose for daytime generation only, with no spill from 4 am-8 pm, and one unit at minimum generation at night, spilling the remainder of outflow from 8 pm-4 am. Based on TMT's feedback today, the COE will consult with legal and policy staff on this operation and email TMT its decision this afternoon.

Later that day (July 22nd) the following e-mail was sent, implementing the operations.

July 22 - COE e-mail at 9:49 p.m.
TMT Members, Alternates, and Interested Parties,

Regarding experimental emergency operations discussed today at TMT to increase adult Snake River Sockeye passage at Little Goose (LGS) and Lower Granite (LWG) dams, the Corps will implement NOAA Fisheries recommended experimental emergency operation at LGS. This operation will include a period of no spill during the daylight hours of 4am to 8pm and a period of a single unit operation at minimum generation while spilling the remainder of outflow during the nighttime hours of 8pm to 4am. The experimental emergency LGS operation will occur for 2 days beginning on Thursday, July 23, at 4am and will continue through Saturday, July 25 at 4am. LGS will resume operations that were underway prior to this experimental operation on Saturday, July 25 at 4am. Regarding LWG operations, the Corps will continue to implement NOAA Fisheries recommended operation to maintain unit 1 priority and deep spill (no spillway weir). The Corps has scheduled a TMT meeting for Monday, July 27, at 9 am and will provide

the TMT with information about current conditions; and will be prepared to discuss this experimental emergency operation and recommendations for continuation of this operation or alternatives with TMT representatives. In addition the Corps will provide an update on this operation during the FPOM conference call on Friday, July 24.
Regards,
Doug
Doug Baus
US Army Corps of Engineers
Northwestern Division
Phone: (503) 808-3995
Douglas.M.Baus@usace.army.mil

The next morning (July 23rd), ODFW sent an official request raising the issue to RIOG.

July 23 - ODFW e-mail at 8:33 a.m.
Given Oregon and others earlier objection to this planned operational change at Little Goose Dam and the solidification of a similarly premised special operation that did not clearly demonstration an association between the operational changes at Lower Granite Dam and adult sockeye passage over Lower Granite Dam, we feel it necessary to elevate this discussion to the Regional Implementation Oversight Group process.

Since the original elevation process has been altered by what has been described as the last elevation to RIOG, it is my understanding that TMT direct link to this elevation process is not being followed for this this request. Further, It is my understanding the expected process will require that Oregon's RIOG representative deliver the formal request to the RIOG chair. I will provide that information to the Oregon's representative and expect he will deliver an additional formal request to elevate this discussion as soon as possible. Given Oregon's and others objection to the plan below and our intent to elevate this discussion, we anticipate that no action will be taken to implement the operation described below until the RIOG process is completed.

Erick Van Dyke
Oregon Department of Fish and Wildlife
17330 SE Evelyn Street
Clackamas, Oregon 97015

COE distributed an e-mail recognizing that the issue was being raised to RIOG. The e-mail included two attached documents from NOAA as justification for their decision: (1) A NOAA letter which advised implementation based on their technical review of the impact on juveniles and (2) NOAA's technical review. See below for COE's e-mail.

July 23 - COE e-mail 3:19 p.m.
TMT Members, Alternates, FPOM Lower Granite Dam Special Operations Team, and Interested Parties,

After consideration of the information provided by sovereign representatives at TMT (and in previous discussions with FPOM), consideration of technical analyses provided by NOAA Fisheries (see attachments), and the need to make a timely decision given the immediate need to address endangered adult sockeye passage, the Corps initiated the 2-day experimental emergency operation at LGS as outlined in my email below.

The attached NOAA Fisheries memos were considered by the Corps to inform our decision to implement the 2-day emergency experimental operation. The Corps is providing these memos for your consideration, and to assist upcoming discussions at FPOM (July 24) and TMT (July 27) on proposals and actions to address the emergency conditions impacting ESA listed adult sockeye (and other adult migrants), and support other ongoing activities, such as NOAAs trapping of adult sockeye at LWG and IDFGs transport efforts. Some TMT members have objected to the 2-day emergency operation at LGS, and have expressed an intent to elevate this emergency action to the RIOG, so additional coordination may be necessary.
Regards,
Doug
Doug Baus
US Army Corps of Engineers
Northwestern Division
Fisheries Biologist

July 24 – Fish Passage Advisory Committee Meeting

The meeting was called to prepare for FPOM later that day. Three documents were shared — (1) USFWS provided an update to their ladder counts and adult passage analysis, (2) NOAA, on the Thursday afternoon prior to the meeting, after official request, sent a document with two pictures of tailrace conditions in 2013, and (3) the increased passage analysis that was conducted on the 2013 passage data, which was NOAA's justification for operating Unit 1 at LGR.

FPC provided a graph of LGR project operations under the three recently implemented configurations; discussed the discrepancies between projects in annual counts and suggested using caution when using counts to assess sizes of populations stalling; and provided recommendations of some additional changes that might be considered for implementation to improve sockeye passage at projects without decreasing juvenile passage protection by decreasing spill, including:

1. Cycling locks at the projects to allow adult sockeye an alternate route of passage upstream.
2. Securing additional pumps to allow adding cooler water drawn from deeper depths in the forebay to decrease ladder temperatures at Little Goose Dam.

NOAA also distributed an Excel file that provided 2015 conversion rates at the Snake River projects based on PIT-tagged fish. In addition, NOAA distributed a graph of individual PIT-tagged adults showing that early in the season most adult sockeye converted to LGR, in the middle of the Bonneville run many fish did not convert well from Bonneville, and recently no fish converted from the lower Columbia to the Snake.

July 24 – Fish Passage Operations and Maintenance Conference Call

This meeting was held after only one day of the no spill operation at LGS. Concern was expressed that the NOAA proposal was for the test to continue without considering the outcome of the first 2-day block. It was clarified that the first 2-day block would be considered on July 27th before going forward. At this meeting the Nez Perce told the group that, in discussion with the manager from Lyons Ferry Fish Hatchery the previous day, sockeye adults were observed jumping at the ladder entrance to the hatchery where cooler spring water is used. IDFG wanted to immediately look into the feasibility of trapping at the facility. COE noted that they had been made aware of this observation earlier in the week, but did not think it was feasible due to hatchery construction work and, therefore, had not pursued it. The Nez Perce representative believed it would be fine based on her conversation with the hatchery manager.

USFWS suggested some additional changes be considered to improve sockeye passage at projects without decreasing juvenile passage protection by decreasing spill, including:

1. Cycling locks at the projects to allow adult sockeye an alternate route of passage upstream.
2. Securing additional pumps to allow adding cooler water drawn from deeper depths in the forebay to decrease ladder temperatures at Little Goose Dam.

COE responded that maintenance issues at LGS precluded their cycling the lock, and contractual and monetary issues precluded pursuing additional pumps, although they agreed to look into this further.

July 27 – Technical Management Team Conference Call

The operations were reviewed at the meeting. Many believed the information was inconclusive and no decisions were made pending discussion at the FPOM meeting and pending the outcome of the RIOG meeting planned for Tuesday morning (July 28th). COE stated that the LGS operation had clear effect on decreasing temperature in LMN forebay. Other TMT members did not agree with this observation.

July 27 – Fish Passage Operations and Maintenance Conference Call

Trap operations were updated. The decision on LGS operations was still on hold until after RIOG on Tuesday (July 28th). COE reiterated that they do not understand why trapping operations are not being extended, particularly given current ladder temperatures.

An update was given on the Lyons Ferry Hatchery: The adult ladder has been opened and so far only adult Chinook and steelhead (no sockeye) have been seen.

NOAA seems to believe that LGS operation was more successful than not, and would like to collect another "data point" by repeating the test. NOAA seemed to have shifted the measure of success as getting fish to LGR trap and that is how they will measure success of these operations. ODFW suggested that low counts at the end of the run, as currently being seen, makes it difficult to assess success of operational changes. ODFW suggested that NOAA should look at variability in 2015 counts for the last portion of run compared to other years. Is variability in 2015 different from other years?

July 27 - COE e-mail at 6:40 p.m.
TMT Members, Alternates, FPOM Lower Granite Dam Special Operations Team, and Interested Parties,

The Corps received a recommendation from NOAA Fisheries today, July 27, 2015 at 5:51 pm to initiate the second 2-day experimental emergency operation at Little Goose Dam (LGS) beginning tomorrow, July 28 at 4am, and continuing through Thursday, July 30 at 4am. The Corps has reviewed NOAA's recommendation and the accompanying rationale, as well as considered the discussions and information provided by sovereign representatives at the recent TMT and FPOM meetings (July 22, 24, and 27), and reviewed the available data on adult sockeye passage and water temperature from the first experimental emergency 2-day operation. Based on our review and consideration of the above, and in light of current moderate weather conditions and forecasted resumption of very warm conditions, along with prospective Hells Canyon releases later this week, the Corps decided to begin implementation of the NOAA recommended operation for the next 2 days. Consistent with the first experimental emergency 2-day operation (see email below), this operation will include a period of no spill during the daylight hours of 4am to 8pm and a period of a single unit operation at minimum generation while spilling the remainder of outflow during the nighttime hours of 8pm to 4am. LGS will resume operations that were underway prior to this experimental operation on Thursday, July 30 at 4am.

The Corps acknowledges there are regional sovereigns that support this experimental 2-day operation and others that oppose; however, a timely decision was necessary given the immediate need to attempt to improve passage conditions for the endangered adult sockeye passage. If you have new information that has not yet been shared, please send to me as soon as possible. Additionally, if you have new proposals to address adult sockeye passage (and other adult migrants) for the Corps' consideration or have other information regarding this 2-day experimental operation, please send to me and we will discuss at our next TMT meeting on Wednesday, July 29 at 9am.

Regards,
Doug
Doug Baus
US Army Corps of Engineers
Northwestern Division
Phone: (503) 808-3995
Douglas.M.Baus@usace.army.mil

July 28 – Fish Passage Advisory Committee

Concern was expressed that decisions are being made outside of the process and agreed upon time lines. Although FPAC members understood that no decision was to be made until after the RIOG meeting on Tuesday, July 28th, NOAA recommended that the COE implement the experimental blocks this morning (see above e-mail from COE on July 27th) in an attempt to assist upriver migration as soon as possible with the hope that adults passing LGS during this operation would arrive at LGR prior to the weekend and, therefore, would have higher likelihood of being captured at LGR during trap and haul operation.

USFWS provided graphs of forebay temperatures at LGR, LGS, and LMN. They pointed out that the graphs demonstrated that LMN forebay temperatures did not appear to be as obviously correlated with LGS operational changes as the COE had claimed during the TMT and FPOM calls on Monday (July 27th), since both Lower Granite and Little Goose showed similar decreases in temperature.

At the meeting it was asked if NOAA had any more recommendations that may "surprise" FPAC members, and they said they were considering halting the operation of the RSW at LMN—but at this point no decisions have been made.

IDFG determined that collecting sockeye at Lyons Ferry Hatchery was not feasible.

July 29 – Technical Management Team Meeting

In response to the COE's July 27th meeting, the FPC distributed the ladder temperature analysis from USFWS and requested that the COE discuss the implementation of additional actions that may be taken, such as securing pumps at Little Goose Dam. The COE said that they did not find the temperature information "compelling." They said that cycling the locks at Little Goose Dam was not possible because of damage to the lock that presently needed to be addressed. They did not discuss cycling the locks at the other projects. With regard to the pumps they stated it was not feasible due to: (1) funding, (2) contracting issues, and (3) work orders (such as wiring) that would be necessary at the project. The Nez Perce brought up the fact that discussion of this was in the sense of an "emergency" and yet maybe actions weren't being taken in the sense of an "emergency."

The first day of the second LGS test produced adult counts of 1.

A TMT was called for the following day to discuss operations going forward.

July 30 – Technical Management Team Conference Call

NOAA proposed no additional testing at Little Goose Dam.

IDFG proposed two options to discontinue emergency trapping at LGR.

1. Trapping will end at noon on July 31, 2015.

2. Researchers continue to press that when there are any changes made to operations they observe an initial increase in adult passage. Therefore, commence operation of Unit 2 on Monday morning and collect fish until Wednesday at noon.

There was agreement to implement the second option. Operations will return to Unit 2 priority at Lower Granite Dam and will continue in that configuration unless further operational changes are recommended later in the month. All flow in excess of that needed to operate Unit 2 will be spilled in a uniform pattern and the RSW will not be operated.

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MEMORANDUM

TO: Ed Bowles
Erick Van Dyke

Michele DeHart

FROM: Michele DeHart

DATE: May 4, 2016

RE: Review of April 2016 Draft of NOAA Fisheries report *2015 Sockeye Salmon Passage Report*

In response to your request, the Fish Passage Center staff reviewed the subject draft report. We offer the following comments for your consideration. The NOAA report addresses the disastrous adult sockeye passage survival in the Columbia and Snake rivers that occurred in 2015. Our overall conclusion is that the report focuses only on a summary of 2015 for sockeye and, by ignoring past years, appears to downplay the long-standing high water temperature issues in the Snake and Columbia rivers and the effects of the FCRPS development and operations on water temperatures and adult and juvenile salmon survival. The approach taken in this summary report of 2015 passage issues obscures the primary lesson from the 2015 experience, which is that under a climate change scenario, the long-recognized and largely unaddressed problem of high water temperatures in the present FCRPS configuration becomes an ever-increasing threat to the survival of salmon in the Columbia River Basin. The recommended actions identified by NOAA in this report are reminiscent of recommendations made over the last 20 years. The problem for migrating adult and juvenile salmon under the present FCRPS configuration, which is significantly different from a free flowing river, is that water temperatures in fishways and forebays routinely exceed the 68°F degree (20°C) level for extended periods of time, over which salmon survival is impaired. NOAA and the action agencies do not address this critical issue in this report.

Our conclusions are summarized in the following points, and later discussed in detail.

- Water temperature in FCRPS fishways has been a long-standing recognized problem for salmon migration, and although recognized, it has been largely unaddressed.
- The 68°F limit for salmon migration corridors is routinely exceeded in FCRPS fishways.
- EPA modelling indicates that the development of the FCRPS increased water temperatures over the natural river.
- NOAA's discussion of water temperatures in the FCRPS obscures the point that 68°F was exceeded in fishways throughout the Columbia Basin. NOAAs discussion of historical exceedances prior to the development of the FCRPS is misleading.
- The management process that was implemented in 2015 did not allow for robust, science-based, decision-making. Actions proceeded on the basis of perception and instincts without scientific evaluation relative to success.
- Survival of adult migrating summer Chinook salmon was also a historical low in 2015 coincident with high water temperatures. This was not addressed in the subject NOAA report.
- We agree with NOAA's statement that sockeye salmon transported as juveniles have a lower adult migration success rate. This is consistent with historical findings for sockeye and other salmon and steelhead. Historical data and the 2015 experience indicate that sockeye salmon should not be transported as juveniles.
- Although continuous cycling of the navigation locks to provide an alternative upstream migration route for sockeye was discussed in the 2015 process, it was not discussed in this report.

Water temperature in FCRPS fishways has been a long-standing recognized problem for salmon migration, although it has been largely unaddressed.

In 1998, NMFS issued a supplemental BiOp for steelhead recommending further actions to the COE. The Corps of Engineers (COE) adopted these recommendations in a 1998 Record of Decision (ROD). The 1998 ROD includes discussion of new information on continuing unresolved issues. They identify water quality standards with respect to total dissolved gas and temperature as one of these issues. And, relative to temperature, they offer (1) the prioritization of cool water releases from Dworshak for juveniles, (2) the development of surface passage routes to decrease forebay delay, and (3) to investigate adult ladder water temperature by collecting more information and evaluating engineering fixes.

It is now 18 years later and NOAA is still recommending that the COE:

> *Improve monitoring and reporting of all mainstem fish ladder temperatures and identify ladders with substantial temperature differentials (>1.0°C).*

The COE has used data loggers to collect temperature in the adult fishways for several years. In spite of this, very little of this information has been made publicly available. The emphasis recommended by the NOAA/COE Report should not be to "monitor temperatures" and "identify temperature differentials," but should be focused on evaluating the existing information and making immediate modifications to fishways to address the ladder temperatures.

The 68°F limit for salmon migration corridors is routinely exceeded in FCRPS fishways

During the 2015 adult sockeye passage season, it became clear that critical temperature data from the adult fishways were not readily available to the fisheries managers. Without these data, managers were unable to evaluate ladder temperature differentials during the period when sockeye passage was of dire concern in the Snake River. Since this time, the FPC has been working with the COE to obtain ladder temperature data so these data can be made available to the fisheries managers. As part of this process, the COE has stated that the temperatures from the forebay monitors generally track the temperatures at the adult fishway monitors (Tammy Mackey, personal communication). With this in mind, the FPC staff summarized daily average temperatures at the Bonneville and Ice Harbor forebay monitors over the last 18 years (1998–2015) for the period of May 1 to up to the point that the monitor is removed (or September 30, whichever occurred first). While 2015 had the highest proportion of days exceeding the 68°F limit for salmon, it is clear from these data that this limit has been routinely exceeded over the last 18 years (Figure 1). For example, in 1998 the 68°F limit was exceeded 48% of the days at Bonneville and 54% of the days at Ice Harbor. Furthermore, even the years with the lowest proportion of days exceeding the 68°F limit still exceeded the limit approximately 20% of the time (1999, 2008, and 2012 at BON; 2008 and 2011 at IHR).

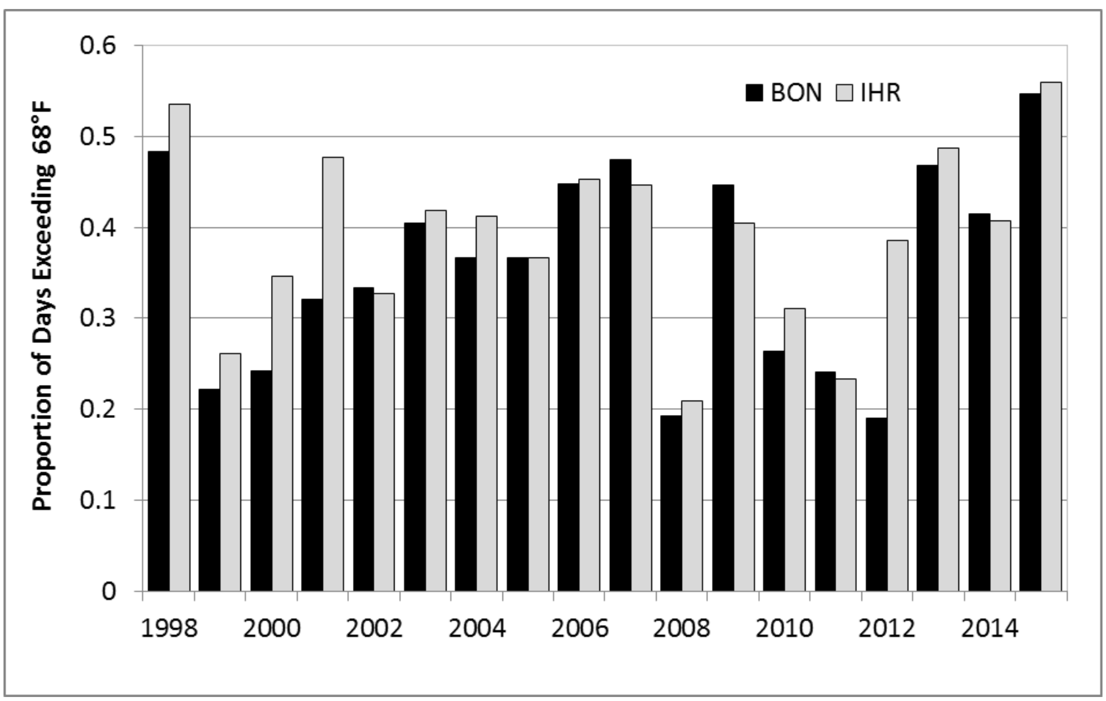

Figure 1. Proportion of days (May 1–~Sept 30) that the forebay monitor at Bonneville or Ice Harbor exceeded the 68°F limit for salmon migration corridors (1998–2015).

EPA modeling indicates that the development of the FCRPS increased water temperatures over the natural river.

Hydrosystem development has had a significant effect on temperature in the mainstem Columbia and Snake rivers. This impact goes beyond the effect caused by naturally high temperatures that may have historically occurred in the mainstem and the tributaries (Note: while naturally high temperatures are often cited to have occurred, there is little consistent water temperature data available to document pre-development river temperatures). By slowing water flow and increasing surface area for solar radiation, dams increase water temperatures in the reservoirs created. The major impact on the daily average, cross-section, water temperature is due to the increase in width and depth resulting from the construction and operation of the impoundments (Yearsley et al., 2001).

In 1995, the National Marine Fisheries Service (NMFS) issued a Biological Opinion (1995 BiOp) concluding that modifications to FCRPS operations were needed to ensure long-term survival of salmon stocks in the Snake River that were protected by the Endangered Species Act (ESA) (NMFS, 1995). The inability to meet water quality standards with respect to temperature was identified as an issue. A temperature of 20°C (68°F) was established as a reference temperature, considered the upper incipient lethal limit for salmon. Focus was on the prioritization of cool water releases from Dworshak and Brownlee dams for juveniles, evaluation and improvement of water prediction temperature models, the development of surface passage routes to decrease forebay delay, and the provision of water temperature control in fish ladders. At that time the COE agreed to coordinate with the Environmental Protection Agency (EPA) regarding their concerns on water temperature.

In October 2000, the states of Oregon, Washington and Idaho signed a Memorandum of Understanding with the EPA-Region 10 that established EPA as the lead agency for the development of a Columbia/Snake mainstem temperature Total Maximum Daily Load (TMDL). TMDL development is usually a state responsibility, but considering (1) the interstate and international nature of the waters, (2) EPA's technical expertise in the modeling effort, and (3) EPA's Tribal Trust responsibilities, EPA agreed to take responsibility for the technical development of this TMDL. Once the EPA developed the TMDL, it was to be up to the states to develop a plan to implement the TMDL.

The EPA modeled the Columbia system using RBM10 (a peer reviewed, one dimensional energy budget model) (Yearsley et al., 2001) and assessed the impacts on natural water temperature (no human-caused pollution or alterations) of point sources, tributary inputs, and dams. They determined that:

1. The effect of existing point sources is very small and does not lead to water quality exceedances when averaged in with the total river flow.
2. Most of the tributaries have a negligible effect on the cross-sectional average temperatures, with exception of the Spokane, Snake, and Willamette, which are large enough to affect the temperature of the Columbia River; and only the Grande Ronde, Salmon, and Clearwater are large enough to potentially alter the Snake River. The magnitude of the effect is a function of temperature differential and flow volume.

3. Dams do have an effect on temperature in the mainstem. The maximum impact ranges from negligible to large, depending on the dam.

The TMDL was to provide a total increase within each reach within target sites to develop waste load allocations. However, the draft TMDL was never finalized and all activity on the TMDL ceased at this time. According to the WA Department of Ecology website (http://www.ecy.wa.gov/programs/wq/tmdl/TMDLsbyWria/tmdlColumbiaRvr.html), the status of the TMDL is "Delayed to allow necessary discussions and information exchange."

NOAAs discussion of water temperatures in the FCRPS obscures the point that 68°F was exceeded in fishways throughout the Columbia Basin. NOAA's discussion of historical exceedances prior to the development of the FCRPS is misleading

Although initially supportive of developing the TMDL and also addressing adult ladder temperatures, the COE moderated their stance regarding the role of the hydrosystem in temperature occurrences above the States' criteria, or the 20°C (68°F) salmon reference temperature, after the development of the feasibility report. This was subsequent to the COE's development of their *Lower Snake River Juvenile Salmon Migration Feasibility Report/ Environmental Impact Statement, Appendix C Water Quality* (USACE 2002).

The COE's official position was included as an appendix to the WQP that was part of the Proposed Actions of the 2004 BiOp remand (NMFS, 2004). The COE's position asserted that high mainstem temperatures occurred both pre- and post-impoundment and that, while the hydrosystem development and operation bore some responsibility for increasing mainstem water temperatures, they also wanted to recognize upstream influences (including the construction and operation of upstream dams, point source returns, agriculture practices, forestry practices, and urban development) as well as climate change.

The NOAA/COE Report uses the same logic and mostly the same data to imply little implication for the hydrosystem in affecting temperature. They use a dataset from 1955–1958 for temperatures from an undeveloped Snake River. There is no recognition that these data (taken from a 1963 publication and converted from °F to °C) are 6-day averages of daily maximum water temperatures. These data may represent a 1-hour or few hours' peak temperature exceedances of the 68°F standard for salmon migration. NOAA misrepresents these data as comparable to the recent data that show daily average temperatures exceed the 68°F standard for most of July and August and, in 2015, the last week of June. In addition, NOAA fails to recognize that, in a natural river, migrating adult salmon can escape to cool deep pools to wait until hourly peak temperatures or short-term peak temperatures dissipate. In the developed FCRPS there is no potential to escape because daily average temperatures exceed 68°F for months at a time. The historical dataset used by NOAA in this report to argue that the FCRPS did not affect salmon migration water temperatures is not comparable or relevant to the present daily average water temperature dataset, given the increased period of thermal exposure adult migrating salmon currently experience. In addition, NOAA fails to recognize that substantial construction work, including the building of a coffer dam, was initiated at Ice Harbor Dam in 1955 which could have affected water temperature at that location.

There were certainly issues with high temperatures and potential mortality to sockeye salmon associated with high river temperatures historically. The issue relative to the present hydrosystem is the magnitude of the exposure and the magnitude of the mortality response due to the delay and concentration of fish in reservoirs and adult fishways. The same 1963 publication warns of the exacerbation of the mortality issue due to the presence and future construction of dams.

In addition, the NOAA/COE Report minimizes the importance of the1°C increase in temperature between McNary and Bonneville dams, while wholly ignoring the extreme temperatures in the Snake River, despite cold water released from Dworshak Dam. It appears that the cooling effect of cold water releases from Dworshak appears to be lost by the time water gets beyond Little Goose Dam. For example, cold water releases from Dworshak are operated in a manner to prevent temperatures at the Lower Granite Dam (LGR) tailrace from exceeding 20°C. Despite the fact that temperatures at the LGR tailrace were mostly below 20°C in 2015, temperatures at the Ice Harbor (IHR) tailrace exceeded 22°C for a total of 24 days in 2015 (Figure 2). In fact, the temperature differentials between LGR and IGR were as high as 3–4°C for 17 days in 2015, mostly in July (June 30–July 2 and July 14–27). These high temperature differentials between LGR and IHR suggest that the reservoirs created by the FCRPS projects on the mainstem Snake River do have an effect on mainstem temperatures, as there is very little input from tributaries between LGR and IHR.

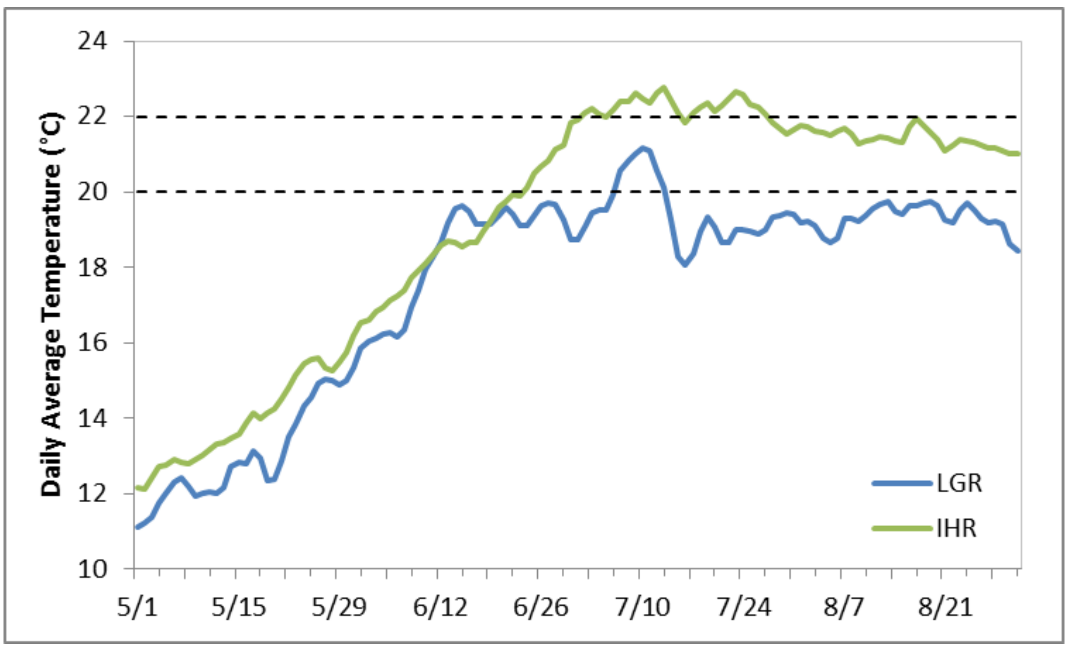

Figure 2. Daily average temperature at the tailrace monitors at Lower Granite and Ice Harbor dams (May 1–August 31, 2015).

As previously discussed, a 1°C temperature differential has been found to be sufficient enough to affect upstream salmon migration in fishways. The 1°C temperature differential between Bonneville and McNary is offered by NOAA as evidence that the FCRPS does not affect water temperature, which clearly discounts the known effect of a similar differential in the fishways.

The management process that was implemented in 2015, did not allow for robust, science-based, decision-making. Actions proceeded on the basis of perception and instincts without scientific evaluation relative to success.

The NOAA/COE Report discusses project-specific operations that were implemented in 2015. They provide in their recommendations to:

> *Develop water temperature models, or similar tools, to assess the effect of alternative project operations at Lower Granite and Little Goose dams on ladder and tailrace temperatures or implement a study to empirically assess the effect of proposed operations.*

This NOAA/COE Report notes that regional disagreement exists regarding the efficacy of changes in project operations and its impacts on adult passage success. The report fails to recognize that regional discussion took into consideration that the actions proposed by NOAA in 2015 at Lower Granite and Little Goose Dam were associated with detrimental impacts to juvenile migrants. NOAA characterizes the juvenile passage as "relatively few juvenile migrants" implying that there would be little impact to juveniles. This view was not regionally accepted in terms of "trading off" operations without having clearly established goals, objectives and criteria for determining success.

Additionally, in spite of over twenty years of recognizing the impact of adult ladders and temperature, there has been a complete stalling of the development of viable alternatives to address the issue. This led to the consideration of actions that had an associated cost in juvenile and adult mortality including: emergency trapping and hauling at high water temperatures, and changing spill operations that decreased juvenile passage protection. It was the cost to juvenile and adult survival and the lack of a plan for evaluation of operations that led to differences in recommendations among the salmon managers.

The issue of adult ladder temperature differentials and passage delay must be addressed, and it must go beyond investigating those recommendations made in this NOAA/COE Report. Once again, a selective water withdrawal capability at Brownlee Dam is overlooked while making recommendations.

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April 13, 2020

U.S. Army Corps of Engineers
Attn: CRSO EIS
1201 NE Lloyd Blvd.
Portland, OR 97232

Submitted via online portal at: comments.crso.info

Re: Columbia Riverkeeper Comments on FCRPS DEIS

Dear Army Corps of Engineers, Bonneville Power Administration, and Bureau of Reclamation:

Columbia Riverkeeper (Riverkeeper) submits the following comments and exhibits regarding the Draft Environmental Impact Statement (DEIS) for federal Columbia and Snake river dams (hereinafter "FCRPS" or "hydrosystem"). **To help prevent the extinction of Snake River salmon, Southern Resident orcas, and Northwest salmon cultures, breaching the four Lower Snake River dams must become part of the final preferred alternative.**

Riverkeeper works to protect and restore the water quality of the Columbia River and all life connected to it, from the headwaters to the Pacific Ocean. Riverkeeper was founded to establish one consistent voice working to protect the Columbia River from a "whole river" perspective—in recognition that poor water quality or degraded habitat anywhere in the Columbia River basin affect salmon and steelhead populations and fisheries both upriver and downriver. Riverkeeper's staff and members are connected by a common interest and concern for salmon and steelhead, which use the Columbia and Snake rivers throughout their lifecycles. Salmon—and subsistence, recreational, and commercial salmon fishing—are integral parts of these rivers, their history, and the communities and lives of local residents. Many of Riverkeeper's staff and members regularly fish for, catch, eat, and serve our families and friends salmon and steelhead caught in the Columbia River and its tributaries. We enjoy and value the ability to consume healthy, delicious salmon and steelhead that are locally and sustainably harvested.

Riverkeeper's staff and members are working to protect and restore strong salmon runs in the Columbia and Snake, with a focus on protecting salmon from warm water caused by the dams and climate change. Riverkeeper staff and volunteers have devoted thousands of hours to researching the causes of, and advocating for solutions to, high water temperatures in the Columbia and Snake rivers. These continuing efforts have included extensive document review; legal, scientific, and factual research; public records requests; meetings and discussions with tribal, federal, and state agencies and scientists; expert scientific and technical research related to the temperature of the Columbia and Snake rivers; and litigation to compel the preparation of a temperature Total Maximum Daily Load (TMDL) for the Columbia and Snake rivers. Riverkeeper has also facilitated several community meetings and training sessions to empower and educate Riverkeeper members and the public about temperature problems in the Columbia and Snake rivers and the impacts to salmon and steelhead.

Riverkeeper's comments[1] on the DEIS will focus largely on water temperature, dams and dam removal, climate change, and the implications for fish survival and recovery.[2] High summer and fall water temperatures already limit the survival of some salmon runs and significantly threaten the future of many Columbia and Snake river salmon fisheries. In 2015, for instance, more than 250,000 adult sockeye died in the Columbia and Snake rivers because warm water prevented them from successfully migrating upstream, trapping them in lethal conditions. In response to temperature-driven fish kills, the Environmental Protection Agency (EPA) noted that "[t]he need to lower water temperatures becomes more critical as the Pacific Northwest Region continues to address and mitigate climate change."[3] The Fish Passage Center similarly concluded that "under a climate change scenario, the long-recognized and largely unaddressed problem of high water temperatures in the [Columbia and Snake rivers] becomes an ever-increasing threat to the survival of salmon . . . ."[4] Unfortunately, the DEIS' overall narrative about water temperature, dams and dam removal, and climate change is incomplete, occasionally misleading, and—perhaps worst of all—largely divorced from the context of salmon migration, survival, and recovery.

Despite its many defects, the DEIS does admit that dam removal would significantly improve the water temperature regime and migration conditions for salmon and steelhead in the Lower Snake River. For instance, the DEIS states that **dam breaching "would have moderate to major beneficial effects on water quality in [the Lower Snake River]** through the restoration of natural, river, and water quality processes; a substantial cooling effect in the fall; greater nighttime cooling[;] and respite from warm water temperature conditions in the summer."[5] As explained below, this and similar admissions are greatly overshadowed by the DEIS's general narrative implying that Lower Snake dam removal would not significantly influence water temperatures.

Based on the events of the past twenty years and the tone of this DEIS, the Army Corps of Engineers (Corps), the Bureau of Reclamation, and the Bonneville Power Administration (BPA) (collectively, "the action agencies") lack the will or the vision to modify the hydrosystem

1 Riverkeeper also incorporates by this reference comments and exhibits submitted by Earthjustice; Defenders of Wildlife and the Center for Biological Diversity; the State of Oregon; and the Columbia River Inter-tribal Fish Commission.
2 *See also* Exhibit 1, Paul Pickett, *Technical comments on the CRSO DEIS' modeling and discussion of water temperature prepared for Columbia Riverkeeper* (2020).
3 Exhibit 2, EPA, *Comments on NMFS' 2015 Adult Sockeye Salmon Passage Draft Report* (2016).
4 Exhibit 3, Fish Passage Center, *Review of Draft of NMFS' 2015 Sockeye Salmon Passage Report* (2016).
5 DEIS, p. 3-275; *see also id.* at pp. 3-270, 4-38.

to meet the Pacific Northwest's needs in 2020 and beyond. Therefore, **Riverkeeper supports ongoing federal legislative efforts to unite Northwest sovereigns, communities, and stakeholders around solutions to remove Lower Snake River dams and re-invest in regional transportation, irrigation, and energy infrastructure.** Working together, we can have a future that includes salmon, agriculture, and clean energy. If the action agencies significantly revised the final EIS, it could inform this legislative effort and lead to real-world improvements. In its current form, however, the DEIS is merely a fig leaf for the untenable status quo; it will only lead to extinction and another court decision that federal agencies violated federal laws.

I. Breaching the Four Lower Snake River Dams Should be Part of the Final Preferred Alternative in the DEIS.

Riverkeeper joins the Nez Perce Tribe, Shoshone Bannock Tribe, the Upper Snake River Tribes (USRT), Oregon's Governor Kate Brown, and hundreds of thousands of people and organizations from across the Pacific Northwest and the United States in calling for the restoration of the Lower Snake River. Snake River sockeye and steelhead are perilously close to extinction now, and it is widely acknowledged that Snake River Chinook are unlikely to survive coming decades without significant changes to the status quo.[6] With these risks in mind, the "small, incremental improvements"[7] touted by the action agencies are legally,[8] ecologically, and morally untenable. After twenty years of failed incrementalism, the action agencies should do what they have long resisted: recommend the removal of the Lower Snake River dams.

Even the DEIS shows that Lower Snake River dam removal is the best way to avoid extinction and recover Snake River salmon and steelhead—although a combination of the DEIS alternatives 3 (dam removal) and 4 (increased spill) would be even more effective. The Fish Passage Center's modeling of Snake River steelhead and spring/summer Chinook survival shows that the action agencies' preferred alternative would not meet the criteria for recovery—but dam removal will.[9] NMFS' own survival model also shows that dam removal would have the most significant benefit to Snake River salmon and steelhead.[10, 11] Setting aside disagreements

6 *See* New York Times, *How Long Before These Salmon Are Gone? 'Maybe 20 Years'* (September 16, 2019) (quoting U.S. Forest Service fisheries research scientist Russ Thurow as saying that wild Snake River Chinook may go extinct in four generations or 20 years); *see also* The Lewiston Tribune, *Simpson offers critical remarks on river study* (March 12, 2020) (quoting Idaho Congressman Mike Simpson as saying "in the next 15 years, if something isn't done, [Snake River salmon] will be extinct. There is no doubt about that, they will be extinct.").
7 DEIS, p. 7-89.
8 Riverkeeper reiterates, and incorporates by reference, Earthjustice's comment that mere "improvement" or "benefit" to salmon and steelhead is a legally insufficient "purpose and need" statement under the National Environmental Policy Act (NEPA).
9 *See* Fish Passage Center, *Comparative Survival Study of PIT-tagged Spring/Summer/Fall Chinook Summer Steelhead, and Sockeye: 2019 Annual Report*, Chapter 2 (December 2019).
10 DEIS, Executive Summary, p. 25.
11 Importantly, neither survival model appears to account for the benefits of decreased exposure to warm water and increased adult survival that would likely result from Lower Snake River dam removal. *Pers. Comm. with Margaret Filardo, ret. Fish Passage Center staff* (March 26, 2019). Accordingly, these models are likely underestimating the improvements to SARs that could result from Lower Snake River dam removal.

between (and about) the models, the difference in survival between stocks that traverse the Lower Snake, and the mid-Columbia stocks that do not, strongly suggests that the Lower Snake River dams are preventing the recovery of Snake River salmon and steelhead. As the Columbia River Inter-tribal Fish Commission (CRITFC) pointed out, salmon and steelhead in the John Day, Deschutes, Yakima, and Umatilla rivers consistently survive the hydrosystem well enough to meet recovery goals. Snake River stocks consistently fail to meet these same goals. From a fish's perspective, the difference is four dams and 140 miles of warm, slack water in the Lower Snake. The DEIS does not seriously dispute this conclusion.

The action agencies' fundamental mistake is believing—despite nearly 100 years of evidence to the contrary—that engineered solutions can replace or improve upon the productivity of the Columbia basin's natural conditions. This preference for engineered solutions over ecological systems is central to the culture and identity of the Army Corps and BOR. But this paradigm for managing our river has failed; it defies common sense, over a century of Euro-American experience, the Traditional Ecological Knowledge of cultures that sustainably managed these fisheries since time immemorial,[12] and scientific findings prepared for the Northwest Power and Conservation Council.[13] As Idaho Congressman Mike Simpson succinctly stated, "Salmon need one thing—they need a river."[14] The preferred alternative in the final EIS should depart from action agencies' failed paradigm and recommend the measure most likely to restore healthy runs of salmon to the Snake River basin.

II. The Alternatives Analysis Violates NEPA.

NEPA requires that every EIS analyze a reasonable range of alternatives and take a hard look at the environmental consequences of each alternative so that decision-makers and the public can readily understand the implications of the choices before the agency. For the following reasons, the DEIS does not meet these requirements.

A. Maintaining the status quo means extinction for Snake River sockeye and steelhead.

The DEIS fails to take a hard look at the consequences of the No Action Alternative (NAA) by failing to explain that maintaining the current status quo will likely lead to the extinction of Snake River sockeye and steelhead in the near term. The DEIS describes the measures included in the NAA and models their implications for fish survival. These models indicate that the smolt-to-adult return rates expected under the NAA will not lead to recovery.[15]

[12] *See, e.g.*, Shoshone-Bannock Tribes, *CRSO Tribal Perspectives Document*, p. 10 (DEIS, Appendix P).
[13] *See generally*, The Independent Scientific Group, *Return to the River: Restoration of Salmonid Fishes in the Columbia River Ecosystem*, Chapter 2 (September 10, 1996).
[14] The Lewiston Tribune, *Simpson offers critical remarks on river study* (March 12, 2020).
[15] *See* DEIS, pp. 3-387, 3-384 (using Snake River spring/summer Chinook survival rates as a proxy for Snake River sockeye survival rates), 7-100, 7-102.

What the DEIS does not explain is that Snake River sockeye and steelhead stocks are in a state of collapse and that failure to substantially recover in the near term will very likely lead to extinction. This critical omission obscures the consequences of the NAA, especially when accounting for intensify climate change, and does not constitute the hard look that NEPA requires.

B. The DEIS' "multiple objectives" approach to fails to present a reasonable range of alternatives.

The alternatives presented in the DEIS violate NEPA because they are not distinct enough to present decision-makers and the public with realistic and intelligible choices. The point of NEPA's alternatives requirement is to describe the range of options before the agency and the corresponding range of environmental consequences that could flow from the decision. Unfortunately, the action agencies' use of so-called "multiple objective" alternatives makes this impossible. The DEIS should have presented a suite of true alternatives that reflect a reasonable range of potential FCRPS operations and the consequences. Instead, the DEIS proposed five "multiple objective" alternatives that are, with the exception of Lower Snake River dam removal, so similar as to prevent meaningful comparison. Further, the "multiple objective" alternatives contain competing or contradictory measures that often obscure the potential environmental benefit of measures disfavored by the action agencies, such as Lower Snake River dam removal or increased spill. To address this problem, the final EIS should abandon the "multiple objectives" approach and analyze alternatives focused on maximizing different benefits of hydrosystem operations, including fish survival. This approach will allow decision-makers and the public to understand the true range of outcomes that could be achieved.

C. The EIS should consider profound changes to the status quo.

The DEIS should have analyzed removing the lower four Columbia River dams. The Yakama and Lummi Nations, Columbia Riverkeeper, and many others have called for the removal of these dams to restore Columbia River fisheries and Southern Resident orcas, honor treaty commitments, and improve ecosystem function to mitigate for the negative impacts of climate change. Additionally, analyzing lower Columbia dam removal would give DEIS readers a better sense of the benefits of a more natural river system, which the action agencies' illegal and myopic focus on dam operations obscures. Lower Columbia dam removal (like Snake River dam removal) is not beyond the action agencies' existing authority and, even if it were, that would not preclude its consideration in a NEPA analysis. These dams were not built to last forever; one is approaching 90 years old. The four lower Columbia dams may be part of the action agencies' cultures and identities but they have significantly disrupted the culture, identity, and economy of many others throughout the Northwest. In the mid-term, their electricity is not irreplaceable, or even particularly significant, given the energy revolution necessary to achieve deep decarbonization goals in the Pacific Northwest. This EIS process is a rare opportunity to weigh real changes to the status quo. As we enter the 21st century, the action agencies should reconsider the value and trade-offs of their 19th century technology.

The DEIS should also have analyzed of the impacts of summertime reservoir draw-downs on temperature and salmonid survival in the Lower Snake River as well as at McNary and John Day dams. As explained below, these reservoirs significantly increase water temperatures and impair fish migration and survival. Drawing down these reservoirs to the spillway crest during certain times has the potential to decrease water temperature due to smaller reservoir surface area and decreased water residence times. While this level of draw-dawn could require modification to fishways and other dam structures, the cost of such modifications should be compared to other measures under contemplation to improve fish survival—including dam removal and the concurrent permanent loss of electric generating capacity. Given the ongoing search for regional solutions to the fish passage problems caused by these dams and reservoirs, the action agencies should have modeled the water temperature impacts of reservoir draw-downs and discussed the implications for salmon and steelhead migration survival and recovery.

D. The DEIS discussion of dam removal in MOA3 is arbitrary and capricious.

First and most importantly, Riverkeeper is appalled—but not surprised—by BPA's continued attempts to leverage fish mitigation in the Snake River basin against Lower Snake River dam removal. The DEIS implies that Snake River dam removal would necessarily result in the immediate termination of the LSRCP, soon followed by significant reductions in fisheries mitigation work throughout the Snake basin.[16] Given ongoing legislative efforts to resolve the deep-seated problems with the FCRPS, and the action agencies' own assertions that dam removal would require additional legislation, BPA's attempt to couch its threat as an unavoidable legal consequence of lower Snake dam removal does not hold water. After decimating the fisheries resources of the Snake River basin, BPA blithely proposes to bulldoze holes in the four Lower Snake dams and walk away from the mess it created—leaving states, tribes, and stakeholders to rebuild what the action agencies destroyed. Moreover, the DEIS' overtly transactional tone is a wholly inappropriate when addressing the tribal and state sovereigns whose fisheries resources have been degraded or eliminated and who effectuate BPA's mitigation obligations on the ground. The Northwest Power Act and the Endangered Species Act obligate BPA to mitigate some of the damage caused by the FCRPS. The discretion afforded BPA in deciding how to carry out this mitigation should never be used as a carrot or wedge to influence regional policy choices.

Similarly, it is duplicitous and unscientific for the action agencies to repeatedly reference pre-dam water temperature observation in the Lower Snake River when describing the consequences of Lower Snake River dam removal and Alternative 3. Even if those measurements were reliable or representative, once-daily surface temperature samples are not

[16] DEIS, pp. 1-45, 3-250, 3-548.

particularly helpful for understanding how the Lower Snake River's water temperature regime influenced fish passage and survival[17] (a mistake perpetuated by the DEIS' singular focus on current daily maximum water temperatures). Furthermore, the DEIS steadfastly ignores *other* pre-dam conditions—especially conditions that show the dams' deleterious impact or undermine the action agencies' long-held policy preferences. For instance, the DEIS does not present pre-dam water temperature or flow data for the main-stem Columbia or the estuary. And the DEIS fails to mention that Snake River coho were historically abundant, went extinct after the construction of the Lower Snake River dams, and were only recently re-introduced by the Nez Perce Tribe. Presenting questionably relevant data on pre-dam conditions only where it appears to support a long-established policy preference is arbitrary and capricious and only serves to highlight the action agencies' bias.

Finally, the DEIS' discussion of Alternative 3 should explain that Lower Snake River dam removal could enhance the benefit of cold-water releases from Dworshak Reservoir.[18] The DEIS concedes that, with the Lower Snake dams in place, the cooling effect of Dworshak's water diminishes significantly downstream of Lower Granite dam. However, **the DEIS does a poor job of explaining that, without the four dams, the cold water from Dworshak could meaningfully and quickly decrease water temperatures throughout entire the Lower Snake River**. Both HEC-RAS and RBM-10 models predict that daily average temperatures in a free-flowing Lower Snake River at Ice Harbor Dam would have significantly declined following a major increase in Dworshak water releases in late June 2015—and significantly increased just after Dworshak releases were curtailed at the beginning of August 2015. The two figures below

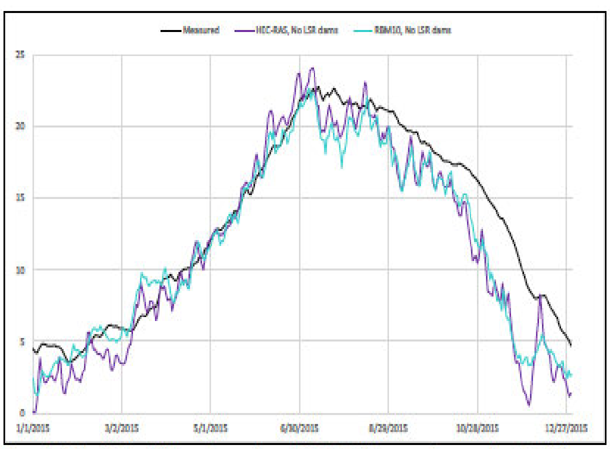


Figure 1-22. Ice Harbor tailrace, Comparison of 2015 Daily Average Temperature Prediction with No Lower Snake River Dams

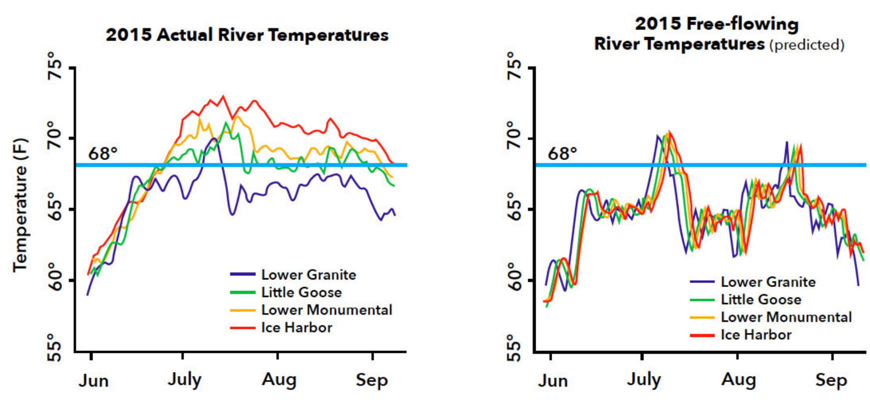
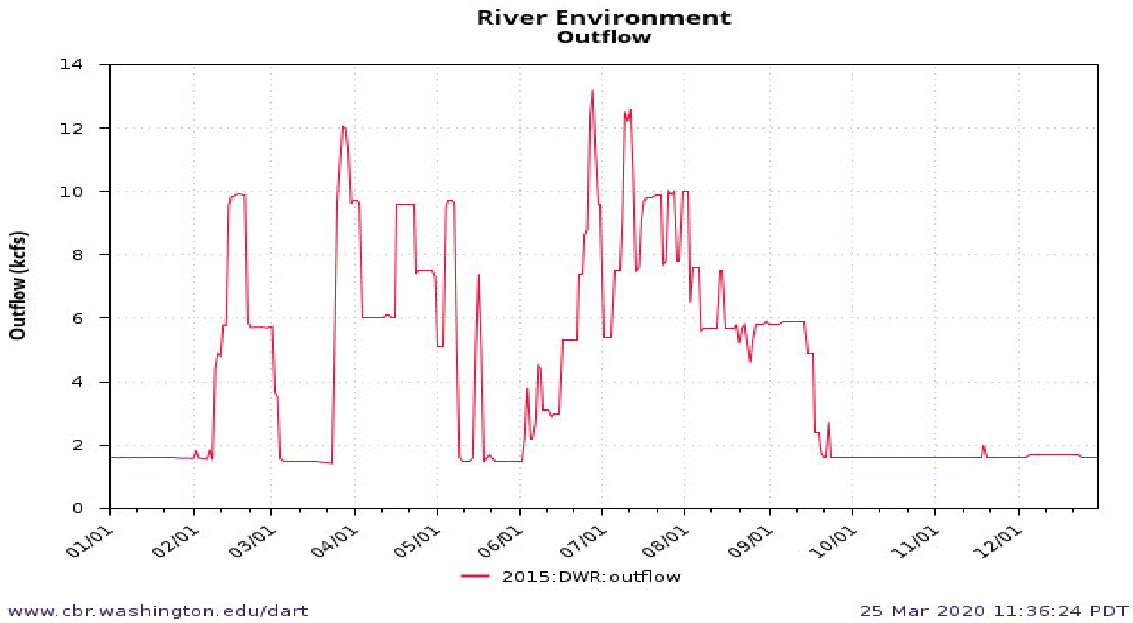


Figure 1. Comparison of 2015 summer water temperatures between the actual, dammed Lower Snake River (left) and a modeled, free-flowing Lower Snake River (right).

describe the daily average temperatures in the Lower Snake at Ice Harbor in 2015, both as observed temperatures and temperatures predicted without the dams. Both figures predict that the

17 *See* Exhibit 4. Margaret Filardo *et al.*, *Letter to Gene Spangrude re: historic Snake River water temperature observations* (November 13, 2019).
18 *See* Exhibit 5, EPA, *Draft Assessment of Impacts to Columbia and Snake River Temperatures using the RBM10 Model*, pp. 39–40 (December 19, 2018) (predicting lower monthly average temperatures in July, August, and September in the Lower Snake River if the dams were breached and Dworshak releases continued.)

average temperature of the free-flowing Snake River at Ice Harbor would have declined sharply in early July and risen sharply again in early August of 2015. What could explain these significant changes in temperature? The next figure shows water releases from Dworshak Dam over the same period.



The hydrograph above shows that cold water releases from Dworshak more than doubled in late June of 2015—just before the Corps and Riverkeeper's modeling both predicted a significant decline in the free-flowing river's temperature at Ice Harbor. Similarly, the hydrograph shows that Dworshak water releases decreased sharply at the beginning of August 2015—and the models predicted significant temperature increases at Ice Harbor shortly thereafter. In contrast, the temperatures observed in the dammed river at Ice Harbor in 2015 showed no noticeable reaction to Dworshak operations. This anecdotal evidence supports the commons-sense conclusion that breaching the Lower Snake River dams would allow Dworshak releases to significantly and quickly influence water temperatures—and improve fish migration—throughout the *entire* Lower Snake River.

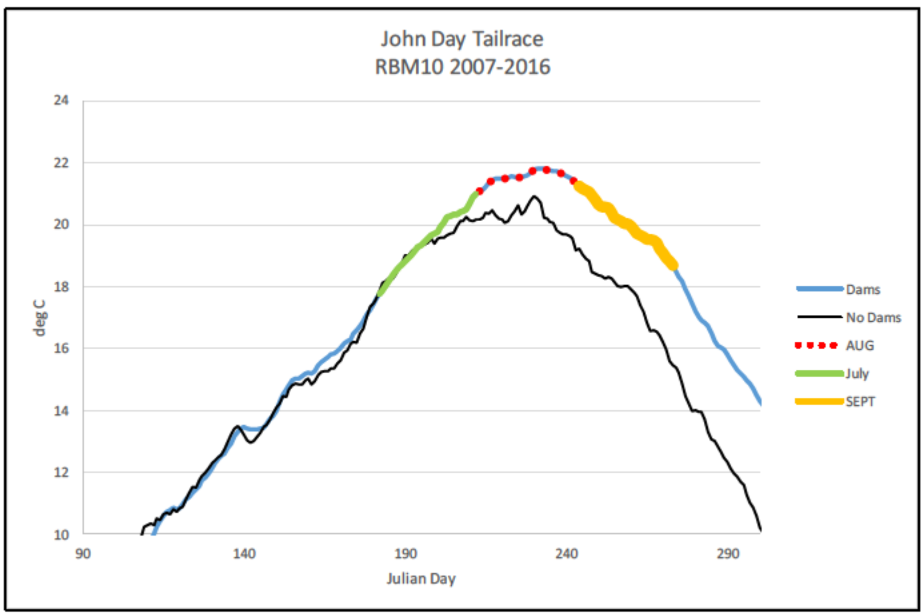
Instead of ignoring and obscuring[19] this important point, **the DEIS should have investigated how to optimize Dworshak releases to regulate water temperature and improve fish survival in a free-flowing Lower Snake.** For instance, Alternative 1 proposes releasing more Dworshak water in June/July, less in August, and more again in September/October. This schedule would release cold water during the peak of the sockeye and spring/summer Chinook migrations in June/July and again during the peak of fall Chinook and

[19] As explained in Section IV and V, below, focusing exclusively on daily maximum temperatures obscures important information about how dam removal would affect water temperatures and fish survival.

steelhead migrations in September/October. Because Alternative 1 does not include Lower Snake dam removal, temperature modeling of this alternative showed (unsurprisingly) that an early summer/early fall Dworshak release schedule would have little to no impact on water temperatures or fish survival in the Lower Snake River. A much more interesting and revealing question would be: how would the Alternative 1 (or other) Dworshak release schedule influence temperature and fish migration in a free-flowing Snake River? The DEIS should have investigated how the combination of Snake River dam removal and different Dworshak dam release patterns could provide the most benefit for fish survival.

III. The DEIS Ignores Water Temperature Problems, and the Lack of Solutions, in the Lower Columbia.

The DEIS conceals the hydrosystem's significant impact on water temperature in the lower Columbia River. Recent modeling by EPA (below) shows that the summer water temperatures at John Day dam are significantly warmer because of the John Day pool and upstream reservoirs.[20]



EPA modeling also shows that John Day and McNary dams together raise the temperature of the Columbia an average of 0.5 and 0.6 degrees C in August and September, respectively.[21] While these results show significant temperature increases due to the dams, Riverkeeper notes that EPA's modeling only examines river temperature with and without dams under *current* flow conditions. Modeling temperature under a natural (*i.e.* pre-FCRPS and Columbia River Treaty) hydrograph where the freshet was more pronounced and lasted longer into the summer would

[20] Exhibit 6, EPA, *Columbia River Temperature TMDL: State and Tribal Meetings PowerPoint Presentation*, Slide 33 (January 2020).
[21] *See* Exhibit 5, pp. 28–29.

show the true extent of the FCRPS' temperature impacts. The action agencies' refusal to discuss pre-dam conditions or consider alternatives that meaningfully depart from the status quo results in a DEIS that conceals the hydrosystem's significant impact on water temperature in the lower Columbia River and its implications for salmon survival.

Furthermore, the DEIS's reliance on EPA's unpublished temperature refuges study and temperature TMDL is misplaced, cynical, and incorrectly implies that the action agencies can foist the main-stem Columbia water temperature problems onto EPA. First, temperature refuges will not address many of the temperature-related fish passage problems in the lower Columbia because temperature refuges do not:

- address the cause of, or solutions to, high water temperatures;
- address temperature barriers at fishways;
- benefit adult sockeye or spring/summer Chinook;
- benefit out-migrating juvenile salmonids experiencing high water temperatures, or;
- exist in the mainstem Columbia or Snake rivers upstream of John Day dam.[22]

Second, the action agencies and federal government should not pretend to rely on a currently non-existent temperature TMDL that they have actively, and successfully, resisted for the last 20 years. A temperature TMDL *could* provide a meaningful plan to reduce water temperature in the Columbia and the Lower Snake. Unfortunately, the action agencies have worked to prevent and undermine the development of such a plan for the past two decades. When EPA put forth a draft temperature TMDL in 2002, the action agencies convinced the Bush administration to shelve that plan. When it appeared the TMDL might go forward anyway, the action agencies pressured EPA to ignore the impacts of the dams on temperature and pressured Oregon and Washington to exempt the dams from the Clean Water Act using a process called a Use Attainability Analysis. After the Ninth Circuit recently ordered EPA to produce the TMDL, the federal government took the extraordinary measure of asking that court to re-consider its opinion *en banc*—but not a single Ninth Circuit judge thought the case worthy of rehearing. It is cynical in the extreme for the federal government to imply that a currently non-existent temperature TMDL will help address water temperature problems. Regardless of the status of EPA's TMDL and thermal refuges work, the DEIS should realistically and clearly analyze whether the hydrosystem is causing or contributing to compliance with the water quality standards.[23]

IV. The DEIS' Overall Narrative About Temperature in a Free-flowing Snake River is Misleading and Incorrect.

Overall, the DEIS gives the incorrect impression that dam removal would cause the Lower Snake River to warm earlier in the spring, have no effect on temperature in the summer, and cool earlier in the fall—and that the spring and fall effects are equivalent in magnitude and

22 *See, generally*, Exhibit 7, Northwest Environmental Advocates, *Comments on Draft Columbia River Cold Water Refuges Plan* (November 19, 2019).
23 *See* Exhibit 1, pp. 2–3.

counterbalance each other in terms of benefits to fish. For instance, the DEIS says that dam breaching:

> ". . . is expected to result in warmer water temperature in the spring, similar water temperatures in the summer, and cooler water temperatures in the fall . . ."[24]

This oft-repeated narrative leaves readers with the impression that Lower Snake River dam removal would not substantially improve water temperatures or fish migration conditions. This is untrue.

A. The free-flowing Lower Snake would not be meaningfully warmer in the spring.

Contrary to the DEIS' general narrative, the DEIS' data show that the free-flowing Lower Snake would not be meaningfully warmer in the spring (*e.g.* March, April, and May) than the dammed river. When ranges of uncertainty were incorporated into the models' results, springtime temperatures in the free-flowing river almost never exceed the dammed river.[25] In March and April, the DEIS' modeling does predicts that the monthly average temperature at Ice Harbor could be one or two degrees F warmer in the free-flowing river.[26] But in March and April, the free-flowing Lower Snake River would almost never be warmer that 56 degrees F[27] and therefore would remain well below the temperature thresholds known to impair salmon and steelhead migration.[28] The small temperature difference resulting from Lower Snake dam removal in March and April is, therefore, not relevant to the fisheries resource. **And in May, the DEIS actually predicts that snowmelt runoff would cause the free-flowing Lower Snake to be colder than the dammed river**.[29] Accordingly, the federal agencies' long-time narrative that the free-flowing Lower Snake would be warmer in the spring is not scientifically viable; irrelevant and misleading (with respect to March and April); and untrue (with respect to May).

B. The summer water temperature regime in the free-flowing Lower Snake River would not be "similar" to that of reservoirs.

The DEIS' oft-repeated claim that water temperatures in June, July, and August would be "similar"[30] with or without the dams is misleading and incorrect, even assuming that the Corps' modeling of temperature in the free-flowing Lower Snake river is reliable. This claim appears to

[24] DEIS, p. 4-32; *see also id.* at 1-45, 3-551, 6-42, 7-19, D-6-25, D-6-71.
[25] DEIS Appendix D, Annex A, p. A-2-5.
[26] DEIS Appendix D, p. D-6-31; *see also id.* at D-A-1-28 (showing even smaller differences when comparing monthly averages of daily average water temperatures).
[27] DEIS Appendix D, p. D-6-36.
[28] *See, generally,* Exhibit 8, EPA, *Issue Paper 1: Salmonid Behavior and Water Temperature* (2001).
[29] DEIS Appendix D, p. D-6-25 (Explaining that "During [May], total river flows are highest due to snowmelt (i.e. spring freshet), resulting in overall cooler water temperatures throughout the [free-flowing] lower Snake River as compared to the No Action Alternative."); *see also id.* at D-6-31.
[30] DEIS, p. 4-32; *see also id.* at 1-45, 3-551, 6-42, 7-19, D-6-25, D-6-71.

be based exclusively on the Corps' projections of *daily maximum* temperatures in the dammed and free-flowing Lower Snake River. Daily maximum temperature is just one of several water temperature parameters that influence how well adult salmon and steelhead migrate and survive. As detailed in Section V, below, other temperature parameters and metrics—including average temperature, diel cooling, and inter-day variability—would all be different, and more favorable to salmon and steelhead, in the free-flowing river. Accordingly, dam removal would meaningfully improve the temperature profile of the Lower Snake in the summertime in ways that benefit salmon and steelhead. The DEIS' blanket assertion that summer temperatures in the Lower Snake would be "similar" after dam removal is therefore misleading and incorrect.

Furthermore, **the temperature model used to assess dam breaching appears to over-estimate summer temperatures in the Lower Snake River**.[31] Problems and uncertainty with the Corps' modeling further undercut the DEIS' central narrative [*e.g.* that summer water temperatures would be the same with and without the Lower Snake dams] because the DEIS appears to over-estimate how hot the Lower Snake would be without the dams. The HEC-RAS model habitually over-predicts summer temperatures in the Lower Snake.[32] But the Corps nevertheless asserts, without any real justification, that it expects HEC-RAS to accurately predict water temperatures without the dams.[33] This makes no logical sense, and some important sources of modeling uncertainty contradict the Corps' hope that HEC-RAS will somehow begin accurately predicting summer water temperatures under a dam-breach scenario. For instance, wind- and temperate-driven evaporative cooling is an important source of heat loss from the river, but the HEC-RAS model has no way to adjust the wind-sheltering coefficients or change evaporation rates seasonally.[34] These limitations on the HEC-RAS model would likely still cause this model overpredict summer water temperatures in the free-flowing Lower Snake.[35] Another indication that the Corps may be over-estimating summer temperatures in the free-flowing Lower Snake is that the Corps' HEC-RAS model over-predicts summer water temperatures in the Lower Snake when compared to EPA's RBM-10 model.[36] Accordingly, summer daily maximum temperatures in the free-flowing Lower Snake may actually be lower than the DEIS predicts.

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31 *See* Exhibit 1, pp. 1–2.
32 DEIS Appendix D, Annex A, p. A-1-16 ("the HEC-RAS representation of the current [*i.e.* dammed] system overpredicts mid-summer temperatures"); *id.* at p. A-1-18 (explaining that HEC-RAS "underpredicts [reservoir] water temperature consistently throughout the year except during the summer, at which time the temperature is overpredicted").
33 DEIS Appendix D, Annex A, p. A-1-18. ("The WQ team believes these results corroborate the 360 HEC-RAS heat balance routines and the parameter set for a one-dimensional representation of 361 dam breach of the lower Snake River."); *id.* at p. A-1-16.
34 Exhibit 1, p. 1.
35 *Id.*
36 DEIS Appendix D, Annex A, p. A-1-28 (comparing results of HEC-RAS and RBM-10 modeling on free-flowing Lower Snake water temperatures).

C. Fall cooling in the free-flowing Snake River would be far more significant than spring warming, both in terms of absolute temperature differences and benefits to fish survival.

The DEIS' narrative incorrectly implies that predicted fall cooling in the free-flowing Snake River would roughly mirror, and offset, spring warming. This is misleading. The magnitude, duration, and ecological impact of predicted cooling in September, October, and November is far greater than the impact of any warming that might occur in March or April. In contrast to the spring months, when ranges of uncertainty are incorporated into the models' results, fall temperatures in the free-flowing river are almost always lower than the dammed river.[37] Furthermore, in contrast to the minor differences between the dammed and free-flowing Lower Snake predicted for March and April, the significant differences in water temperature predicted in September and October would occur when the dammed river would be warm enough to cause migrating salmon and steelhead thermal stress. Steelhead and fall Chinook attempt to migrate through the Lower Snake mostly in September and October. According to EPA, migration temperatures for adult steelhead and fall Chinook are 10–13 C and 10.6–19.4 C, respectively.[38] Temperatures in the dammed Lower Snake are often above, or at the high end, of these ranges in September and October. Therefore, significant temperature reductions in September and October provided by dam removal would meaningfully improve migration conditions for steelhead and fall Chinook. Dam removal would also improve spawning temperatures, and success, for fall Chinook in the Lower Snake, especially in October and early November when the dammed river is often significantly warmer than the 10 C optimum spawning temperature or even the 15 C level considered "stressful" for spawning.[39] In sum, the fall cooling predicted in a free-flowing Lower Snake River significantly exceeds the magnitude, and benefit to salmonids, of any spring warming that might occur due to dam removal; the EIS—and, more broadly, the action agencies and NMFS—should stop implying that these two effects are equivalent and counterbalancing.

V. The DEIS Does Not Take a Hard Look at the Impacts of Lower Snake River Dam Removal on Water Temperature, Fish Migration, and Salmon Recovery.

The DEIS' blanket assertion that "Adult upstream passage through the CRS projects on the lower Columbia and lower Snake Rivers is generally safe and effective"[40] is incorrect and deeply irresponsible. Columbia and Snake river dams routinely and significantly impair the upstream migration of adult salmon and steelhead, in large part due to the dams' impacts on water temperatures in fishways and reservoirs.

[37] DEIS Appendix D, Annex A, p. A-2-5.
[38] Exhibit 9, EPA, *Summary of Temperature Preference Ranges and Effects for Life Stages of Seven Species of Salmon and Trout*, pp. A-3, A-4 (1998).
[39] Exhibit 8, p. 17.
[40] DEIS, p. 3-301 (note that the pagination of the DEIS erroneously jumps from 3-304 to 3-285 and then repeats upward, meaning that duplicate page numbers exist in that range).

The eight dams on the lower Columbia and Snake rivers have caused significant mortality of returning adult endangered Snake River sockeye[41] in four of the past five years. The catastrophic and well-known fish kill in 2015 destroyed an estimated 96% of the endangered Snake River sockeye before they passed Lower Granite Dam, and EPA admitted that the death of these fish was "attributable primarily to warm water."[42] Unfortunately, subsequent years have shown that adult Snake River sockeye frequently die in significant numbers in the hydrosystem. In 2017, NMFS estimated that passage through the hydrosystem killed 43% of returning adult endangered Snake River sockeye.[43] In 2018, NMFS estimated that 15% of adult Snake River sockeye died between the Bonneville and McNary dams;[44] and ladder counts suggested that 28% of the remaining fish died in the Lower Snake.[45] **In 2019, ladder counts suggested 75% mortality for sockeye in the Lower Snake**: 320 sockeye were observed at Ice Harbor Dam ladder, but only 81 were observed in the ladder at Lower Granite Dam.[46] Unhelpfully, the DEIS only presents information on adult Snake River sockeye survival from 2012 through 2016[47]—even though the current BiOp requires the action agencies to collect and report such reach mortality data every year.[48] The overwhelming evidence suggests that the hydrosystem has caused very significant mortality on endangered Snake River sockeye in recent years—particularly in the Lower Snake River.

Adult Snake River steelhead and Chinook also suffer significant mortality from the hydrosystem. The DEIS suggests that (when eliminating other sources of mortality) only 85% of these fish survive their journey past the 8 dams.[49] The DEIS does not explain why the action agencies believe that killing 15% of all pre-spawn adult fish from populations that are not meeting recovery objectives is "safe" and "effective," or whether this level of mortality is acceptable, sustainable, or likely to lead to extinction. As explained below, these estimates of out-right fish mortality in hydrosystem do not capture the effects of chronic or cumulative thermal stress that may contribute to additional mortality or reproductive failure upstream of Lower Granite dam.

The DEIS' explicit dismissal of the impacts of the dams, and water temperatures, on adult salmon and steelhead survival and recovery constitutes a failure to take a hard look at an important problem. The following subsections provide a more thorough review of why the DEIS' discussion of water temperature and salmonid migration is inadequate.

41 The DEIS uses the modeled SAR for Snake River spring/summer Chinook as a proxy for Snake River sockeye survival. This is inappropriate given the differences in return timing, temperature sensitivity, and conversion rates between adults of these two species.
42 *Columbia Riverkeeper v. Pruitt*, Case No. 2:17-cv-00289-RSM, Defendants' Answer, ¶ 3 (May 15, 2017).
43 Exhibit 10, NMFS, *"2019 adult survival estimates for distribution" spreadsheet; "SR Sockeye" tab* (2019) (excerpted from original).
44 *Id.*
45 Fish Passage Center, *Adult Returns for Columbia & Snake River Dams Webpage* (queried April 5, 2020).
46 *Id.*
47 DEIS, Table 3-113 on p. 3-302 (this table is mis-labeled).
48 NMFS, *2019 CRS Biological Opinion*, p. 877 (March 29, 2019).
49 DEIS, p. 3-302.

A. The DEIS' singular focus on daily maximum temperature, and 68 F, ignores many important, and complex, relationships between salmonids and water temperature.

Although the DEIS' focus on daily maximum water temperature, and particularly on the 68 F (20 C) mark, is appropriate for evaluating the water quality standards, it oversimplifies a multifaceted relationship between fish migration, fish health, and water temperature. Because the DEIS' water quality modeling only predicted daily maximum temperatures, the DEIS's analysis and discussion of those modeling results overlooks many of the differences in the temperature regimes that would occur in a dammed and free-flowing Lower Snake River. While instantaneous daily maximum temperature is relevant to salmonid survival (and can be controlling if, temperatures are extreme), the daily maximum is just one of several important temperature metrics that influence how well salmonids can migrate through the Lower Snake River.[50] Furthermore, focusing on days above and below 68 F oversimplifies the state water quality criteria that the DEIS is purporting to address.[51] The DEIS' focus on daily maximum temperature obscures important consequences of Lower Snake River dam removal and does not constitute the hard look that NEPA requires.

The DEIS' singular focus on 68 F daily maximum temperatures is inappropriate because many negative impacts to salmonids occur at temperatures well below 68 F. These chronic temperature impacts can, and often do, lead to migration failure and premature mortality. As EPA explained with regard to sockeye, "migration blockages, susceptibility to disease, impaired maturation, increases to stress parameters, reduced efficiency of energy use, and reduced swimming performance are all more common as daily mean temperatures exceed 62.6 °F (17°C)."[52] Similarly, NMFS noted that, "At water temperatures above 64.4 °F, [Snake River] sockeye salmon display increases in fallback and straying, and decreases in survival."[53] In laboratory tests, all sockeye held at 68 F died after 12 days; but even sockeye held at 61 F showed significant thermal stress (weight loss, absence of fat reserves, enlarged liver, and reduced egg size) when compared to fish held at lower temperatures.[54] Temperature impacts below 68 F are not limited to sockeye. Adult Chinook survive better when water temperatures remain below 57.2 F,[55] and EPA found 66.9 F to be the upper "feasible" limit for fall Chinook

50 *See* Exhibit 11, EPA, *Issue Paper 5: Summary of Technical Literature Examining the Physiological Effects of Temperature on Salmonids*, p. 74 (2001) ("Even if a free-flowing river experienced a maximum daily temperature that impeded upstream migration, it would not have continuous temperatures beyond the migration threshold, nor would they be present for many consecutive days.")

51 *See* Exhibit 1, pp. 2–3 (explaining how the DEIS' approach to addressing state water quality criteria for temperature ignores the states' natural conditions criteria, which limit additional thermal loads from anthropogenic sources, including dams, when waterways exceed the numeric temperature criteria).

52 *See* Exhibit 11, p. 74.

53 NMFS, *2019 CRS Biological Opinion*, p. 600 (March 29, 2019).

54 *See* Exhibit 11, p. 78; *see also* Crossin, *et al*., *Exposure to high temperature influences the behaviour, physiology, and survival of sockeye salmon during spawning migration*, Canadian J. of Zoology, 86:127–40 (2008) (explaining that wild adult sockeye collected and held for 24 days at 18 C were roughly twice as likely to die both during holding and during their subsequent spawning migration as sockeye held at 10 C).

55 *See* Exhibit 11, p. 76.

migration.[56] Accordingly, the DEIS' singular focus on 68 F as a proxy for adult salmonid migration success ignores the well-documented negative impacts of water temperature below this threshold and therefore does not constitute a hard look at an important problem.

The DEIS' singular focus on 68 F daily maximum temperature is also inappropriate because it does not address the negative impacts to reproductive success from warm water that occur well below 68 F. Even for salmon and steelhead that survive their migration through the hydrosystem, the extended exposure to elevated temperatures can compromise their ability to reproduce successfully for a wide variety of reasons, from pre-spawning mortality to poor fry condition in the next generation. As EPA explained regarding sockeye, "[e]levated but sublethal temperatures are known to negatively affect secretion of the hormones controlling sexual maturation . . . [and t]he likely physiological consequences of these reduced hormone levels are poor spawning success, poor egg quality and viability, and senescent death prior to spawning."[57] Hatchery observations of *O. mykiss* and Chinook also showed a variety of negative impacts on reproductive success (*e.g.* increased pre-spawn mortality; decreased sperm volume and viability; decreased egg size, fertility, and survival; and decreased embryo and juvenile survival) that generally intensified as pre-spawning water temperatures increased from 50 to 68 F.[58] Observations of wild coho salmon also showed decreased egg viability and hatching rates for fish that encountered water above 59 F during their spawning migration.[59] By focusing almost exclusively on the 68 F mark, the DEIS fails to explain, much less attempt to quantify, how the combination of sustained warmer water and increased migration time in the Lower Snake River reservoirs likely harms the reproductive success of all stocks of Snake River salmon and steelhead.

The DEIS' singular focus on 68 F daily maximum temperature also obscures the importance—to adult salmonid migration and, ultimately, reproduction—of the increased daily temperature fluctuations that would occur in a free-flowing lower Snake River. The DEIS does admit that summertime daily temperature fluctuations would be roughly two to six times greater in a free-flowing Lower Snake River: modeling predicts that daily low temperatures in the free-flowing Lower Snake would be 2.5 to 3.5 F less than daily maxima, whereas daily cooling in the reservoirs would be just 0.5 to 1.0 F.[60] However, the DEIS does not really describe the implications of this admission—namely that, assuming similar daily maxima, **the free-flowing Lower Snake would, throughout much of each summer day, be significantly cooler than dammed river.** This severely undercuts the DEIS' central narrative that summer water temperatures in the Lower Snake would be "similar"[61] with or without the four dams. At most, the *daily maximum* summer temperatures in the Lower Snake with and without dams might be

56 *See id.*
57 *Id.*
58 *See, generally, id.* at pp. 76–77.
59 *See id.* at p. 77 (May 2001).
60 DEIS, p. 3-270; *see also id.* at D-6-37 (Figure 6-29, showing modeled daily temperature fluctuations that would occur without the four Lower Snake Reservoirs).
61 DEIS, p. 4-32; *see also id.* at 1-45, 3-551, 6-42, 7-19, D-6-25, D-6-71.

similar. But the temperature regime that fish experience throughout each day in the dammed versus free-flowing Lower Snake would be quite different, and more favorable to migration, because the undammed river would often cool 2 to 3 F throughout each 24-hour period.[62] As EPA noted, even if the "free-flowing [Lower Snake] river experienced a maximum daily temperature that impeded upstream migration, it would not have continuous temperatures beyond the migration threshold, nor would they be present for many consecutive days."[63] By over-emphasizing daily maximum temperatures and largely ignoring the much greater daily cooling that would occur in the free-flowing Lower Snake, the DEIS incorrectly concludes that summer temperatures, and salmon migration conditions, would be "similar" in the dammed and free-flowing rivers.

The DEIS' singular focus on daily maximum temperature also obscures the significant differences between *average* summer water temperatures in the dammed and free-flowing Lower Snake. Contrary to the DEIS' repeated assertion that summer temperatures in the Lower Snake would be "similar"[64] with or without the four dams, modeling by Columbia Riverkeeper using the EPA's RBM-10 temperature model (below) shows that daily average temperatures in the Lower Snake River during the summer of 2015 would have actually been significantly lower

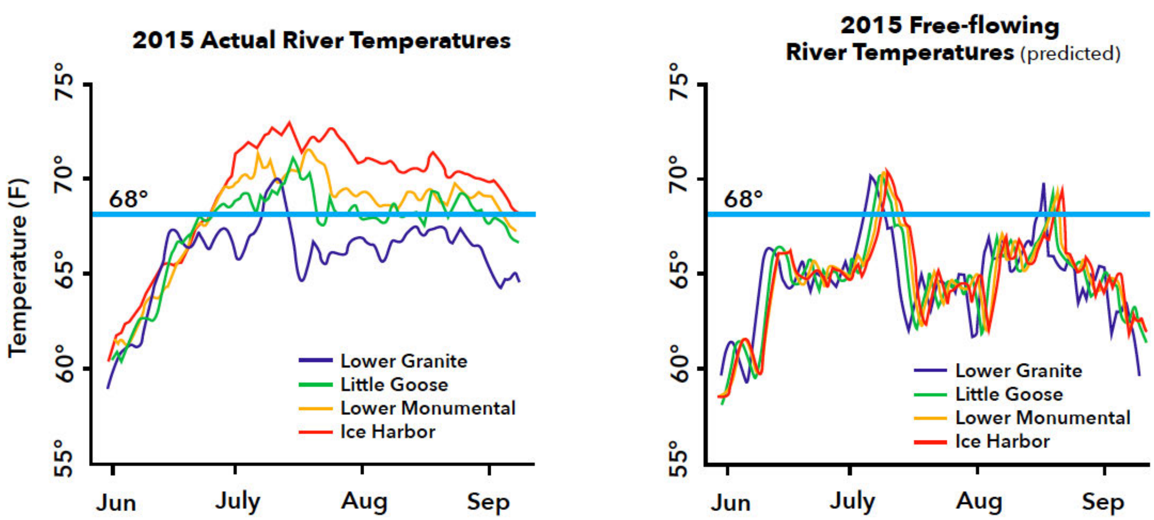

Figure 1. Comparison of 2015 summer water temperatures between the actual, dammed Lower Snake River (left) and a modeled, free-flowing Lower Snake River (right).

than daily average temperatures in the dammed river.[65] The Corps' HEC-RAS model produced similar results for summer 2015.[66] The Corps could and should have used HEC-RAS, which uses an hourly timestep, to comprehensively to model the daily minimum and daily average temperatures that would result from dam removal—alongside the daily maxima. The results of such a modeling effort would have given readers of the DEIS a much more robust and

62 DEIS, pp. 3-270, D-6-37.
63 *See* Exhibit 11, p. 74.
64 DEIS, p. 4-32; *see also id.* at 1-45, 3-551, 6-42, 7-19, D-6-25, D-6-71.
65 Exhibit 12, Columbia Riverkeeper, *White Paper: Computer modeling shows that Lower Snake River dams caused dangerously hot water for salmon in 2015*, p. 4 (2017).
66 DEIS, Appendix D, Annex A, p. A-1-28.

meaningful picture of how dam removal would impact temperature and salmonid migration. Instead, the Corps focused its modeling effort exclusively on daily maximum temperatures, an oversight that led directly to the DEIS' misleading narrative that summer water temperatures would be "similar" in the dammed and free-flowing Lower Snake. Compounding this error, the DEIS provides almost no explanation of how the lower average and minimum daily temperatures that would occur in the free-flowing Lower Snake would benefit survival and reproductive success of summer-migrating adult salmonids. Altogether, the Corps' singular focus on modeling daily maximum temperatures results in a DEIS that gives the incorrect impression that Lower Snake Dam removal would not improve summer water temperatures or migrating conditions for adult salmonids.

B. Lower Snake River dam removal could decrease cumulative thermal stress on adult salmon and steelhead by shortening migration times.

The DEIS should have examined how removing impediments to migration in the Lower Snake River could decrease *cumulative* thermal stress and improve adult salmon migration, survival, and reproduction. Even if the DEIS' narrative that summer water temperatures would be similar with and without the Snake River dams was true (and it is not), salmon and steelhead migrating through the dammed and undammed rivers would likely experience significantly different amounts of thermal stress. This is because migrating adult salmon and steelhead experience thermal stress cumulatively,[67] and the dams, fishways, and reservoirs create migration blockages that likely cause adult fish to spend more days lingering in warm water.[68] Fish forced to hold in warm water expend significantly more metabolic energy just to survive, and, because migrating adult salmon do not feed and have a finite amount of "stored body energy,"[69] increasing the *duration* of exposure to warm water can drain energy stores and lead to negative outcomes for survival and reproduction.[70] Accordingly, the DEIS should have compared adult fish passage times through the dammed Lower Snake River to projected passage times through the free-flowing river and discussed the implications for migration, latent mortality, and reproductive success. The discussion of temperature is incomplete without an acknowledgement

67 *See* Exhibit 13, Lisa Crozier, *Impacts of Climate Change on Salmon of the Pacific Northwest*, p. 18 (2015) (explaining that cumulative thermal stress is "the primary predictor of migration survival in endangered Snake River sockeye adults").

68 *See* Exhibit 11, p. 78 (Explaining that "[f]orced delays in spawning, such as are frequently caused by difficulties in passing dams, can cause decreases in reproductive success."); *see also* NMFS, *2019 CRS Biological Opinion*, p. 601 (noting high rates of sockeye fall back and consequent migration delays at Lower Granite, The Dalles, and Bonneville dams); *see also* Exhibit 14, David Cannamela *et al.*, *Letter to Northwest Policymakers re: Science-based solutions are needed to address increasingly lethal water temperatures in the lower Snake River* (October 22, 2019).

69 *See*, Exhibit 11, p. 75.

70 Exhibit 15, Keefer, *et al.*, *Thermal exposure of adult Chinook salmon and steelhead: Diverse behavioral strategies in a large and warming river system*, PLoS ONE 13(9), pp. 16–17 (2018) ("Warm conditions more rapidly exhaust finite energetic reserves, which salmon and steelhead are simultaneously re-allocating to sexual maturation and depleting during migration, holding, and spawning. At the same time, stress hormone production surges, organs atrophy, and immune function is substantially reduced. These co-occurring processes allow the proliferation of parasites and pathogens, many of which become more virulent as temperatures rise, significantly increasing the likelihood of premature mortality.").

that the dams and fishways create migration delays that likely subject migrating adults to more cumulative thermal stress than they would experience in a free-flowing river. This is another example of how the DEIS' singular focus on daily maximum water temperature obscures and minimizes the benefits of Lower Snake River dam removal for water temperature and salmon recovery.

VI. The DEIS does not take a hard look at the implications of climate change for water temperatures and salmonid survival.

The DEIS does not take a hard look at how impending climate change will impact river temperatures.[71] Climate change has led to increased water temperatures throughout the hydrosystem;[72] various studies show that the monthly average August temperature of the Columbia at Bonneville Dam is increasing at .2 to .4 C per decade[73] and could warm by a cumulative 1.7 to 2 C by the end of the century.[74] Despite this significant threat to water quality and fisheries, the DEIS does not take the logical step of modeling how climate change will impact river temperatures at various points throughout the hydrosystem in coming decades. Indeed, the RMJOC model that the DEIS uses to discuss climate change could have produced the necessary inputs (*i.e.* predicted air temperate, precipitation, streamflow, etc.) to run the water temperature models under predicted climate conditions for the coming decades.[75] The failure to model potential future water temperatures throughout the hydrosystem not only prevents the DEIS from taking a hard look at a looming problem, it cuts short any discussion of what measures might be necessary to ensure that salmon and steelhead can still endure their migration through the warming rivers in coming decades.

The DEIS should have considered new strategies to mitigate the effects of climate change on river temperatures. Not only is new temperature mitigation necessary to ensure that salmon and steelhead can safely migrate through the hydrosystem as climate change intensifies, it is appropriate because the reservoirs actually intensify the water temperature increases caused by changing climate.[76] In other words, the impacts of climate change on water temperature (and, by extension, fish survival[77]) in the current hydrosystem are worse than they would be in a free-flowing river. Nevertheless, the DEIS does not explore or recommend strategies to deal with increasing water temperatures under climate change. An appropriate exploration of temperature mitigation actions would have included, at least, studying: increased summer flow from Canadian storage reservoirs; increased and/or variable-depth releases from Grand Coulee dam;

[71] *See, e.g.,* DEIS, p. 4-31; *see also* Exhibit 1, pp. 3–4.
[72] *See generally* Exhibit 16, EPA, *Draft Assessment of Climate Change Impacts on Temperatures of the Columbia and Snake Rivers* (2018).
[73] Exhibit 17. EPA, *Columbia & Snake River Temperature TMDL: Preliminary Technical Information PowerPoint Presentation*, Slide 28 (August 29, 2018).
[74] Exhibit 6, Slide 53.
[75] *See* Exhibit 1, pp. 3–4.
[76] Exhibit 17, Slide 31 (showing that average August temperatures at John Day dam are increasing faster in the dammed river than they would without the dams).
[77] *See, generally,* Exhibit 13.

summer-time drawdown of McNary and John Day pools or the removal of these dams; and the draw-down or removal of Snake River dams coupled with optimizing Dworshak cold water releases to enhance fish migration. The failure to contemplate, much less recommend, any mitigation for the intensifying water temperature problems caused by the dams and climate change (especially in the main-stem Columbia River) is inexcusable and short-sighted.

Conclusion

To help prevent the extinction of Snake River salmon, Southern Resident orcas, and Northwest salmon cultures, breaching the four Lower Snake River dams must become part of the final preferred alternative. The EIS' narrative should also be corrected to tell a more accurate, and complex, story about how dam removal would significantly improve the water temperature regime in the Lower Snake River to the benefit of critically endangered salmon and steelhead.

Sincerely,

Miles Johnson
Senior Attorney
Columbia Riverkeeper

Exhibits:

1. Paul Pickett, *Technical comments on the CRSO DEIS' modeling and discussion of water temperature prepared for Columbia Riverkeeper* (2020).
2. EPA, *Comments on NMFS' 2015 Adult Sockeye Salmon Passage Draft Report* (2016).
3. Fish Passage Center, *Review of Draft of NMFS' 2015 Sockeye Salmon Passage Report* (2016).
4. Margaret Filardo *et al.*, *Letter to Gene Spangrude re: historic Snake River water temperature observations* (November 13, 2019).
5. EPA, *Draft Assessment of Impacts to Columbia and Snake River Temperatures using the RBM10 Model*, pp. 39–40 (December 19, 2018).
6. EPA, *Columbia River Temperature TMDL: State and Tribal Meetings PowerPoint Presentation* (January 2020).
7. Northwest Environmental Advocates, *Comments on Draft Columbia River Cold Water Refuges Plan* (November 19, 2019).
8. EPA, *Issue Paper 1: Salmonid Behavior and Water Temperature* (2001).
9. EPA, *Summary of Temperature Preference Ranges and Effects for Life Stages of Seven Species of Salmon and Trout* (1998).
10. NMFS, *"2019 adult survival estimates for distribution" spreadsheet; "SR Sockeye" tab* (2019).
11. EPA, *Issue Paper 5: Summary of Technical Literature Examining the Physiological Effects of Temperature on Salmonids* (2001).

12. Columbia Riverkeeper, *White Paper: Computer modeling shows that Lower Snake River dams caused dangerously hot water for salmon in 2015* (2017).
13. Lisa Crozier, *Impacts of Climate Change on Salmon of the Pacific Northwest* (2015).
14. David Cannamela *et al.*, *Letter to Northwest Policymakers re: Science-based solutions are needed to address increasingly lethal water temperatures in the lower Snake River* (October 22, 2019).
15. Keefer, *et al.*, *Thermal exposure of adult Chinook salmon and steelhead: Diverse behavioral strategies in a large and warming river system*, PLoS ONE 13(9) (2018).
16. EPA, *Draft Assessment of Climate Change Impacts on Temperatures of the Columbia and Snake Rivers* (2018).
17. EPA, *Columbia & Snake River Temperature TMDL: Preliminary Technical Information PowerPoint Presentation* (August 29, 2018).

cc'd via email:

- Senator Ron Wyden
- Senator Jeff Merkley
- Representative Peter DeFazio
- Senator Patty Murray
- Senator Maria Cantwell
- Representative Mike Simpson
- Brent Hall, CTUIR
- DR Michel, UCUT
- Art Martin, ODFW
- Michael Garrity, WDFW
- Paul Ward, Yakama Nation
- John Ogan, Confederated Tribes of Warm Springs
- Dave Cummings, Nez Perce Tribe
- Taylor Aalvik, Cowlitz Tribe
- Scott Hauser, USRT
- Dianne Barton, CRITFC
- Melissa Gildersleeve, Washington Department of Ecology

Confederated Tribes and Bands
of the Yakama Nation

Established by the
Treaty of June 9, 1855

July 17, 2020

Sent via Electronic Mail

Chris Hladick
Regional Administrator
Environmental Protection Agency Region 10
1200 Sixth Avenue, Suite 155
Seattle, WA 98101-3188

Re: TOTAL MAXIMUM DAILY LOAD FOR TEMPERATURE IN THE COLUMBIA AND LOWER SNAKE RIVERS

Dear Mr. Hladick:

I write on behalf of the Confederated Tribes and Bands of the Yakama Nation ("Yakama Nation") in response to the Environmental Protection Agency's ("EPA") request for comments on its Total Maximum Daily Load ("TMDL") for Temperature in the Columbia and Lower Snake Rivers.

Since time immemorial, the original, free, and independent Native Nations that later confederated as the Yakama Nation have depended on the Columbia River for cultural, spiritual, and economic wellbeing. In Article III of the Treaty with the Yakamas, U.S. – Yakama Nation, June 9, 1855, 12 Stat. 951 ("Treaty of 1855"), the Yakama Nation expressly reserved the right to fish at "usual and accustomed places," which includes sites on the Columbia River.[1] The Yakama treaty negotiators knew that securing these rights was crucial to guaranteeing the vitality of their people. For the Yakama Nation, the exercise of fishing rights in particular was "not much less necessary…than the atmosphere they breathed."[2]

The Yakama Nation acts as a steward over the Columbia River in exchange for the livelihood that it provides, "speaking for the things that cannot speak for themselves." The Yakama Nation's Fisheries Resource Management Program and Yakima/Klickitat Fisheries Project have seen considerable success revitalizing fish populations and habitat throughout the Columbia River Basin. This success is threatened, however, by the drastic increases in water temperature caused by industrial development and

1 ***See, e.g., U.S. v. Winans***, 198 U.S. 371 (1905).
2 ***Id.*** at 381.

exacerbated by climate change.[3] The mass sockeye fish kill in 2015, which was "attributed primarily" to extreme water temperature exceedances,[4] was devastating to both the Yakama Nation's fisheries and its culture. The Yakama Nation therefore has a significant interest in ensuring that water temperature in the Columbia River and its tributaries is regulated in a manner that will protect fish and, by extension, the Yakama Nation's Treaty-reserved rights.

The TMDL is the first step of the regulatory process necessary for meaningful and effective temperature control in the Columbia River. This comment will first outline the EPA's responsibilities to the Yakama Nation with respect to the development of the TMDL. Next, this comment will describe aspects of the TMDL which the Yakama Nation supports. Finally, this comment will highlight deficiencies that the EPA must correct prior to finalizing the TMDL. Once those flaws are corrected, the EPA should incorporate the TMDL into relevant Clean Water Act permits, including the anticipated National Pollutant Discharge Elimination System ("NPDES") permits for the Federal Columbia River Power System ("FCRPS").

1. **The EPA has an obligation to ensure that the TMDL is consistent with the Yakama Nation's Treaty rights.**

The Yakama Nation's Treaty rights must be "understood as bearing the meaning that the Yakamas understood [them] to have in 1855."[5] With respect to taking fish, the Yakamas understood that they "would forever be able to continue the same off-reservation…fishing practices as to time, place, method, species and extent as they had or were exercising."[6] Rather than securing a mere "equal opportunity" to catch fish, then, the Treaty of 1855 guarantees to the Yakama Nation a portion of the harvest.[7] This guarantee is "worthless without harvestable fish."[8] Accordingly, actions or inactions which threaten the survival of Treaty-reserved fish stocks may constitute a violation of the Treaty of 1855.

The federal government, including its agencies, has a fiduciary trust obligation to the Yakama Nation.[9] This obligation is based on the Yakama Nation's cession of certain rights to roughly ten million acres of land in reliance on federal promises to protect the Yakama Nation's resources for future generations. The trust responsibility imposes

3 *See,* The Yakama Nation, *Climate Adaptation Plan for the Territories of the Yakama Nation*, 28-9 (April 2016), https://www.critfc.org/wp-content/uploads/2016/05/Yakama-Nation-Climate-Adaptation-Plan-.pdf.
4 Answer at 2, *Columbia Riverkeeper v. Pruitt*, No. 2:17-cv-00289-RSM (W.D. Wash. May 15, 2017).
5 *Wash. State Dept. of Licensing v. Cougar Den, Inc.* 139 S. Ct. 1000, 1011 (2019) (citing *Winans*, 198 U.S., at 380-81; *Seufert Brothers Co. v. United States*, 249 U.S. 194, 196-98 (1919); *Tulee v. Washington*, 315 U.S. 681, 683-85; *Washington v. Washington State Commercial Passenger Fishing Vessel Assn.*, 443 U.S. 658, 677-78 (1979)).
6 *See United States v. Washington*, 384 F. Supp. 312, 381 (W.D. Wash. 1974).
7 *Washington State Commercial Passenger Fishing Vessel*, 443 U.S. at 681-82.
8 *See United States v. Washington*, 827 F.3d 836, 852 (9th Cir. 2016) *(aff'd by an equally divided court, Washington v. United States*, 138 S. Ct. 1832 (2018)).
9 *See U.S. v. Mitchell*, 463 U.S. 206, 225 (1983).

fiduciary duties on the federal government with respect to "any Federal government action" which relates to the Yakama Nation.[10] The U.S. Supreme Court has stated that the federal trust obligation to the Native Nations should be judged by the "most exacting fiduciary standards."[11]

The federal government's trust obligation is distinct from but related to its responsibilities stemming from the Treaty of 1855. Where a Native Nation has reserved treaty rights, the federal government has a duty to protect those rights.[12] Therefore, "in carrying out its fiduciary duty, it is the [federal government's]…responsibility to ensure that Indian rights are given full effect."[13]

With respect to the TMDL, the Treaty of 1855 prohibits water temperatures that would result in harm to Treaty-reserved fish stocks or to the "time, place, method, species and extent" of Treaty harvests. If temperature exceedances become significant enough to threaten the survival of Treaty-reserved stocks, then the Yakama Nation's guaranteed portion of harvestable fish is likewise threatened. Furthermore, since the Treaty of 1855 and its assurances must be interpreted as the Yakama Nation's negotiators would have understood them, the Columbia River's "natural condition" in 1855 should serve as the baseline for evaluating temperature changes and impacts in the TMDL.

The EPA, as a federal agency, has a fiduciary trust obligation to the Yakama Nation. The development of the TMDL clearly triggers this responsibility, given the TMDL's potential impact on the Yakama Nation's resources. Accordingly, the Yakama Nation expects that the EPA will protect and give full effect to the Yakama Nation's Treaty-reserved rights during this process. At a minimum, the EPA must ensure that the TMDL is sufficiently stringent to avoid harm to fish populations caused by excessive temperatures. In order to give full effect to the Treaty of 1855, however, the EPA should also develop and incorporate an accurate "natural condition" model that considers temperature changes and impacts since 1855.[14]

2. The TMDL includes several positive elements that the EPA should retain.

The Yakama Nation supports some aspects of the TMDL. Generally, the Yakama Nation finds the TMDL's application and implementation of modeling to be adequate. The TMDL seems to appropriately model the temperatures of the river system.

10 *See Northwest Sea Farms,* 931 F.Supp. at, 1519-20 (W.D. Wash. 1996) (citing *Nance v. Environmental Protection Agency*, 645 F.2d 701, 711 (9th Cir. 1981), *cert. denied*, 454 U.S. 1081 (1981)).
11 *Seminole Nation v. U.S.*, 316 U.S. 286, 297 (1942).
12 *Parravano v. Babbitt,* 70 F.3d 539, 547 (9th Cir. 1995) ("[T]he Tribes' federally reserved fishing rights are accompanied by a corresponding duty on the part of the government to preserve those rights.")
13 *Northwest Sea Farms*, 931 F. Supp. at 1520 (citing *Seminole Nation*, 316 U.S. at 296-97.
14 The Yakama Nation agrees with the EPA's statement that existing "natural condition" models do not accurately capture predevelopment conditions.

Importantly, the EPA acknowledges that dam impoundments have a greater temperature impact than point sources and tributaries.[15] Dams are not part of the natural Columbia and Snake River systems and should be analyzed in the TMDL the same as any other human source. A TMDL which ignored this reality would be an inadequate foundation for effective temperature regulation in the Columbia River.

In considering the impact of the dams, the EPA altered its model's river geometry to evaluate free-flowing river conditions that might occur in absence of existing dams.[16] The Yakama Nation agrees that this approach is appropriate. Use of the tailrace temperature data does provide the best average temperature. However, the EPA should clearly note that temperature extremes exist in and around the point and non-point source locations.

3. The TMDL includes various deficiencies that the EPA must correct.

a. The Yakama Nation objects to the EPA's assertion that states can merely revise designated uses to allow for compliance with water quality standards.

At the outset, the Yakama Nation is discouraged by the EPA's assertion that "[e]ven if all the allocations in this TMDL are implemented and the temperature reductions envisioned are fully realized, it is unlikely that the numeric criteria portion of the WQS will be met at all times and all places."[17] The Yakama Nation acknowledges that sources of heat pollution beyond the regulatory reach of the EPA (and the Clean Water Act overall) may contribute to higher temperatures. However, the Yakama Nation contends that, to account for these other sources, the EPA should design the TMDL so that it is stringent enough to ensure that compliance with applicable numeric criteria is indeed possible.

More problematic, however, is the EPA's assertion that "[o]ne 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."[18] The most sensitive beneficial uses in the Columbia and Snake Rivers are salmon migration and spawning.[19] Taken together, the EPA seems to be implying that the states could revise their salmon migration and spawning uses to be less stringent by citing infeasibility, which would allow for compliance with applicable criteria.

The Yakama Nation would be categorically opposed to such an action by the states. Salmon have used the Columbia River for migration and spawning since time

[15] ENVT'L PROT. AGENCY, TOTAL MAXIMUM DAILY LOAD (TMDL) FOR TEMPERATURE IN THE COLUMBIA AND SNAKE RIVERS ("TMDL"), 43 (2020).
[16] *Id.* at 30.
[17] TMDL, 2.
[18] *Id.*
[19] TMDL, 1.

immemorial. These uses are sacred to the Yakama Nation's culture and central to the federal government's promises in the Treaty of 1855. Water quality standards that do not protect migration and spawning would be in direct conflict with the Yakama Nation's Treaty-reserved rights and traditional way of life. Accordingly, the EPA should strike this potential "option" from the final TMDL.

b. The EPA failed to use the most protective temperature measurement threshold for computation, determination, and development of the TMDL.

Throughout the TMDL, the EPA switches between multiple regulatory measures of temperature. These include Daily Average Temperature (DA), Maximum Daily Temperature (DM), and 7 Day Average Daily Maximum Temperature (7-DADM). In Appendix H, the EPA provides its purported justification for relying on the DM, rather than the 7-DADM. The EPA asserts that "it is clear that there is no mathematically clear answer to the question of which averaging period is more stringent – in all cases where EPA was faced with choosing between two equivalent WQC with different averaging periods, we utilized the DM averaging period."[20]

However, it is well known in regulatory fields that the DM can under predict exceedances, making the 7-DADM preferable for such analyses. As illustrated in the figure below, which was taken from Appendix H, the DM under-predicts number and duration of temperature exceedances (Delta T is negative) during the time periods of concern: July, August, September, and October.

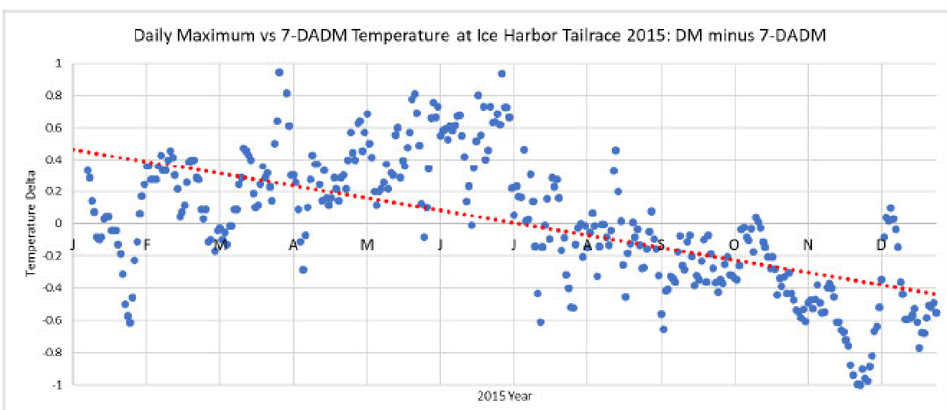

Figure 4: Delta between DM and 7-DADM (DM minus 7-DADM) at Ice Harbor Dam on the Snake River for the year 2015. Trendline in red.

Therefore, it would appear that the EPA is attempting to downplay temperature exceedances by employing the DM rather than the 7-DADM. This foundational

[20] TMDL, App. H.

deficiency has the potential to impact a significant portion of the analyses in the TMDL, as well as any subsequent regulatory action or control plans which rely on the TMDL. The Yakama Nation requests more clarification as to why the EPA chose to utilize the DM as opposed to the 7-DADM. Without adequate explanation, the Yakama Nation asserts that the EPA should use the 7-DADM when indicated by state and tribal regulations.

c. *The EPA has not adequately justified its reliance on a 0.3º C allowance for temperature targets.*

The EPA utilized a 0.3º C allowance for temperature targets in the TMDL, relying in part on a provision in Washington's water quality standards which provides that a "temperature increase of 0.3º C or greater" constitutes a "measurable change."[21] However, the cited provision applies to Washington's Tier II reviews. These reviews are only conducted for the following actions:

> (a) [NPDES] waste discharge permits;
> (b) State waste discharge permits to surface waters;
> (c) Federal Clean Water Act Section 401 water quality certifications; and
> (d) Other water pollution control programs authorized, implemented, or administered by [the Dept. of Ecology].[22]

An EPA-developed TMDL does not seem to fit into any category on the list. Therefore, it is unclear why the EPA cited this regulation to support a 0.3º C allowance. Indeed, the fresh water designated uses and criteria section of Washington's water quality standards, which would seem applicable here, provides that:

> [w]hen a water body's temperature is warmer than the criteria in Table 200 (1)(c) (or within [0.3º] of the criteria) and that condition is due to natural conditions, then human actions considered cumulatively may not cause the [7-DADM] temperature of that water body to increase more than [0.3º C].[23]

The EPA has not concluded that the Columbia River's temperature impairment is due to "natural conditions." Presumably, this is the reason that the EPA did not cite the fresh water designated uses and criteria section for its 0.3º C allowance. However, since the cited "Tier II" provision cannot apply here, the EPA must clarify the basis for employing the 0.3º allowance in this TMDL.

Relatedly, the EPA provides no rationale for its decision to ignore applicable tribal water quality standards in the TMDL.[24] These applicable standards may have more stringent criteria that would affect the 0.3º C allowance for temperature targets. The

21 *Id.* at 9.
22 WAC § 173-201A-320(2).
23 WAC § 173-201A-200(1)(c)(i).
24 TMDL, 6.

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EPA is authorized to treat tribes as states for certain provisions of the Clean Water Act, including Section 303(c).[25] Where a tribe promulgates Section 303(c) water quality standards that are approved by the EPA, then those tribal standards carry the same authority as approved state standards.[26] Therefore, the EPA must consider applicable tribal standards in the TMDL.

d. The EPA failed to incorporate climate change into the TMDL's loading allocation or reserve allocation.

The EPA acknowledges the current warming trends associated with climate change in Section 4.3 of the TMDL.[27] Appendix G likewise provides a detailed discussion of climate change trajectory and impacts to stream temperatures. Nevertheless, the EPA did not include future climate scenarios in the 0.3˚C loading allocation of the TMDL.[28]

The EPA's omission here is a major flaw in the TMDL and is inconsistent with relevant EPA guidance that calls for consideration of climate change in establishing load allocations.[29] As noted above, climate change has aggravated temperature impacts in the Columbia River Basin at the expense of fish populations.[30] It is likely that temperature increases caused by anthropogenic climate change already account for a significant portion of the 0.3º loading allocation.

Similarly, the EPA cannot contend that these increases will cease over the lifespan of the TMDL. Accordingly, a reserve allocation that does not address the inevitability of continued temperature increases as a result of climate change does not reasonably account for future sources of thermal impairment. The EPA must incorporate climate change into these allocations in the final TMDL.

e. The EPA should not include a reserve allocation in the TMDL because the system is not currently meeting temperature criteria.

Apart from disputing the EPA's decision to not include climate change scenarios in the TMDL's reserve allocation, the Yakama Nation also questions the logic of including a reserve allocation in the TMDL at all.

The EPA makes clear that temperatures in portions of the Columbia and Snake Rivers exceed applicable criteria.[31] Moreover, as noted above, the EPA concedes that "[e]ven if all the allocations in this TMDL are implemented and the temperature reductions

[25] 33 U.S.C. § 1377(e).
[26] *See, e.g. City of Albuquerque v. Browner*, 97 F.3d 415 (10th Cir. 1996) (concluding that the EPA had authority to require a city to comply with downstream EPA-approved tribal water quality standards).
[27] TMDL, 30.
[28] *Id*. at 43.
[29] ENVT'L PROT. AGENCY, NATIONAL WATER PROGRAM 2012 STRATEGY: RESPONSE TO CLIMATE CHANGE, 109 (2012)
[30] *See*, n. 4,5, *supra*.
[31] TMDL, 1.

envisioned are fully realized, it is unlikely that the numeric criteria portion of the WQS will be met at all times and all places."[32] In other words, the study area is already out of compliance with applicable standards and the TMDL is not stringent enough to provide for compliance.

The Yakama Nation is unclear as to why, in light of these issues, the EPA has established a 0.01° C reserve allocation for future uses.[33] The most problematic purpose contemplated by the reserve allocation is the vague "future growth."[34] This provides a greenlight for further development and heat pollution on the Columbia River. The EPA should instead include a zero reserve allocation to better align with the urgency of addressing thermal impairment in the Columbia River.

f. The TMDL does not include reasonable assurances for achieving load reductions.

In Section 7 of the TMDL, the EPA rightfully notes the importance of including reasonable assurances to achieve compliance:

> [p]roviding reasonable assurance that nonpoint source control measures will achieve expected load reductions increases the probability that the pollution reduction levels specified in the TMDL will be achieved, and therefore, that applicable standards will be attained.[35]

Nevertheless, the EPA fails to include adequate reasonable assurance that nonpoint sources associated with dams, which the EPA asserts are the largest contributors of thermal impairment, will meet the necessary load reductions set forth in the TMDL.

The EPA's discussion on reasonable assurances ignores ongoing regulatory processes related to the FCRPS, including its own draft NPDES permits and Section 401 certification actions by Washington and Oregon. The EPA can incorporate Washington's certification conditions, which include compliance with the TMDL, into the pending NPDES permits for these dams to provide reasonable assurance of compliance. The EPA should expressly acknowledge this action, as well as any other potential assurance actions, in the final TMDL.

4. The EPA should correct the deficiencies in the TMDL and integrate it into the NPDES permits for the FCRPS by incorporating Washington's certification conditions.

The Yakama Nation expects that the EPA will meaningfully consider this comment and incorporate it the final TMDL.

32 TMDL, 2.
33 *See* TMDL, 61.
34 *Id*.
35 TMDL, 72.

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The EPA has not provided clarification as to the relationship between the TMDL and the anticipated NPDES permits for the FCRPS. However, the Yakama Nation also expects the EPA to integrate the final revised TMDL into these NPDES permits by incorporating Washington's certification conditions. Without integration into enforcement mechanisms, the TMDL cannot further the objective of meaningful and effective water temperature control.

The Yakama Nation's capacity to review the TMDL was limited due to the COVID-19 health emergency. Therefore, the fact that the Yakama Nation does not state its opposition to a particular aspect of the TMDL should not be interpreted as approval of that aspect. The Yakama Nation reserves the right to provide further input beyond the public comment period and to request government-to-government consultation on the TMDL as Tribal Council deems necessary.

If you have any questions regarding this letter, please contact Mr. Ethan Jones, Lead Attorney for the Yakama Nation Office of Legal Counsel, at (509) 865-7269, ext. 6014.[36]

Sincerely,

Virgil Lewis

f. DELANO SALUSKIN, CHAIRMAN
YAKAMA NATION TRIBAL COUNCIL

36 In submitting this comment, Yakama Nation does not waive its sovereign immunity from suit, nor does it waive, alter, or otherwise diminish its sovereign rights, privileges, or remedies guaranteed by the Treaty with the Yakama of 1855 (12 Stat. 951). Furthermore, submission of this comment does not substitute for formal government-to-government consultation on this matter.

Confederated Tribes *of the*
Umatilla Indian Reservation

Department of Natural Resources

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July 21, 2020

Mr. Chris Hladick, Regional Administrator
U.S. Environmental Protection Agency, Region 10
Park Place Building
1200 Sixth Avenue
Seattle, WA 98101-3188
Sent via e-mail to: ColumbiaRiverTMDL@epa.gov

Re: CTUIR DNR Comments on Columbia and Lower Snake Rivers TMDL

Dear Regional Administrator Hladick:

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) Department of Natural Resources (DNR) provides the following comments on the Temperature Total Maximum Daily Load for the Columbia and Lower Snake Rivers (TMDL) developed by the U.S. Environmental Protection Agency (EPA). The TMDL is a positive step forward in better protecting these vital river systems that are integral to assuring healthy and sustainable environmental conditions necessary to provide for the exercise of tribal rights and the maintenance of the natural resources which all the region's citizens depend on and enjoy. Our comments support and incorporate by reference those of the Columbia River Inter-Tribal Fish Commission. (CRITFC).

Introduction

The CTUIR is a federally-recognized Indian tribe, with a reservation in Northeast Oregon and ceded, aboriginal, and usual and accustomed areas in Oregon, Washington, Idaho, and other Northwest states. The Columbia and Snake Rivers and their watersheds are situated in the heart of these areas and form the lifelines that tie them together. In 1855, predecessors to the CTUIR—ancestors with the Cayuse, Umatilla, and Walla Walla Tribes—negotiated and signed the Treaty of 1855 with the United States, 12 Stat. 945. The Treaty is a contract between sovereigns and is "the supreme Law of the Land" under the United States Constitution. In the Treaty the CTUIR ceded millions of acres of land to the federal government, and in exchange received assurances that various pre-existing tribal rights would be protected, and our interests would be respected, in perpetuity. A paramount objective in the Treaty was protecting and maintaining our tribal First Foods—water, fish, big game, roots, berries, and other plants—and the habitats and environmental conditions that support and sustain them, then, now, and forever. This remains a paramount objective of the CTUIR.

Water is the first of the CTUIR's First Foods. It is also essential to the health and well-being of all the other foods—and us. For years the CTUIR has been concerned about persistent violations of applicable water quality standards for temperature in the mainstem rivers and the tributaries, posing increasing threats to already-imperiled salmon populations. These problems will only be further exacerbated by climate change as time goes on.

EPA has a duty to honor and uphold the Treaty of 1855 and to act as a steward and trustee to ensure that its terms and commitments can be fulfilled. In implementing federal environmental laws and adopting rules pursuant to them, the agency can and should always remain attentive to how such laws and rules and their concurrent treaty-based obligations must be read in tandem to be mutually supportive and reinforcing. Rules and regulations should be developed and adopted that not only carry out the mandates of the underlying statute, but also to concurrently promote EPA's ability to honor and uphold the Treaty and the agency's related Trust Responsibility to the CTUIR.

The Treaty of 1855 explicitly guarantees to the CTUIR and its members the right of "taking fish." Associated with that right is the implicit assurance that there will be fish to take—they will exist. The waters necessary for that existence—for fish survival, health, and sustainability—must also be protected and maintained. Incorporated in the Treaty Right to fish is the right to water—clean, cool, available water necessary for fish to exist and propagate, and thereby effectuate tribal fishing rights. Protecting and maintaining our tribal First Foods is essential to safeguarding our Treaty Rights and the traditions, culture, and way of life they were meant to secure.

General Comments

The CTUIR DNR recognizes the significant time and effort EPA has expended in developing the TMDL. We agree with the results of the modeling and the document's acknowledgement that mainstem Columbia and Lower Snake dams are substantial factors in causing temperature water quality problems. From the TMDL it is evident that significant changes to the federal mainstem hydropower system—operational (including alternative management of reservoir releases) and potentially structural (system configuration)—are needed to reduce temperatures to acceptable levels and limit additional water quality degradation. The CTUIR DNR believes that the load allocations for the dams are an appropriate means to begin to address this situation, although certainly not the endpoint. For example, the TMDL would benefit from commitments by the federal agencies (U.S. Army Corps of Engineers, Bureau of Reclamation, etc.) to reduce water temperatures at their projects, through specific, proactive measures.[1]

Potential Modifications, Amendments

The CTUIR DNR believes there is room for improvement in certain portions of the TMDL, and invite you to consider changes to some of its provisions before any use by Oregon and Washington in water quality management planning. These possible changes are discussed in greater detail in the CRITFC comments, so our comments here will provide a broader, more generalized overview.

[1] While the TMDL suggests that the Columbia River System Operations (CRSO) review process may eventually yield actual identified projects to reduce water temperatures, this remains to be seen and is by no means assured. Technical review of the Draft Environmental Impact Statement and its preferred alternative indicates that, at this stage, actions to achieve substantive temperature reductions are still elusive.

The CTUIR DNR is disappointed that the TMDL suggests that numeric temperature criteria in the states' water quality standards are unlikely to ever be met. While we acknowledge the need for realism and respect the difficulties that lie ahead, we should also never lose sight of the aspirational goals of the TMDL and, fundamentally, the Clean Water Act itself, on which it is based. The CTUIR DNR also believes there should be no language to suggest that a suitable state "fall-back" response to consistent violations of temperature water quality criteria is to weaken the criteria—"move the goalposts." Simply retreating to Use Attainability Analyses by the states is an abdication of responsibility that does nothing to protect resources or meet legal obligations. Salmon migration, spawning, and rearing must always remain preeminent, sacrosanct beneficial uses of the Columbia and Lower Snake Rivers, not subject to any diminishment through regulatory sleight-of-hand.

Among other items that the TMDL should reconsider are the following:

- EPA should support more uniform, consistent temperature standards that protect all salmonid life stages, in all waters they inhabit, notwithstanding artificial state boundaries or differing jurisdictions.

- The TMDL should also consider comprehensive approaches (i.e., more natural thermal regimes) to address all salmonid life stages beyond just those associated with the warm summer/fall, lower-flow months.

- The TMDL should consider water temperatures in dam fishways and forebays, and not just in the tailraces, and appropriate criteria should apply to them all.

- The TMDL should not discount the inevitability of acute heat loading events, and should consider the necessity of ameliorating their impacts on salmonid populations when they occur.

- The TMDL should recognize that, while tributary restoration may prove beneficial in terms of eventual water temperature reductions, such results may not be evident for a long period of time, and criteria may continue to remain unmet to the detriment of salmon populations during that period.

- The TMDL should more closely examine irrigation practices and effects; analysis of the extensive irrigation activity occurring throughout the Columbia River Basin is too limited.

- The TMDL should more fully consider potential options for cold-water releases and augmentation.

- The TMDL should also more thoroughly examine mixing zones, including the extent to which they may mask or mischaracterize the impacts of more acute, discrete temperature-loading inputs or situations.

Conclusion

The CTUIR DNR thanks you for your consideration of our input and comments on the Columbia and Lower Snake Rivers TMDL. We hope that CTUIR and EPA can continue to effectively work in productive collaboration to honor the Treaty of 1855, implement the federal Trust Responsibility, and protect our shared natural and environmental resources for the benefit of all people.

Sincerely,

Eric Quaempts
Director, Department of Natural Resources
Confederated Tribes of the Umatilla Indian Reservation

Cc: Fish and Wildlife Commission
Tribal Water Commission

CONSUMERS POWER INC.

August 12, 2020

Mr. Andrew Wheeler, Administrator
U.S. Environmental Protection Agency
ColumbiaRiverTMDL@epa.gov

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 Consumers Power, Inc. (CPI) regarding the Total Maximum Daily Load for Temperatures for the Columbia and Lower Snake Rivers (CLSRT TMDL).

CPI is an electric distribution cooperative providing service to 23,000 members located in mostly rural parts of Lincoln, Benton, Linn, Marion, Polk, and Lane counties in Western Oregon. The majority of our wholesale power supply comes from the federal hydro projects on the Columbia and Snake Rivers.

Many of our members are seniors with limited or fixed incomes and are particularly sensitive to increased costs for essential services like electricity. The rural communities we serve were ravaged economically when the federal and state forests were severely impacted by restrictions on timber harvesting in the 1980s and 1990s. Many of the families who live and work in these communities continue to suffer economically today and are also sensitive to the same cost increases. We are concerned that serious shortcomings in the development of the CLSRT TMDL may contribute to additional cost burdens that they will be forced to bear.

CPI strongly supports the comments provided by Northwest RiverPartners, of which we are an active member. We also support the comments provided by PNGC Power and the Public Power Council, both of whom we are also members. Consequently, we urge the EPA to revise its draft CLSRT TMDL accordingly.

Chief among CPI's concerns is that no consideration is given in the CLSRT TMDL for water temperatures close to or exceeding state water quality standards before the water even reaches state boundaries, in which case the federal dams could be held to unattainable standards. We urge you to rectify this deficiency in the draft CLSRT TMDL.

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We are also concerned about seemingly arbitrary decisions to include some large storage dams in modeling the hypothetical "free flowing" state of the river while excluding others. Such inconsistent treatment of major river components significantly increases the risk of introducing bias into the EPA's modeling results, leading in turn to possibly unfair and undesirable state policy outcomes which are based on this body of work.

We are troubled as well by the differences between the EPA's modeling results and the 2002 study of lower Snake River water temperatures by the U.S. Army Corps of Engineers. The failure of the EPA's model to replicate real world results suggests a deficiency within the model or inadequacy of the model itself and should be addressed appropriately in a revised draft TMDL.

Policy decisions regarding the Columbia and Snake Rivers have a disproportionate effect on CPI and its members, given our dependence on hydropower as our primary energy source. It is incumbent upon the EPA to produce the highest quality information upon which policy decisions are based. We urge you to address the concerns expressed here and by Northwest RiverPartners, PNGC Power, and the Public Power Council in a revised draft of the CLSRT TMDL.

Again, thank you for the opportunity to submit these comments regarding this important effort.

Sincerely,

Roman E. Gillen

Roman E. Gillen
President/CEO

Cowlitz Indian Tribe

August 17, 2020

Dan Opalski, Director
Water Division
U.S. Environmental Protection Agency, Region 10
1200 Sixth Avenue, Suite 155
Seattle, WA 98101

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

To Mr. Opalski;

The Cowlitz Indian Tribe (CIT) is a Federally Acknowledged Tribal Government located in southwest Washington and northwest Oregon. Our historic area includes a large portion of the Lower Columbia River Basin that spans both sides of the Columbia River. Our historic lands include many tributary rivers, including, but not exclusively, the Cowlitz, Kalama, and Lewis rivers. We submit the following comments on the proposed Total Daily Maximum Load for Temperature in the Columbia and Lower Snake Rivers. We also note and thank EPA for the Government-to-Government meeting held on July 9, 2020.

While Section 303(c) requires states, and here EPA at the request of state, to establish water quality standards, it does not require remedies to water quality problems. The draft Total Daily Maximum Load (TDML) for Temperature in the Columbia and Lower Snake Rivers, May 18, 2020, Introduction explains that "[t]he temperature WQS are designed to protect the beneficial uses in those waters, the most sensitive of which are salmon migration and spawning. Within the framework of the CWA, TMDLS are designed to assess, and provide information needed to address, water quality impairments." The document continues that "[it is] unlikely that numeric criteria portion of the WQS will be met at all times and all places."

We understand that decades of misuse and misbegotten development have resulted in many ecological issues throughout the Columbia and Snake River watersheds. The past and present abuses will continue to affect the Columbia River for many more decades, even with prompt and effective remedial mitigation. The importance of developing a TDML should not be underestimated, nor should it be the final step. The next steps must be taken by EPA, States, tribes, and local governments to begin restoration activities that begin the long and challenging 'river' to recovery.

Solutions to the temperature TDML must be found in innovative partnerships and actions.

One step is to increase monitoring throughout the basin, continuing to understand factors and improve the modeling effort. In particular we recommend permanent monitors downstream of the major lower Columbia River point sources at Portland, Vancouver, Kalama, Longview, and Wauna to characterize their impacts on the

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lower Columbia River. We encourage EPA and other federal agencies to consult with Tribes and other entities to place additional monitors to help us fully characterize the problem and begin evaluating new activities that may assist the recovery.

As part of this, we also encourage EPA to place additional emphasis on tributary impacts, inclusive of tributary dams. We encourage EPA to include additional information on tributary temperature effects into the TDML document. Major tributaries are overwhelmingly affected by dams, their own point source pollutants, and other factors. Decreasing temperatures from tributaries is one of several necessary actions for turning improving the temperature regime on the mainstem Columbia River. Proper characterization of these impacts will assist in restoration activity planning and implementation.

We are conducting such work ourselves. We are reviewing existing Cowlitz River monitoring and water quality activities. We are doing this work so we can better understand the inputs and impacts of existing land use and river use on water quality metrics. We are looking at opportunities to engage in innovative water quality projects with federal, state, and local partners. We are interested in the Cold Water Refuges Report and potential funding streams that may facilitate this work. We are looking to engage in detail in the future.

Please contact our Natural Resources Department Director, Taylor Aalvik or our Natural Resources Program Assistant, Tiffini Alexander for further discussion and scheduling. Taylor can be reached at: 360-577-8140, or taylor.a@cowlitz.org, and Tiffini can be reached at: 360-577-8140, or talexander@cowlitz.org,

Sincerely Yours,

Philip Harju,
Chairman of the Cowlitz Indian Tribe

Cc: WA Governor Jay Inslee
WA Department of Ecology Laura Watson
WA Department of Ecology Office of Columbia River Tim Poppleton

Discovery Clean Water Alliance
8000 NE 52nd Court
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City of Vancouver Washington
415 W 6th Street
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July 15, 2020

Mary Lou Soscia, Columbia River Coordinator
EPA Oregon Operations Office
805 SW Broadway, Suite 500
Portland, OR 97205

RE: **Public Comment on May 18, 2020 EPA "TMDL for Temperature in the Columbia and Lower Snake Rivers" from Discovery Clean Water Alliance and City of Vancouver, Washington**

Dear Ms. Soscia:

Introduction

The Discovery Clean Water Alliance (Alliance) is a regional wastewater transmission and treatment utility serving approximately 125,000 residents located in the central portions of Clark County, Washington. The City of Vancouver, Washington (City), provides wastewater collection and treatment for approximately 235,000 residents of the greater City of Vancouver utility service area. Our agencies are committed to supporting state and federal regulatory processes that improve water quality and the quality of life for our residents. At the same time, as public agencies, we must manage the public funds entrusted to us in a manner that delivers high value for each expenditure. In this context, we look forward to continuing to collaborate with EPA and Ecology in protecting the Columbia and Lower Snake Rivers through the TMDL process. On behalf of the more than 360,000 residents served by the Alliance and the City, please accept the following comments regarding the above-referenced TMDL that EPA released for public comment on May 18, 2020.

Comment 1 - Regarding Relative Contribution of NPDES Point Sources

Please remove the point source dischargers from the TMDL. Table 4-1 in the TMDL document (page 30) provides the estimated range of temperature impacts for current sources, as modeled by EPA:

Table 4-1 Estimated range of current source impacts on Columbia and lower Snake River mainstems from July to October across RBM10 model domain

River	Point Sources (Δ C)	Tributaries (Δ C)	Dworshak Dam Cooling (Δ C)	Dams (Δ C)	Climate Change (Δ C)
Columbia River	0.0 – 0.1	0.0 – 0.1	(-0.2) – 0.0	(-0.9) – 4.5	1.0 – 2.0
Snake River	0.0 – 0.1	0.0 – 0.1	(-3.8) – 0.0	0.3 – 3.2	1.0 – 2.0

Table 4-1 acknowledges that NPDES point sources have a negligible to small contribution (0.0 to 0.1 degrees C), yet implementing the TMDL for point sources would impact 126 different facilities in

Washington and Oregon (31 "major facilities" are listed in Table 6-12 and 95 "minor facilities" are listed in Table 6-13, totaling 126 facilities). This would require Oregon and Washington to update permits and develop compliance strategies for these 126 facilities, which may include costly infrastructure investments and burdensome compliance challenges for what is little or no environmental benefit. At a time when many private employers and state and local governments are addressing budget challenges, this aspect of the TMDL places a significant new burden on the point source permitted community that does not meet the public value standard of delivering high environmental benefit commensurate with the associated public expenditure.

Comment 2 - Regarding Tributaries Allocations in the TMDL

Please clearly define the basis for allocating 0.1 degrees C heat load to the 23 major tributaries and include a method to reassign portions of the tributaries source allocation to the reserve allocation category as TMDLs are implemented on tributaries and temperature criteria are achieved. As tributary TMDLs are implemented and tributary heat loads decrease they will increasingly contribute to thermal reductions in the Columbia and Lower Snake Rivers.

The TMDL (Table 6-3) shows the allocations to three sources groups to achieve the 0.3 degrees C allowable temperature change.

Table 6-3 Aggregate allocation: allowable 0.3°C

	WLA and LA (°C)	Source Group		
		Dams (Nonpoint source) (°C)	NPDES Point Sources and Reserve (°C)	Major Tributaries (°C)
Aggregate Allocations	0.3	0.1	0.1	0.1

However, Section 3.2 Tributary Temperature in the TMDL does not clearly define the basis for allocating 0.1 degrees C heat load to the tributaries. The basis of uncertainty for the TMDL heat load allocation to tributaries during July-October includes the following:

- All tributaries included in the TMDL contribute an average water temperature that is 1.6 degrees C colder than the mainstem Columbia River temperature in September and even colder water is contributed in October (Section 3.2 and Appendix E – Tributary Assessment Methods and Results);
- All tributary river temperatures in October are shown to be below 14.5 degrees C and only 3 of 21 tributaries to the Columbia River were above 13.0 degrees C (Table 3-9);
- 21 of 23 tributaries have temperature criteria cooler than the Columbia and Snake River criteria; and
- These TMDL temperature data demonstrate that tributaries are providing thermal benefits to the Columbia and Snake Rivers in October and are not contributing heat loads above the 20 degree C temperature criteria.

Support for the request to reassign tributary source allocations as TMDLs are implemented are as follows:

- 9 of 22 listed tributaries have had temperature related TMDLs completed so they will be contributing thermal benefits to the mainstem Columbia and Lower Snake Rivers (Table 6-20); and

- EPA modeling of the thermal improvement to the mainstems when tributary temperatures achieve temperature criteria through TMDL implementations show a cumulative maximum reduction of 0.2 degrees C is forecast for the Columbia River at RM 42, and this cumulative reduction is double the tributaries allocation of 0.1 degrees C.

Comment 3 – Concerning Seasonal Application of the TMDL

Please clarify that the TMDL for temperature only applies to NPDES point source dischargers during the July to October period and only to a portion of that period when the Columbia and Lower Snake River water temperatures exceed applicable temperature criteria. It would not be appropriate for the WLAs to apply to NPDES permitted facilities during periods of the year when the Columbia and Snake rivers are in compliance with the applicable water quality standards.

Section 6.2 on page 39 starts with the following statement: "The critical time periods for this TMDL are July-October for all locations." While the focus on this four-month season is consistently applied throughout the document, the WLAs for NPDES permitted facilities listed in Table 6-12 and Table 6-13 do not explicitly state that the WLA applies only for this four-month period. Please provide a statement in the text or footnote for Table 6-12 and Table 6-13 confirming that WLAs apply only during the four-month period of July-October, or to a portion of that period when the Columbia and Snake rivers are out of compliance with water quality standards within the applicable river reach. For instance, below Bonneville Dam for River Miles 0 to 141.5, where the year-round criterion is 20^{o}C, Tables 3-2 through 3-6 suggest that the 20^{o}C criteria is only exceeded in the months of July through September.

Comment 4 – Concerning Application of Thermal Waste Load Allocations When Discharge Temperatures Are Below the Temperature Criteria

The TMDL should only apply to point source dischargers when the effluent from those dischargers exceeds the temperature criteria and therefore the discharges are contributing to the impairment status.

The Waste Load Allocations (WLAs) for NPDES permitted point sources are presented in Tables 6-12 through 6-15 and it is explained in the first paragraph on page 51 that the "WLA was calculated using the facility design flow and the highest known or estimated temperature of the facility effluent." With the approach for WLA calculation used in the TMDL, discharges of effluent at temperatures below the applicable river temperature criteria appear to still be subject to a WLA and potential thermal load limits. Because discharges of effluent at temperatures below the applicable river temperature criteria contribute to river cooling and additional progress towards attainment of the temperature criteria in the river, thermal loads limits should not apply when the effluent temperature for discharges is below the applicable river temperature criteria.

This situation has been addressed in the Oregon Department of Environmental Quality's 2008 report "Temperature Water Quality Standard Implementation – A DEQ Internal Management Directive" through the definition of Excess Thermal Load (ETL) wasteload allocations and ETL calculations for use in NPDES permit compliance. The TMDL should either: 1) clarify that WLAs will only apply when effluent temperatures are above the applicable river temperature criteria; or 2) state that an ETL approach should be taken by the states in applying the thermal WLAs to NPDES permits. Failure to address the regulation of thermal waste loads with this consideration will put several point sources in jeopardy of non-compliance during periods when their effluent is contributing to the reduction of river temperatures relative to the applicable water quality standard.

Comment 5 – Regarding Application of October Temperature Criteria in the TMDL

October should not be included in the compliance period for point sources below RM 141.5 (below Bonneville Dam). Table 6.1 lists the two water quality temperature criteria that Oregon applies in the lower Columbia River in October. The year-round criterion is 20 degrees C for River Miles 0 to 141.5, and the temperature criterion in a two-mile river segment below Bonneville Dam (RM 141.5 to 143.5) is 13.0 degrees C for October 15-March 31. Table 3-7 shows no temperature exceedances of the 20.0 degrees C temperature criterion in October from the Priest Rapids Dam (RM 396) to the Pacific Ocean. It would not be appropriate for the WLAs to apply to NPDES permitted facilities during periods of the year when the Columbia and Snake rivers are in compliance with the 20^{o} C water temperature criterion.

Comment 6 – Regarding Definition of Parameters for the Application of WLAs

Please clarify that implementation of the WLAs is intended to be on a monthly average basis. The paragraph on page 53 immediately preceding Table 6-12 states: "The assumptions of the modeling assessment can be considered in determining how to translate the TMDL waste load allocations into permit limits. In the model, a point source is input as a continuous heat load, and this is analogous to a source discharging continuously at its monthly average permit limit. Collectively, if all the sources discharge this load on average, the goal of the TMDL for point sources will be achieved." This paragraph is the context for presenting the WLAs in Table 6-12 and Table 6-13. However, the headings for the parameters (flow, temperature, WLA) do not explicitly indicate the time period basis for measurements. Please confirm that the intent of the TMDL is for the states of Washington and Oregon to apply the flow and waste load values as monthly average values for compliance with the WLAs, as this approach was the basis for the modeling within the TMDL.

The difference in interpretation of the thermal waste loads against the WLAs on a daily as opposed to a monthly basis for instance could put several point sources at risk of non-compliance under current conditions and the current presentation of data leaves the period of measurement for compliance open to interpretation. Please provide an explicit notation stating these parameters are monthly average values to avoid any misapplication or confusion about the basis of the WLAs and the measures for compliance.

Comment 7 – Concerning Discharge Location for Major Facilities

Please correct the river mile (RM) designation for several major facilities, as further explained below.

Table 6-12 lists WLAs for Major facility NPDES permitted facilities on the Columbia River including the "Salmon Creek STP" under permit number WA0023639 near the bottom of page 53. The Location (river mile, RM) designation is incorrect for this facility in the TMDL (where it is listed as RM 103.2). The NPDES permits for this facility lists the discharge as located in the "Columbia River between River mile 95 and 96". This facility is typically listed as discharging at RM 96.

The basis for river mile (RM) designations needs to be defined in Section 1.2 of the TMDL. There are other inconsistencies in RM designations compared to the RMs shown in NOAA charts and Army Corps of Engineers Condition Surveys are as follows: Vancouver Marine Park WRF is RM 109.2 (not RM 109.5); Portland Columbia Boulevard WTP is RM 105.3 (not RM 102.5); Vancouver Westside WRF is RM 105.1 (not RM 105); and River Road Generating Plant is RM 103.2 (not RM 105).

Comment 8 – Concerning River Reaches Applied in the TMDL

Please define the term "reaches" as the term is used throughout the document. The TMDL does not clearly define the river regions within each reach. Section 2.4 refers to 10 reaches on the Columbia River and one reach on the Snake River in referring to applicable water quality temperature criteria – and cites Table 2-2. Section 6.5.1 (Dams) states that "the cumulative temperature impact in each reach caused by all upstream dam impoundments and estimates when and where this impact exceeds the 0.1°C cumulative dam load allocation." This implies that a reach is the river segment between dams on the Columbia River in the context of temperature modeling of the dams, however, it is not clearly stated. Please clearly define the river reaches applied in the TMDL in the document.

This definition is important because of the method applied for reserve allocations. In Section 6.5.4 – Reserve Allocations, the TMDL states (on page 61) that "EPA inserted a heat load in the model at the midpoint of each TMDL reach"… and "the resulting reserve load for each reach is 4.4 x 10^9 Kcal/day." It is recommended that the TMDL document include a table to define each river reach in the TMDL so that NPDES point source dischargers can understand their locations along the river and the associated reserve allocations available to dischargers within their respective reach.

Comment 9 - Regarding Reserve Allocations

Section 6.5.4 discusses Reserve Allocations (page 60-61) including consideration for the needs of future growth, new point sources, adjustments to the waste load allocations (WLAs), and other non-point sources. The TMDL is clear in delegating the requirement for managing reserve allocations to the states on page 61: "The reserve needs to be managed by Washington and Oregon during implementation, including maintaining a system to track the reserve, determining whether a point source can access the reserve, and establishing a process for granting a portion of the reserve." However, the TMDL document does not provide specific guidance on the approach or rules that would be acceptable to EPA to be considered consistent with the overall TMDL framework. Please accept the following comments on the topic of reserve allocations:

Future Growth

- Reserve allocations for future growth allocations should be prioritized according to official growth planning frameworks within the states. For example, in Washington, an official planning process is established under the Growth Management Act (GMA) and other statutory and administrative code frameworks that allocates growth to counties. Counties then allocate growth to urban and non-urban areas. Wastewater utilities then provide General Sewer Plans (WAC 173-240) and related documents to serve the growth within urban areas, including an assessment of necessary provisions for treatment and discharge locations. The reserve allocations for future growth should respect and compliment this established planning framework. For example:

    - The Salmon Creek STP (WA0023639) received an approval for its most recent Wastewater Facility Plan/General Sewer Plan Amendment from Ecology on August 27, 2013. This document supports the state and county coordinated planning basis for the applicable service area for future flows of 30.70 mgd on a monthly average flow basis. Please update the allocation for the Salmon Creek STP to 30.70 mgd in Table 6-12 to fully respect this coordinated basis of planning.

    - The City of Vancouver's Marine Park WRF (WA0024368) received approval for its most recent General Sewer Plan (2011) from Ecology in December 2011. This document supports the state and county coordinated planning basis for the applicable service area for future flows of 24.2 mgd on a monthly average flow basis. Please update the allocation for the Vancouver's Marine Park WRF to 24.2 mgd in Table 6-12 to fully respect the coordinated basis of planning.

Adjustments to the WLAs

- The TMDL should support adjustment to the WLAs of Columbia River discharges based on an environmental benefit and/or economic efficiency for a change in the current WLAs. This could take two forms: (1) a change in flow allocation (and therefore WLA) between two or more Columbia River permitted discharges or (2) the consolidation of flows from two or more separately permitted discharges into one, where one or more facilities are currently a Columbia River discharger (and therefore receiving a WLA) and other facilities may currently discharge to a tributary of the Columbia River (and therefore not directly receiving a WLA).

Comment 10 – Regarding Water Quality Credit Trading

Please provide a statement of support for the use of water quality credit trading consistent with EPA guidance to comply with the TMDL and establish geographical boundaries where the trading would be allowed, consistent with the TMDL, or establish the procedures for defining geographic trading areas.

Trading areas are typically defined based upon areas of consistent temperature criteria and location in relation to the point of maximum impact within a river reach. Washington and Oregon have water quality trading guidance consistent with EPA guidance and trading may be a key means for ensuring compliance with the TMDL. The TMDL does not specify means for point source dischargers to comply with the WLAs; however, trading programs will require the definition of geographic trading areas within which trading could occur between contributing sources.

Conclusion

Thank you for providing the opportunity to review and comment on the TMDL for Temperature in the Columbia and Lower Snake Rivers. Because the TMDL will have substantial implications for resource management and potential future investment to attain the desired environmental outcomes, it is important that the TMDL allow as much flexibility as possible for the regulated community to seek cost effective and innovative compliance strategies. On behalf of the residents served by the Alliance and the City of Vancouver, we appreciate EPA's consideration of these comments and look forward to EPA making revisions to the TMDL deemed appropriate as related to the items addressed in this letter.

Sincerely,

John M. Peterson, P.E.
General Manager
Clark Regional Wastewater District

Administrative Lead
Discovery Clean Water Alliance

Brian K. Carlson, P.E.
Deputy City Manager
City of Vancouver

c: Greg Zentner, Washington Department of Ecology

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July 17, 2020

Mr. Andrew Wheeler
Administrator
Environmental Protection Agency
ColumbiaRiverTMDL@epa.gov

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 the Eugene Water & Electric Board (EWEB) regarding the *Total Maximum Daily Load for Temperatures for the Columbia and Lower Snake Rivers* ("CLSRT TMDL").

EWEB is the largest publicly-owned electric and water utility in Oregon, and our electric system supplies service to 93,000 residential, commercial, and industrial customers in and around the city of Eugene. Addressing issues related to climate change and affordability is central to EWEB's 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 nation and is essential to EWEB's continued ability to provide our customer owners with reliable, affordable, clean electricity throughout the year.

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.* [1]

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.

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

While EWEB recognizes that river temperatures are a serious environmental concern, the shortcomings of the TMDL model mean that the Federal Columbia River Power System ("FCRPS") could be placed in an untenable position--unfairly penalized and bearing the responsibility for upstream river conditions.

We would like to begin by expressing our support for the comments provided by Northwest RiverPartners. As a Northwest RiverPartners member, we firmly agree with their position on the CLSRT TMDL and the need for its revision.

If these revisions are not made, the TMDL, as written, needlessly threatens the vitality of the Federal Columbia River Power System ("FCRPS") and the multiple purposes for the system as established by the United States Congress.

KEY POINTS OF EMPHASIS

- The states of Washington and Oregon are signaling that they intend to base energy and environmental policy on the CLSRT TMDL. This outcome is problematic because, as EPA notes, "The current water quality conditions present a significant challenge to achieving downstream water quality standards in Washington and Oregon."[2] This challenge arises because water temperatures entering Washington state from Canada and from Idaho often significantly exceed the respective states' water quality standards during the peak summer months. This confounding situation raises the possibility that the FCRPS dams will be held to unattainable standards.
- Due to the possibility described above, the stakes are very high for the CLSRT to be extremely accurate.
- The CLSRT TMDL relies upon the one-dimensional RBM10 model, which lacks the detail and sophistication necessary to provide precise results for a river system with the complexity of the Columbia-Snake river system.
- Tellingly, the TMDL did not attempt to simulate the entire Columbia River Basin with its RBM10 model, but instead truncated the Columbia and Snake rivers near the Washington state borders. This artificial limitation doesn't allow the model to accurately account 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).
- The TMDL, as written, includes significant arbitrary assumptions, such as including large storage dams in its "free flowing" state. These larger dams can release artificially cool water during the summer. This inconsistent treatment (i.e., including some dams but excluding others) places an unfair temperature standard on the downstream dams.
- A 2002 study under the US Army Corps of Engineers ("USACE") compared pre-lower Snake River dam measurements from 1955-1958 to measurements taken after the lower Snake River dams were constructed. The study found no evidence that river temperatures had increased, and instead remained unchanged or slightly lower after completion of the four lower main stem dams.[3] This real-life finding runs contrary to what we are seeing in the TMDL's modeling output.

[2] Columbia and Lower Snake River Temperature Total Maximum Daily Load. 5/18/2020. US EPA, p 42.
[3] Water Temperatures and Passage of Adult Salmon and Steelhead in the Lower Snake River

- 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. This finding is much more consistent with the 2002 USACE finding described above.

RECOMMENDATION

EWEB supports Northwest RiverPartners' recommendation that EPA revise its *Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers* and provide a revised 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 clean energy goals, and billions of dollars of extra costs forced on Northwest families.

Thank you again for the opportunity to comment.

Best regards,

Susan Ackerman
Chief Energy Officer
Eugene Water & Electric Board

Fall River Electric
Cooperative, Inc.
1150 N 3400 E
Ashton, ID 83420
208-652-7431
www.fallriverelectric.com

July 30, 2020

Mr. Andrew Wheeler
Administrator
Environmental Protection Agency
ColumbiaRiverTMDL@epa.gov

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 Fall River Rural Electric Cooperative regarding the *Total Maximum Daily Load for Temperatures for the Columbia and Lower Snake Rivers* ("CLSRT TMDL").
We are a non-profit electric cooperative serving portions of three states (Idaho, Montana, and Wyoming). Fall River has over 14,000 owner-members covering 2,524 square miles.
Fall River purchases power primarily from Bonneville Power Administration and we rely on generation produced from the Federal Columbia River Power System("FCRPS").
We would like to begin by expressing our support for the comments provided by Northwest RiverPartners. As a Northwest RiverPartners member, we firmly agree with their position on the CLSRT TMDL and the need for its revision.
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.

KEY POINTS OF EMPHASIS

- The states of Washington and Oregon are signaling that they intend to base energy and environmental policy on the CLSRT TMDL. This outcome is problematic because, as EPA notes, "The current water quality conditions present a significant challenge to achieving downstream water quality standards in Washington and Oregon."[1] This challenge arises because water temperatures entering Washington state from Canada and from Idaho often significantly exceed the respective states' water quality standards during the peak summer months. This confounding situation raises the possibility that the FCRPS dams will be held to unattainable standards.

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

- Due to the possibility described above, the stakes are very high for the CLSRT to be extremely accurate.
- The CLSRT TMDL relies upon the one-dimensional RBM10 model, which lacks the detail and sophistication necessary to provide precise results for a river system with the complexity of the Columbia-Snake river system.
- Tellingly, the TMDL did not attempt to simulate the entire Columbia River Basin with its RBM10 model, but instead truncated the Columbia and Snake rivers near the Washington state borders. This artificial limitation doesn't allow the model to accurately account 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).
- The TMDL, as written, includes significant arbitrary assumptions, such as including large storage dams in its "free flowing" state. These larger dams can release artificially cool water during the summer. This inconsistent treatment (i.e., including some dams but excluding others) places an unfair temperature standard on the downstream dams.
- A 2002 study under the US Army Corps of Engineers ("USACE") compared pre-lower Snake River dam measurements from 1955-1958 to measurements taken after the lower Snake River dams were constructed. The study found no evidence that river temperatures had increased, and instead remained unchanged or slightly lower after completion of the four lower main stem dams.[2] This real-life finding runs contrary to what we are seeing in the TMDL's modeling output.
- 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. This finding is much more consistent with the 2002 USACE finding described above.

RECOMMENDATION

Fall River Electric supports Northwest RiverPartners' recommendation that EPA revise its *Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers* and provide a revised 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 clean energy goals, and billions of dollars of extra costs forced on Northwest families.

Thank you again for the opportunity to comment.

Sincerely,

Fall River Electric
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Fall River Electric Board of Directors and CEO/GM,

President Dede Draper	Vice President Georg Behrens	Secretary/Treasurer Brent Crowther
Director Jay Hanson	Director Jeff Keay	Director Anna Lindstedt
Director Brent Robson	Director Doug Schmier	Director Jodi Stiehl

Bryan Case
CEO/General Manager

1 Water Temperatures and Passage of Adult Salmon and Steelhead in the Lower Snake River

IDAHO
CONSERVATION
LEAGUE

208.345.6933 • PO Box 844, Boise, ID 83702 • www.idahoconservation.org

July 20, 2020

Columbia River Coordinator
EPA Oregon Operations Office
805 SW Broadway, Suite 500
Portland, OR 97205

RE: TMDL for Temperature in the Columbia and Lower Snake Rivers

To Whom it May Concern:

Thank you for the opportunity to comment on the Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers (TMDL). Since 1973, the Idaho Conservation League (ICL) has been Idaho's voice for clean water, clean air and wilderness—values that are the foundation for Idaho's extraordinary quality of life. The Idaho Conservation League works to protect these values through public education, outreach, advocacy and policy development. As Idaho's largest state-based conservation organization, we represent over 20,000 supporters, many of whom have a deep personal interest in anadromous and resident fish recovery, renewable energy, and rural Idaho communities. ICL represents members whose livelihoods depend on the return of abundant, harvestable populations of salmon and steelhead. Ensuring the restoration of these species is of paramount importance and directly impacts our members.

Part of the purpose for this TMDL is to specify "the maximum amount of a pollutant that a waterbody can receive and still meet applicable [Water Quality Standards]." The States of Oregon and Washington have established Water Quality Standards (WQS) to protect the beneficial uses of the Columbia and Lower Snake Rivers, one of which is salmon migration and spawning. This use is essential for the recovery and non-jeopardization of endangered Snake River salmon and steelhead. ICL believes that recovery of endangered Snake River salmon and steelhead populations is inherently important, but also valuable for Idaho communities and our members.

Our provided comments (attached) focus on ensuring stringent protections for salmon and steelhead from the impacts of temperature pollution. We question some of the scientific methods used in developing this TMDL, and the explanations given for steps used.

We also comment on EPA's discussion of removing designated uses for salmon and steelhead from the Columbia and Snake Rivers (TMDL page 2). These designated uses are part of the critical habitat for multiple ESA-listed species, and cannot be removed. We consider it dangerous for EPA to suggest this possibility in light of the clear impact of high water temperatures on salmonid migration. We thus advocate for EPA to clarify their comments on the removal of designated uses, especially in relation to the following listed protections:

- Critical habitat under the Endangered Species Act for listed populations in the Columbia and Snake River systems
- Essential Fish Habitat for all salmonid species designated by the National Marine Fisheries Service (NMFS) under the Magnuson-Stevens Fisheries Act
- Protections for tribal access to harvest of salmon and steelhead under Tribal Treaties
- Treatment of fish in relation to hydroelectric generation under the Pacific Northwest Electric Power Planning and Conservation Act of 1980

Please do not hesitate to contact me with any questions regarding our comments.

Sincerely,

Mitch Cutter
Salmon and Steelhead Advocacy Fellow
mcutter@idahoconservation.org

Comments

I. Table 6-4 (pg 44): Ice Harbor Dam is not shown.

Please correct this error.

II. Steps used in explaining Tables 6-6 through 6-9 are not correct (pg 45).

Step 4 states:

> "If Column G ('Measured Target Exceedance") is greater than 0.1, then the dams upstream of this location are cumulatively contributing to impairment and the analysis proceeds to Step 5."

Column G does not measure the cumulative impact of upstream dams: Column F ("RBM10 Cumulative Impact") does. If this column's value is > 0.1, the stream is impaired at this location due to the cumulative impacts of upstream dams, and analysis should proceed to Step 5. Please correct this error.

III. Explanation of using RBM10 Daily Average outputs versus the Daily Maximum WQS is poorly explained (pg 45).

The TMDL uses the existing RBM10 model to assess the impacts of all pollutant sources on water temperature. We do not disagree with the use of the RBM10 model in this TMDL, but we do not believe its use has been fully justified in the scientific methodology explained on page 45.

The TMDL states:

> "Since the diel variation is typically greater in a free-flowing river than when dams are present, the impact of the dams on the daily average temperature is greater than the impact on the daily maximum temperature. The daily average temperature is therefore a more conservative indicator of dam impact."

The comparison of dams' effect on daily average temperatures versus daily maximum temperatures is poorly explained, and needs to be demonstrated graphically. From this statement alone it is not clear how or why dams would impact daily averages more than they would daily maxima. The reader can imagine a river without dams (and greater diel variation) having extreme temperatures at day and night, with the average somewhere in the middle. A dammed river could have the same average, with daily extremes just closer to that average (showing lower diel variation). The Daily Average thus would change little due to the impact of dams, while the Daily Maximum would change dramatically.

The data and model results show this scenario is not the case, but because they are not cited here, the use of RBM10 results to document the effect of dams on daily maximum water temperatures is inadequately explained or justified.

More to this point, the TMDL states that this component of the analysis related to using RBM10 results is "considered as a margin of safety" (45). Again, without any justification as to how using Daily Averages from RBM10 results is related to Daily Maxima, it is impossible to say whether this is a good source for a margin of safety. The use of RBM10 results could overestimate or underestimate the impact of dams on actual water quality impairment under WQS, and cannot be taken as conservative at face value.

IV. The TMDL mischaracterizes its use of monthly maxima in development of temperature allocations (pg 65)

In its list of "conservative assumptions that form an "implicit [Margin of Safety] in derivation of temperature allocations" the TMDL states:

> "EPA is also using the mean of the monthly maxima recorded for the 2011 – 2016 period to establish the current conditions benchmark. In other words, exceedances at a given location are the mean of the six highest daily maximum temperature[s] recorded in that month over the period 2011 – 2016."

The TMDL is mischaracterizing the use of these records in the last sentence. The values used are the mean of the highest daily maximum temperatures recorded in that month over the period 2011-2016, but this does not make them the six highest daily maximum temperatures for a given month across that whole period. The exceedances were averaged from the highest daily maxima for a given month in a given year for six years, not from the highest six daily maxima across the whole period. The highest six daily maximum temperatures could have all been from the same year, but the TMDL samples from each year of a six-year period. This mischaracterization should be fixed.

V. The use of recent high-temperature years should not be taken as part of the Margin of Safety (pg 65).

In its list of "conservative assumptions that form an "implicit [Margin of Safety] in derivation of temperature allocations" the TMDL states:

> "The TMDL assessment focuses on six recent years of data and modeling (2011 – 2016), and this period, compared to the historic record, is characterized by relatively high air temperature and river temperature."

This TMDL is meant for use in a river system that will be changed by the effects of climate change. Those effects have already been observed in recent years, as water and air temperatures continue to climb in the Pacific Northwest. In assessing the state of the river, the historical record is thus not as relevant as the most recent years. The use of observations from 2011-2016 is thus appropriate for this TMDL, but should not be accounted as part of the Margin of Safety.

The trend of climate change is well-studied and well-understood, and significant efforts have been made to study the effects of climate change on the hydrograph and water temperatures of the Pacific Northwest. The River Management Joint Operating Committee (RMJOC) has created predictions for air temperature and streamflows at various horizons and under different climatic scenarios. Significantly, air temperatures are expected to continue to increase and late summer flows are expected to decline as the hydrograph shifts earlier in the year.[1]

This is not to state that this TMDL should factor in the RMJOC results. It is clear that using only data from recent years is a fair approximation of current river conditions, which should not be included as part of the MOS. As climate change continues to impact the river, the 2011-2016 data used will be increasingly non-representative of the river system, and this TMDL should be routinely refreshed with more current data.

---

[1] Climate and Hydrology Datasets for RMJOC Long-Term Planning Studies:Second Edition. *2018*. https://www.bpa.gov/p/Generation/Hydro/hydro/cc/RMJOC-II-Report-Part-I.pdf

Sent via email to ColumbiaRiverTMDL@epa.gov

U.S. Environmental Protection Agency, Region 10
Park Place Building
1200 Sixth Avenue, Suite 155
Seattle, WA 98101

July 21, 2020

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

Dear Regional Administrator Hladick,

Thank you for the opportunity to comment on the U.S. Environmental Protection Agency's (EPA) Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers (TMDL). Idaho Wildlife Federation (IWF) is Idaho's oldest statewide conservation organization, founded by sportsmen and women in 1936. Today, we represent a nonpartisan voice of 28 affiliate organizations with 45,000 affiliate members and individual supporters who desire to sustain and enhance Idaho's fish and wildlife, conserve their habitat, and maximize sporting opportunity for current and future generations. Our efforts advance "made in Idaho" solutions to the modern challenges of fish and wildlife management.

The TMDL, as required by Section 303(d) of the Clean Water Act (CWA), is a crucial document for Columbia and Snake River Basin States to identify load limits for temperatures in impaired waterways based on the States' water quality standards (WQS). These limits are necessary to ensure salmon and steelhead have safe water temperatures in spawning, rearing, and migrating habitat to complete their life cycle amidst the increasing threat of climate change in the Northwest. While IWF supports and appreciates the majority of the analysis in this document, we would like to address a few components below.

I. EPA's should remove the suggestion that Washington and Oregon employ Use Attainability Analyses to remove salmon migration,spawning, and rearing as "Uses" of the Columbia and Lower Snake Rivers.

EPA admits that even if all the allocations in the TMDL are implemented, it is unlikely that the numeric criteria portion of the WQS will be met at all times. With the current system in place, EPA believes the States are setting the bar too high with temperature WQS meant to safeguard beneficial uses such as salmon migration and spawning. EPA suggests to Oregon and Washington to conduct a Use Attainability Analysis to remove salmon migration, spawning, and rearing as "uses" of the Columbia and Lower Snake Rivers to simulate compliance with establish WQS. By undergoing a Use Attainability Analysis, the states could prove that attaining that use is not feasible and the conflict would simply vanish.

EPA's suggestion to the States to weaken their WQS ignores decades of efforts to improve water temperature issues for salmonid species in the Columbia and Snake Rivers. Conducting a Use Attainability Analysis to remove these uses would only wipe away enforceable standards in place and would not solve the issue that Endangered Species Act (ESA)-listed salmon and steelhead species face with harmful water temperatures caused by dams and reservoirs on the Snake and Columbia Basins. It also suggests that Oregon and Washington should essentially write off economies and communities reliant on salmon and steelhead, even into riverside towns of Central Idaho, because it is too difficult to achieve temperatures that can provide for thriving populations of salmonid species in the current system. Idaho's anadromous fish must travel these corridors to return to their natal streams as adults, where Idahoans and riverside towns rely on them for their economic and cultural importance.

IWF rejects EPA's notion that Oregon and Washington weaken their WQS rather than substantially addressing water temperature issues that harm our fish during their migrations to Idaho. We must move away from ignoring known harms to our fish to simply move the goalposts and check new boxes of success. Our goals should strive for healthy, harvestable, and well-distributed runs of salmon and steelhead throughout the Columbia and Snake Basins and providing those species with adequate and enforceable measures to minimize harm while in the system.

II. The TMDL does not ensure temperature criteria will be achieved throughout the entire focal area and throughout the year.

The TMDL notes that all target sites are at the tailraces of dams. EPA believes that because the rivers are relatively well-mixed at the tailraces, these data provide a better estimate of the cross-sectional average river temperature than the forebay[1]. While measuring at the tailrace is likely a good estimate across the basin, the TMDL does not address temperature inadequacies in other areas such as forebays and in passage structures that may fail to meet WQS. Compared to well-mixed tailraces, water entering fish ladders are usually fed by surface water from the above reservoirs. Fish passage structures are times of high stress for migrating salmonid species-

[1] TMDL at p.35.

mortality may be increased with temperatures that are higher than the averages from the more mixed tailraces.

EPA concludes that climate change has estimated increases in river temperatures since the 1960s range from 0.2C to 0.4C per decade, for a total water temperature increase to date of 1.5C± 0.5C[2]. With this conclusion, IWF struggles to understand why the TMDL only addresses exceedances of WQS between July and October. There is evidence that temperature exceedance occurs outside of this time frame, such as the 250,000 sockeye killed by high temperatures beginning in June 2015[3]. NOAA Fisheries concluded that though June and July 2015 river temperatures were unprecedented, it should be reasonable to expect that similar events could occur in the future[4].

IWF believes the TMDL should analyze temperatures in forebays and fishways in addition to tailraces, and assess temperatures over a longer timeframe to at least minimize violations of WQS in the current river system. EPA's conclusion that the impact of the dams on the daily average temperature is greater than the impact on the daily maximum temperature[5] is troublesome when addressing the identified use of Salmon and Steelhead migration- Salmonids spend more time per day and for a greater number of days, on average, enduring harmful conditions with a dammed system when compared to a free-flowing river. This is especially true with Snake River Basin salmon and steelhead returning to Idaho. These conditions surely decrease overall salmon and steelhead abundance and reproductive success.

III. EPA cannot rely on the Final CRSO EIS and Biological Opinion to lower water temperatures and provide reasonable assurance.

The TMDL states that this process may identify water temperature improvement projects for the Columbia River to provide a reasonable assurance that the pollution reduction levels specified in the TMDL will be achieved, and therefore, that applicable standards will be attained[6]. While we appreciate the efforts by many federal, state, and nonprofit entities to provide these assurances, we cannot accept the pending 2020 Final Columbia River System Operations (CRSO) EIS and associated NOAA Fisheries Biological Opinion for the federal hydropower system as an immediate and concrete assurance. Even if the CRSO EIS were finalized, the CRSO agencies' analyses plainly state that changes to the hydropower system with the selected alternative, including mitigating for harmful water temperatures to salmonids, provide minimal systemic improvements for our bleak anadromous fish runs. Given that this process has been struck down time and time again in the courts for lacking substantial changes to the current hydropower system, the conclusion and reliance on this pending document to provide reasonable assurance cannot be taken seriously.

2 TMDL at p.30.
3 https://www.nwcouncil.org/news/warm-water-blamed-huge-columbia-river-sockeye-die
4 https://www.nwcouncil.org/sites/default/files/2016_0412_5.pdf
5 TMDL at p.45.
6 TMDL at p.72.

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Andy Barth
Inland Power & Light
10110 W Hallett Rd.
Spokane, WA 99224

July 21, 2020

Mr. Andrew Wheeler
Administrator
Environmental Protection Agency
ColumbiaRiverTMDL@epa.gov

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 Inland Power & Light regarding the *Total Maximum Daily Load for Temperatures for the Columbia and Lower Snake Rivers* ("CLSRT TMDL").

Inland Power & Light is the largest nonprofit electric cooperative in the state of Washington. We provide affordable, safe and reliable electricity to over 42,000 meters and 34,000 member-owners in 13 counties throughout eastern Washington and northern Idaho.

We would like to begin by expressing our support for the comments provided by Northwest RiverPartners. As a Northwest RiverPartners member, we firmly agree with their position on the CLSRT TMDL and the need for its revision.

If these revisions are not made, the TMDL, as written, needlessly threatens the vitality of the Federal Columbia River Power System ("FCRPS") and the multiple purposes for the system as established by the United States Congress.

KEY POINTS OF EMPHASIS

- The states of Washington and Oregon are signaling that they intend to base energy and environmental policy on the CLSRT TMDL. This outcome is problematic because, as EPA notes, "The current water quality conditions present a significant challenge to achieving downstream water quality standards in Washington and Oregon."[1] This challenge arises because water temperatures entering Washington state from Canada and from Idaho often significantly exceed the respective states' water quality standards during the peak summer months. This confounding situation raises the possibility that the FCRPS dams will be held to unattainable standards.

- Due to the possibility described above, the stakes are very high for the CLSRT to be extremely accurate.
- The CLSRT TMDL relies upon the one-dimensional RBM10 model, which lacks the detail and sophistication necessary to provide precise results for a river system with the complexity of the Columbia-Snake river system.
- Tellingly, the TMDL did not attempt to simulate the entire Columbia River Basin with its RBM10 model, but instead truncated the Columbia and Snake rivers near the Washington state borders. This artificial limitation doesn't allow the model to accurately account 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).
- The TMDL, as written, includes significant arbitrary assumptions, such as including large storage dams in its "free flowing" state. These larger dams can release artificially cool water during the summer. This inconsistent treatment (i.e., including some dams but excluding others) places an unfair temperature standard on the downstream dams.
- A 2002 study under the US Army Corps of Engineers ("USACE") compared pre-lower Snake River dam measurements from 1955-1958 to measurements taken after the lower Snake River dams were constructed. The study found no evidence that river temperatures had increased, and instead remained unchanged or slightly lower after completion of the four lower main stem dams.[2] This real-life finding runs contrary to what we are seeing in the TMDL's modeling output.
- 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. This finding is much more consistent with the 2002 USACE finding described above.

---

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

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

RECOMMENDATION

Inland Power & Light supports Northwest RiverPartners' recommendation that EPA revise its *Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers* and provide a revised 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 clean energy goals, and billions of dollars of extra costs forced on Northwest families.

Thank you again for the opportunity to comment.

Best regards,

Andy Barth
Business Development &
Community Relations Officer
Inland Power & Light

Methow Valley Citizens Council

PO Box 774
Twisp, WA 98856
www.mvcitizens.org
509 997-0888

July 20, 2020

Via email to: *ColumbiaRiverTMDL@epa.gov*

To whom it may concern,

On behalf of the Methow Valley Citizens Council, we are submitting the following comments with respect to the Columbia River Total Maximum Daily Load (TMDL) temperature analysis recently completed by EPA Region 10. The analysis provides an updated view of the overall temperature profile of the Columbia and Snake rivers from the perspective of spatial and seasonal heat pollution.

To summarize our understanding of the document, in the context of the larger Columbia Basin, the TMDL calls out the large influence of the lower four dams on the mainstem Columbia River and lower four dams on the Snake River on contributing to heat pollution and elevating water temperatures that exceed state water quality criteria. It further describes the critical role of tributary river inflow in contributing to or ameliorating seasonal water temperatures and in providing cooler water thermal refugia for migrating salmon and related biota. Finally, it describes likely river temperature conditions through the rest of the century under different projections of climate change.

We found the TMDL and supporting documents provide a significant understanding of the various sources of heat pollution and elevated water temperatures that plagues the Columbia and Snake rivers. In most years, summer temperatures now exceed the water quality temperature criteria maximum of 68 F for weeks on end. The EPA report documents that temperatures have increased significantly in the river corridors over the last few decades.

As a result of climate change over the remainder of this century, river temperatures will rise much further if actions are not taken to ameliorate this effect. Table 3-1 of Appendix G to the TMDL, titled “Projected stream temperature responses to future climate change scenarios in the Northwest," unequivocally demonstrates that climate change requires a focus on water temperature and commitments to implement actions to reduce water temperature.

see EPA's text clarification on the next page

EPA’s temperature modeling suggests that if the lower Snake River dams were to be removed, the river temperatures would be within State limits even in the month of August. This strongly suggests that removal of the lower four dams on the Snake River is the most likely action that could reverse river temperatures increases over time.

These elevated temperatures are a significant factor in limiting the fitness and survival of native salmon and steelhead of the Columbia and Snake rivers. Despite tens of millions of dollars annually spent to recover the remaining native salmon, the near lethal temperatures in the Columbia and Snake rivers almost ensure the failure of these recovery efforts if not reversed. In addition, failure to recover Columbia and Snake River salmon would significantly hamper efforts to recover Southern Resident Killer Whales, listed as Endangered

Methow Valley Citizens Council

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Twisp, WA 98856
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July 20, 2020

Via email to: *ColumbiaRiverTMDL@epa.gov*

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EPA's clarified text

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Methow Valley Citizens Council

under the Endangered Species Act over 15 years ago. Their population has declined 10% since their listing, and a major reason for their precarious status is lack of Chinook salmon, their preferred food.
We also wish to voice our support for a greater level of involvement by the states of Washington and Oregon in forcing the federal dam facilities to comply with state water quality temperature criteria. Time has shown that EPA and other federal agencies have limited capacity to compel the federal agencies responsible to take more decisive action to move towards improving temperature conditions.

Sincerely,

Jasmine Minbashian
Executive Director

National Hydropower Association
NHA
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August 20, 2020

Mr. Daniel Opalski
U.S. Environmental Protection Agency, Region 10
Mail Code 10-C09
1200 Sixth Ave
Seattle, WA 98101
ColumbiaRiverTMDL@epa.gov

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

Dear Mr. Opalski:

The National Hydropower Association[1] appreciates the opportunity to comment on the Total Maximum Daily Load (TMDL) for Temperature in the Columbia and Lower Snake Rivers issued by the U.S. Environmental Protection Agency (EPA). NHA is supportive of the comments submitted by the Northwest Hydroelectric Association and Northwest RiverPartners.

The TMDL recognizes that air temperatures have increased by 1.5 degrees Celsius since 1960. If the temperature continues to increase at this rate it has the potential to drastically impact the environment. Reducing emissions from the electricity sector by expanding renewable energy is an important step in our efforts to reverse this trend. NHA believes the hydropower resources on the Columbia and Snake Rivers are indispensable sources of renewable energy and are essential components of any climate change solution. In addition, should the climate continue to warm despite our efforts to reduce emissions, dams are useful tools to manage water if environmental conditions change.

While the EPA's production of the TMDL may not be the appropriate venue to consider emissions and climate change policies, implementation of the TMDL must look more broadly. The dams included in this TMDL serve multiple purposes, including irrigation, recreation, navigation, fish and wildlife restoration, and renewable energy generation. How these resources operate is the result of extensive stakeholder processes and collaboration. In addition, the retirement and replacement of fossil fuel resources in the region poses a serious resource adequacy challenge for the electric grid and financial costs to ratepayers. Policies designed to implement the TMDL must consider and balance the TMDL in context with the multipurpose nature of these dams and their stakeholders.

[1] NHA is a non-profit national association dedicated exclusively to advancing the interests of the United States hydropower industry, including conventional, pumped storage, and new hydrokinetic technologies. NHA promotes the role of hydropower as a clean, renewable, and reliable energy source that advances national environmental and energy policy objectives. NHA's membership consists of more than 245 organizations, including public power utilities, investor-owned utilities, independent power producers, project developers, equipment manufacturers, environmental and engineering consultants, and attorneys.

As the national trade association for the hydropower industry, NHA is uniquely situated to provide information on hydropower's growing role in the nation's climate change policies. As the EPA notes, implementation of the TMDL is the responsibility of Washington and Oregon, but EPA will remain a key facilitator amongst stakeholders. NHA requests to be included in EPA stakeholder outreach and to be notified of opportunities to supply information and public comments.

Hydropower, including pumped storage, is the number one source of renewable energy in the Pacific Northwest, the United States, and the world. Hydropower is a renewable, baseload, and dispatchable resource that integrates other renewables, such as wind, solar, and batteries. [2] As Washington and Oregon aim to decarbonize their economies, hydropower can serve as the foundation of our renewable energy future.

NHA looks forward to working with EPA and other stakeholders on these issues.

Sincerely,

Dennis Cakert
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National Hydropower Association
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Washington, D.C. 20001
Email: Dennis@hydro.org

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[2] See joint Op Ed from the Solar Energy Industries Association, American Wind Energy Association, Energy Storage Association, and the National Hydropower Association: https://morningconsult.com/opinions/the-u-s-electric-grid-of-the-future-powers-a-stronger-economy-and-environment/ (Morning Consult, June 26, 2020).

NWHA
NORTHWEST HYDROELECTRIC ASSOCIATION

August 18, 2020

Submitted via E-Mail

Mr. Daniel Opalski
U.S. Environmental Protection Agency, Region 10
Mail Code 10-C09
1200 Sixth Ave
Seattle, WA 98101
ColumbiaRiverTMDL@epa.gov

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

Dear Mr. Opalski:

The Northwest Hydroelectric Association (NWHA) welcomes the opportunity to comment on the Total Maximum Daily Load (TMDL) for Temperature in the Columbia and Lower Snake Rivers issued by the U.S. Environmental Protection Agency (EPA) on May 18, 2020. This comment period is critically important, particularly given the time constraint placed on EPA to issue the TMDL. The TMDL covers almost 900 miles, with both river segments encompassing many point and non-point source dischargers from a wide variety of facilities and operations. Moreover, these rivers are significantly influenced by external factors. NWHA thanks EPA in advance for its careful consideration of these comments.

NWHA's Interest in the TMDL

NWHA members own and operate hydropower projects on both of these rivers and thus are directly affected by the TMDL. Our members have long partnered with other stakeholders and regulatory agencies to engage in efforts to protect water quality and aquatic life in these watersheds. They are at the forefront of habitat restoration and other activities to promote the recovery of many aquatic species; the vitality of these species is often the foundation of state water quality standards, including those established in Washington and Oregon for temperature.

More broadly, NWHA is dedicated to the promotion of hydropower in the Northwest region. Hydropower is a clean, efficient source of energy. NWHA's membership represents public and private utilities; independent developers and energy producers; manufacturers and distributors; local, state, and regional governments including water and irrigation districts; consultants; and contractors. Collectively, the hydropower sector supplies a significant portion of the electricity generation in both Oregon and Washington.

NWHA is uniquely suited to comment on the impact of hydropower facilities on river temperature, the measures employed by hydropower facilities to address

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temperature impacts, and the feasibility of implementing temperature controls at hydropower facilities. Our members have a direct, concrete stake in the final load allocations and waste load allocations of the TMDL, and will play a vital role in helping state and federal agencies implement the TMDL. NWHA's comments below are also supported by the National Hydropower Association.

Overview of TMDL

In line with a schedule provided by court order, EPA issued the current TMDL for public comment on May 18, 2020. The TMDL is no small undertaking, analyzing hundreds of miles of river from the Canadian and Idaho borders of Washington to the Pacific Ocean. The river segments within the TMDL are subject to a series of numeric temperature criteria varying by several degrees Celsius for summer months. In all segments, however, the TMDL and the underlying state water quality standards permit a cumulative increase of 0.3°C above the basic criteria. The TMDL splits this allowance into three aggregate allocations: (1) a 0.1°C waste load allocation for existing and future point sources, (2) temperature impacts from tributaries, and, most importantly for NWHA's purposes, (3) impacts from dams as non-point sources.

The TMDL Appropriately Recognizes the Infeasibility of Addressing Temperature Through a TMDL

The TMDL acknowledges that sources of heat loading outside its allocation structure are significant, if not the most significant, influences on river temperatures during the critical summer months. Chief among these sources are elevated air temperatures and heat loading upstream in either Canada or Idaho. NWHA agrees that it is entirely reasonable and appropriate for EPA to recognize that, due to these external factors, it is impossible to achieve the applicable numeric water quality standards for temperature in the Snake and Columbia Rivers.

Ignoring that fact would put the TMDL on unstable ground. At least one federal court has held that a TMDL should not be designed so that it is "inequitable" to downstream jurisdictions within the study area, and the same court held that a TMDL should not be "impractical" or "impossible." Imposing a heavier burden on regulated entities in Washington and Oregon on account of actions in Canada and Idaho would be both inequitable and impractical.

The TMDL is just as poor a means of addressing long-term trends in air temperature. The Clean Water Act provides no means for curbing global phenomena like climate change or even for curbing regional greenhouse gas emissions that might contribute to climate change. At best, an allocation for increased air temperatures would be a largely symbolic gesture. Neither EPA nor the state implementation agencies could leverage the Clean Water Act to require reduced air emissions, and no enforcement mechanism exists to address exceedances of an allocation for air temperature. The U.S. Court of Appeals for the Ninth Circuit has looked unfavorably on allocation structures that are "unenforceable."

The TMDL Appropriately Recognizes the Minimal Role of Dams in Contributing to Elevated Temperatures or to Impairing Designated Uses

A. Dams Have Minimal Impact on Temperature

NWHA supports the recognition in the TMDL that dams play a minimal role in any temperature criteria exceedances. Evidence compiled by the National Oceanic and Atmospheric Administration (NOAA) indicates that parts of the Lower Snake River routinely experienced temperatures between 20°C-25°C in the 1950s, far earlier than recent concerns over the abundance of salmon or other species.

Dams within the Columbia and Snake River basins have been demonstrated to moderate extreme water temperatures by shifting some of the summer heat into the fall and thereby reducing temperature variability. Further, temperature levels before and after dam construction have been demonstrated to remain steady or even decrease, even as air temperatures increase. In many instances, dams reduce water temperatures by storing cooler water and releasing it when ambient temperatures have increased. That might often be the case, for instance, when ambient temperatures begin to increase in early summer months, and while the reverse scenario might sometimes occur (with stored water being warmer), evidence indicates that any such effect is not a key reason why water quality standards might be exceeded.

Relying on RBM-10 modeling conducted by the U.S. Army Corps of Engineers, NOAA concluded that breaching dams along the Lower Snake River would have a near-trivial impact on temperature exceedances. The "near-natural condition[s]" reduced exceedances of a 20°C standard in that reach by only 5 of 64 days. If that same basic effect holds for other reaches with lower numeric criteria, it seems likely that the number of exceedances might be reduced even less (and perhaps not at all).

EPA's conclusion that temperature exceedances are largely driven by factors other than dams should be reflected throughout the TMDL. As discussed in more detail below, the manner in which some data is presented and certain assumptions made by EPA are inconsistent with this important conclusion.

B. Dams Have Minimal Impact on Aquatic Life Uses

The temperature criteria established by Washington and Oregon were driven in large part by the goal of protective aquatic life, and specifically salmon. However, there is evidence that the salmon are not adversely impacted by the temperature exceedances, and certainly not by the operation of dams. Different salmon migrate at different times of year, and in at least some dammed stretches of the Columbia River, according to NOAA, the critical period for salmon migration—and temperature impacts on that migration—is the month of June.

The TMDL does not formally study this month. Yet it might be precisely when the release of cooler water from dam impoundments helps to ameliorate rising ambient temperatures. In fact, the TMDL illustrates that in July, the current temperature in the Columbia River is lower than that during the free-flowing scenario for many of the river segments; it is not until the confluence of the Snake River that the temperature exceeds the water quality standard. NOAA also found that some species have shown abundance above historic levels in some recent years. In fact, a recent NOAA study found that 2014 was the best year for salmon since 1938.

NWHA notes there is some evidence of adult salmon deaths occurring in 2015 during the months of June or July. However, in recognition of the fact that dams have minimal effects during those months, NOAA concluded that the dams had no contribution to those salmon deaths. Rather, the agency found that it was natural sources of heat that caused the issue. In fact, cool water discharges from stratified hydroelectric power project reservoirs were one of the short-term measures employed as part of the emergency response strategy.

Even if dams were contributing to exceedances of the standard, those exceedances are not causing adverse impact on aquatic life. NOAA studies have concluded that adverse impacts to salmon occur when water temperature reaches 21-22 degrees. Both the Washington and Oregon water quality standards are below this number. Thus, the standard is more stringent than needed to protect salmon. This is consistent with the experience in the rivers.

C. <u>Dams Provide Vital Support to Other Waterbody Uses</u>

Dams are also vital to realizing other uses of the Columbia and Snake Rivers. Dams of course provide an exceptionally large share of clean electricity for the Pacific Northwest; in Washington, for example, hydropower facilities produced nearly five times as much net generation as the next closest source (natural gas) during March 2020. As a non-emitting source of electricity, the hydropower projects of NWHA members will also be particularly important to achieving Washington’s goal of one hundred percent clean electricity by 2045.

Beyond their core hydroelectric function, dams support other designated uses. Reservoirs provide recreational and boating opportunities to the public. Dams and their storage also support water supply or storage for residential, industrial uses, and they enable agricultural irrigation as well. Given these benefits, any regulatory course that might severely impact dam operations would ultimately undermine the designated uses of the Columbia and Lower Snake Rivers.

The TMDL Appropriately Recognizes the Need for Flexible Alternative Implementation Options

NWHA agrees with EPA that Oregon and Washington hold ultimate responsibility for implementing the TMDL. Yet EPA should still remain fully cognizant of limitations and flexibilities at the implementation stage, and it should develop final allocations with those considerations in mind. A TMDL must be “established at a level necessary to implement the applicable water quality standards[.]” It must also “established at [a] level necessary to attain and maintain the applicable” water quality standards. If final allocations require unrealistic or infeasible reductions in temperature impacts, they will not be able to “implement” the needed water quality improvements. Nor will they be able to “attain and maintain” the standards. They will instead be the sort of unenforceable allocations criticized by the Ninth Circuit.

Constraints on implementation are particularly important for any allocations to hydropower facilities. For example, at any dam, the Washington Department of Ecology must first focus on “reasonable and feasible improvements[,]” and for federally licensed facilities—essentially all projects not operated by the Corps—the Washington Department of Ecology “may only require a person to mitigate or remedy a water quality violation or problem to the extent there is substantial evidence such person has caused such violation or problem.” If an allocation to dams effectively require reductions beyond the exceedances attributable to them, it might be largely unenforceable.

EPA should also develop allocations with an eye towards flexible, efficient implementation for hydropower facilities. Federal regulations and guidance have long considered Best Management Practices (BMPs), rather than direct limits on temperature impacts, as the default mechanism for implementing load allocations for non-point sources. In fact, EPA has traditionally urged improvements at non-point sources first through voluntary or incentive-based programs, and NWHA applauds EPA’s decision to continue doing so here.

Finally, if a TMDL cannot provide a feasible path forward to reasonable compliance with numeric criteria, NWHA agrees with EPA’s suggestion that a use attainability analysis or other reconsideration of the temperature water quality standards might be necessary. Reconsideration of those numeric criteria might be particularly appropriate where, as here, aquatic uses can persist despite technical exceedances.

Areas of Clarification Needed in the TMDL

NWHA respectfully suggests that EPA consider making clarifications to several aspects of the TMDL. As discussed above, EPA properly concludes that temperature exceedances are largely driven by factors other than dams. However, some of the assumptions made by EPA in its analysis, inaccuracies in the model, and the graphical presentation of data, are inconsistent with that conclusion. For example, the technical appendices to the TMDL describe the 0.1°C allocation to dams as an aggregate allocation applicable to the sector as a whole. However, both the appendices and the main TMDL document appear to attribute portions of temperature exceedances to individual dams. EPA should make it abundantly clear to the States that these are not binding, project-specific load allocations.

These attributions may be the result of several assumptions made by EPA, which EPA itself acknowledges overstate a dam’s impact. For example, EPA recognizes that the assumptions made in determining the margin of safety are conservative indicators of dam impact. However, such conservative assumptions are not necessary given the acknowledgment that dams do not drive the temperature exceedances.

Additionally, EPA’s “free-flowing” scenario is problematic because it removes only those dams that are within the boundary of the TMDL, rather than applying the scenario all the way upstream. A true free-flowing scenario may further illustrate that the presence of the dams does not affect – or improves – temperature levels. Issues in how “free flowing” is defined likely skew the modeling results.

These conservative definitions and assumptions are applied to develop Tables 6-6 through 6-9, which could be read to suggest allocations for individual facilities. But this does not appear to be EPA’s intent, given the text and conclusions reached elsewhere in the document. As noted above, the data in these tables also result from inaccurate modeling. Thus, clarity is needed that, given the conclusions regarding the minimal impact of dams on temperature, alternative implementation measures are more likely to address the temperature exceedances than individual allocations to dams. The suggestion of individual facility allocations is the result of inaccurate modeling, and conflicts with the greater body of information and analysis that results in EPA's conclusion that dams have minimal impact on temperature.

Conclusion

The TMDL appropriately recognizes and could even more clearly explain that (1) the temperature exceedances in the Columbia and Snake Rivers are caused largely by external factors; (2) dam operations have minimal impact on temperature; in fact, dam operations in many instances have a cooling effect during periods critical to salmon; (3) the temperature standards are not attainable and possibly more stringent than necessary to protect salmon; and (4) flexible implementation is appropriate, including the consideration of a use attainability analysis or site-specific water quality criteria. EPA's conclusions are consistent with the available data and studies, and NWHA looks forward to a final TMDL that supports and adopts each of these four principles and clarifies the issues raised above.

NWHA appreciates the opportunity to comment on the TMDL. We look forward to working with EPA to revise the TMDL as appropriate, and with the states of Washington and Oregon as they work to implement the TMDL. Please contact me if you have any questions about these comments or need any additional information.

Sincerely,

B Vaughn

Brenna Vaughn, Executive Director

Kurt Miller
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July 21, 2020

Mr. Andrew Wheeler
Administrator
Environmental Protection Agency
ColumbiaRiverTMDL@epa.gov

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.

The main hydroelectric supplier in the Pacific Northwest is the Bonneville Power Administration ("BPA"), which markets power from federally operated dams within the Columbia River Basin. Unlike most federal agencies, BPA does not receive annual congressional appropriation. Instead, the agency is self-financed from revenues received from the sale of power and transmission services. Any additional costs applied to these federal dams as a result of the CLSRT TMDL will increase BPA's costs, which in turn will impact BPA's customers throughout the Northwest. The vast majority of BPA's electricity sales go to not-for-profit, community-owned utilities throughout the region.

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

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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

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 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, the 2002 Corps of Engineers study demonstrated that lower Snake river temperatures remained unchanged or slightly lower than pre-impoundment levels.

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

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

[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.

(“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:

- 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.

[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.

[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.

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 a "use attainability analysis" for the states of Washington and Oregon:

> *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 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 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]

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

- 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]

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 comparatively simplistic nature lacks the ability to solve for complex problems that a multi-dimensional model could.

Of specific concern is the inability of EPA's RBM10 model to simulate diurnal temperature fluctuations which are important in determining the impact of the ten federal dams on exceedances of Washington and Oregon 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 simplification 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 RBM10 model may not be able to represent actions (e.g. different dam operations) taken during TMDL implementation that may result in lower river temperatures.

Critiques of TMDL Modeling Approach to the Columbia-Snake Rivers

Assigning the Burden of Climate Change on Dams

[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
[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.

EPA recognizes the impact of climate change on increased temperatures in the Columbia and Snake rivers. EPA writes, "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."[22]

Even though EPA acknowledges climate change is one of the largest drivers of water temperature increases in the Columbia River Basin, it appears that EPA is, de facto, placing the burden of reversing climate-caused temperature changes unfairly on dam operations located within Washington state.

This choice highlights an important logical contradiction. Hydropower is the Pacific Northwest's strongest tool to fight climate change, yet this TMDL threatens to reduce hydropower's capabilities and/or make it less economic. Unfortunately, this outcome may increase the threat of climate change on endangered and threatened salmonid species in the Northwest and worldwide.

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).[23]

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 the CLSRT TMDL's artificial borders. This modeling truncation, again, unfairly places the burden of upstream river temperature mitigation on dams located within Washington state.

As we noted earlier, even if all of the dams on the mainstem Columbia and lower Snake rivers within Washington state were eliminated, the Washington and Oregon state water quality standards would frequently be exceeded.

Lastly, we believe that modeling the entire Columbia River Basin would help the CLSRT TMDL better address the issue of inconsistent water quality standards for the same purpose for the same body of water.

As an example, upstream of the model's current boundaries, in both Canada and Idaho, the water quality standards for the Columbia and Snake Rivers are 2°C higher than downstream in Washington. 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". Idaho DEQ writes:

> *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*

[22] Columbia and Lower Snake River Temperature Total Maximum Daily Load. 5/18/2020. US EPA, p 30.
[23] Columbia and Lower Snake River Temperature Total Maximum Daily Load. 5/18/2020. US EPA, p 2.

of the recommended criteria due to reservations as to their attainability. These reservations persist to this day[24]*.*

For the reasons noted above, it is important that the TMDL incorporate a basin-wide approach 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).

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 Biases 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.
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.[25]

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,[26] 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.*

Other Concerns

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

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

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

Northwest RiverPartners has other technical concerns related to CLSRT TMDL and the RBM10 model. These concerns are included in Appendix 2 of our comments.

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.

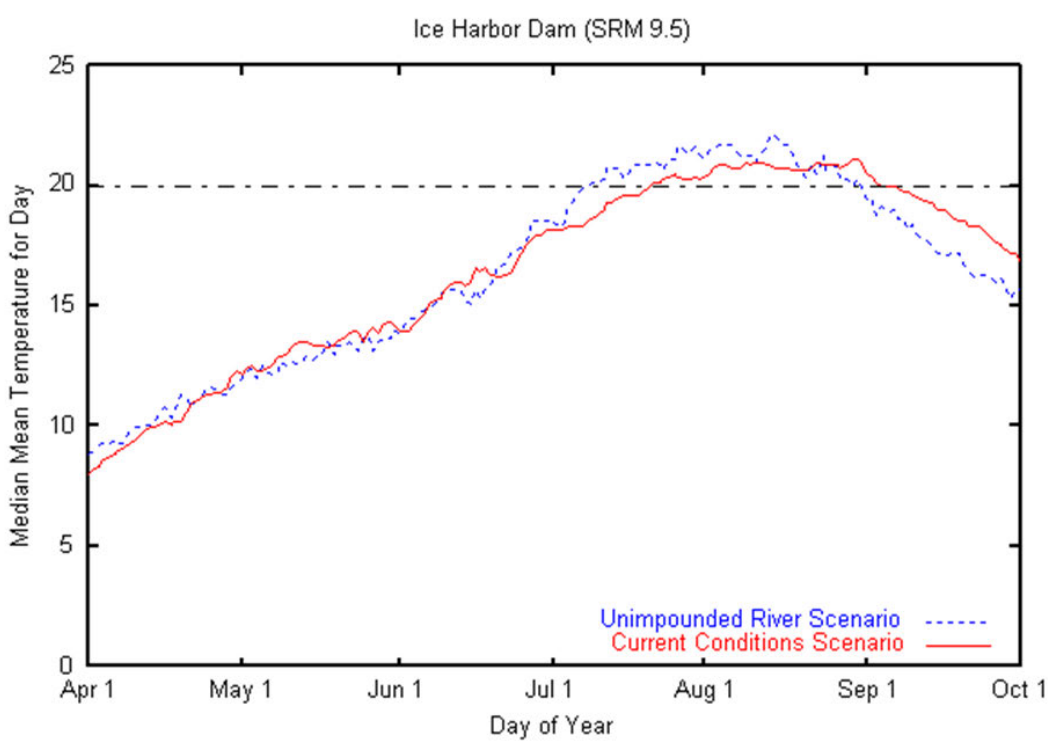
Whatever model is ultimately utilized by EPA for its TMDL should be consistent in the inclusion/exclusion of all dams in its free-flowing scenario.

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.* [27]

The chart below comes from the 2002 PNNL paper.



[27] 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

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.

RECOMMENDATIONS

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, Northwest RiverPartners asks the EPA to issue 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 that 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).

5) The TMDL should encourage the states of Washington and Oregon to pursue a Use Attainability Analysis ("UAA"). 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.

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.

Northwest RiverPartners believes it is important to address warming river temperatures and also recognizes the complexity of modeling a river system like the Columbia-Snake system. That said, the RBM10 model used by EPA to produce its TMDL, while useful for certain purposes, represents an oversimplified view. It artificially truncates the Columbia and Snake rivers at the borders of Washington state. It also 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 protect endangered salmonid species.

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.

Northwest RIVERPARTNERS
Hydropower for a better Northwest

Best regards,

Kurt Miller
Executive Director
Northwest RiverPartners

Northwest RIVERPARTNERS
Hydropower for a better Northwest

Temperature	Precipitation	Snow Water Equivalent

Year Range
1955 to 2019

Variable Selection
Average Temperature

Time Frame
Annual

Trend Range
Per Decade

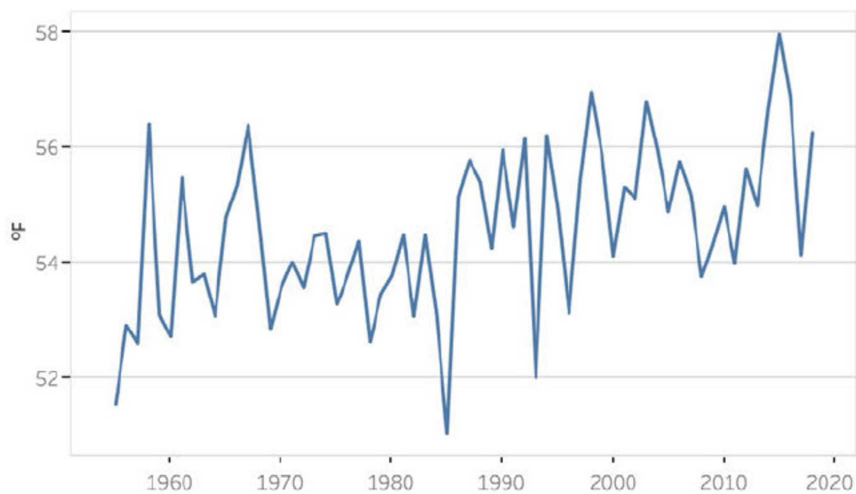
Trend	-	0	+
Significant (S)	●		●
Not Significant (NS)	●	○	●
Insufficient Data (I)	●	●	●

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)

1. Due to the one-dimensional, linear nature of the RBM10 model, it cannot fully represent the spatial and temporal complexity of the Columbia and lower Snake river system. In large rivers such as the Columbia River, heat flow cannot be fully encompassed by average temperatures in a model reach, because the cross-sectional area does not have uniform heat distribution, but rather has vertical stratification with warmer waters closer to the surface and cooler waters deeper below the surface. Appendix C states such limitations of the model:

   Limitations include the spatial and temporal resolution of the model. The one-dimensional representation provides cross-sectional average predictions and does not represent vertical stratification. The daily time step simulates daily average temperatures; daily maximum and minimums are not estimated. [28]

   Vertical stratification plays a critical role in many efforts to lessen any effects dams have on river temperatures, as dams discharge water from their cooler depths downstream rather than hotter water closer to the surface, and this choice is not reflected by the average temperature of the forebay as the model uses in its calculations, leading to an overestimation of the effects of dams on river temperatures.

2. Due to the extreme complexity of the Columbia-Snake system and the relative simplicity of the RBM10 model, the CLSRT TMDL relies on many assumptions that oversimplify its geographical area of focus. As an example, the model segments representing impounded reaches are very large, in some cases over 20 miles, and assume uniform depth of the entire segment. While assumptions like these allow for the RBM10 model to maintain its efficiency as a linear model, there is an intrinsic risk of misrepresenting the system each time a simplifying assumption is applied. As a result, there is a substantial risk that inaccuracies based on oversimplifications in the model will accumulate over the full model domain, leading to significant errors in the output of the model.
3. Likely in an effort to ensure that the full potential of heat sources is accounted for, conservative assumptions are used in the CLSRT TMDL modeling. Specifically, a conservative approach is taken in the case in calculating temperature impacts for each source of heat loading that do not have already defined impacts for National Pollutant Discharge Elimination System ("NPDES") point source discharges, nonpoint source heat from dams and reservoirs, and tributaries. Furthermore, the current conditions that are used to evaluate the impairments in the model domain are calculated using conservative assumptions. For example, the TMDL notes that:

   EPA is also using the mean of the monthly maxima recorded for the 2011 – 2016 period to establish the current conditions benchmark. In other words, exceedances at a given location are the mean of the six highest daily maximum temperature recorded in that month over the period 2011 – 2016. [29]

   Because this TMDL calculates exceedances from such a conservative standpoint, outlier temperatures have a greater influence on the exceedances than more typical temperatures, and so the TMDL overestimates the magnitude of impairments. Cumulatively, conservative assumptions such as this one could lead to a large margin of safety that could overestimate the restrictions that need to be

[28] Columbia and Lower Snake River Temperature Total Maximum Daily Load, Appendix C. 5/18/2020. US EPA, p 71.

[29] Columbia and Lower Snake River Temperature Total Maximum Daily Load. 5/18/2020. US EPA, p 65.

implemented to meet the WQS ("Water Quality Standards"). Such restrictions could threaten the hydropower system availability that serves such a vital role in providing affordable, carbon-free energy to the Northwest.

4. Statistical analyses of the RBM10 model reveals that the model consistently overestimates lower Snake River temperatures over the sample timeframe of 2007 – 2016, except for the July-August period where it slightly underestimates temperatures with a mean error of -0.008°C [30]. During the critical September-October period, the model overestimates lower Snake River water temperatures with a mean error of 0.227°C [31]. In addition, over the April-November timeframe, the model overestimates lower Snake River temperatures with a mean error of 0.206°C and over the entire year (January-December), the model overestimates lower Snake River temperatures with a mean error of 0.103°C [32]. While lower Snake River temperatures do not significantly affect Columbia River temperatures based on the sensitivity analysis in Appendix C, this overestimation does reveal flaws in the RBM10 model and raises questions on whether it should be used to model this river system. It is of particular concern that this model overestimates lower Snake River temperatures because interest groups have already called for the breaching of the lower Snake River dams and overestimating the temperatures in the model could impair the ability of policymakers to make informed decisions on the lower Snake River dams.
5. In order to calculate expected exceedances of WQS, the TMDL used observed data of Daily Maximum ("DM") temperatures, specifically the DM that is highest for each month of interest from 2011-2016. Since these calculations are based on current data, the moderating effects of dam waters on river temperatures are included in the current conditions. However, the free-flowing condition would not have the benefits of dams moderating water temperatures, and so would have greater variability and therefore likely have higher DM measurements, particularly earlier in the year. As a result, while comparisons between the current and free-flowing models can predict changes in average temperatures between these two conditions, a conclusion cannot be made as to whether free-flowing conditions would significantly affect DM observations. Because this TMDL uses DM temperatures to calculate exceedances, the free-flowing model cannot be used to draw conclusions on whether free-flowing conditions would result in significantly less impaired water temperatures based on the method used in this TMDL. The TMDL writes:

   EPA used the RBM10 temperature model to estimate the dams' impacts on river temperature by comparing daily average river temperatures with and without the presence of dams. The target temperatures are daily maxima. Since the diel variation is typically greater in a free-flowing river than when dams are present, the impact of the dams on the daily average temperature is greater than the impact on the daily maximum temperature. [33]

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[30] Columbia and Lower Snake River Temperature Total Maximum Daily Load, Appendix C. 5/18/2020. US EPA, p 35.

[31] Columbia and Lower Snake River Temperature Total Maximum Daily Load, Appendix C. 5/18/2020. US EPA, p 36.

[32] Columbia and Lower Snake River Temperature Total Maximum Daily Load, Appendix C. 5/18/2020. US EPA, p 33-34.

[33] Columbia and Lower Snake River Temperature Total Maximum Daily Load. 5/18/2020. US EPA, p 45.

While this approach is more conservative, it does not allow for analysis on the effects of free-flowing conditions on water impairment, which calls into question the efficacy of using this RBM10 model for this purpose.

July 21, 2020

Sent via electronic email to: ColumbiaRiverTMDL@epa.gov

Chris Hladick, Regional Administrator
U.S. Environmental Protection Agency, Region 10
Park Place Building
1200 6th Avenue
Seattle, WA 98101

RE: Total Maximum Daily Load (TMDL) for Temperature in the Columbia and Lower Snake Rivers

Dear Regional Administrator Hladick,

Thank you for the opportunity to provide comments on the Total Maximum Daily Load (TMDL) for Temperature Control in the Columbia and Lower Snake Rivers. Please accept as the official filing from Orca Conservancy the following letter:

Orca Conservancy wishes to thank the Environmental Protection Agency (EPA), Region 10 for your hard work developing this report, especially during the coronavirus pandemic. We applaud you for your perseverance. We want it noted (and on record) that the coronavirus pandemic is a direct result of human activity/involvement in the degradation of natural habitat.[1]

Orca Conservancy is a 501(c)(3) Washington State non-profit established in 1996 with the mission of working on behalf of *Orcinus orca*, the killer whale, and protecting the wild places on which it depends. The organization's urgent attention is on the remaining 72 members of the critically endangered Southern Resident killer whale (SRKW) population.[2] Orca Conservancy represents over 38,000+ members and supporters and collaborates with some of the top research institutions and environmental groups to address the most critical issues facing wild killer whales.

[1] 2020, Proceedings of the Royal Society B, **https://doi.org/10.1098/rspb.2019.2736**
[2] 2020. Center for Whale Research

The SRKWs are struggling, despite being listed as endangered in 2005, and continue to suffer from the effects of toxins in the water, noise pollution masking prey, and most importantly, the lack of their preferred prey, Chinook salmon. Chinook salmon make up over 80% of their diet. Through centuries the SRKWs evolved to primarily eat Chinook salmon and if we are seriously committed to recover this population, we need to recover their preferred prey.

The findings of this study clearly demonstrate that the waters of the Columbia and Snake rivers have become too hot to support healthy salmon numbers for the tribal communities, the fishing communities, and the Southern Resident communities (J, K, and L pods). In 2001 EPA produced another study stating, *Temperature, perhaps more than any other environmental parameter, greatly affects the status of fish and other aquatic life.* [3] Therefore, due to the EPA findings, both in the past and now, Orca Conservancy strongly supports urgent action to recover the salmonid species, which are also endangered and/or threatened. Bold actions needed are the continued spill over the dams to cool the waters, extensive planting of trees near tributaries to also aid in cooling waters, and most importantly, removing the lower Snake River dams as the best means for recovering the Southern Residents and the salmon species of the Columbia and Snake rivers. We do not have the luxury of time, nor do we need more studies and debates. The science is clear.

As a reminder, Congress enacted the Endangered Species Act (ESA), in part, to provide a "means whereby the ecosystems upon which endangered species and threatened species depend may be conserved...[and] a program for the conservation of such endangered species and threatened species."[4] Section 2(c) of the ESA establishes that it is "the policy of Congress that all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act."[5] The ESA defines "conservation" to mean "the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary."[6] Similarly, Section 7(a)(1) of the ESA directs that federal agencies shall use their programs and authorities to conserve endangered and threatened species.[7] To fulfill the purposes of the ESA, Section 9 of the ESA prohibits any person, including any federal agency, from "taking" an endangered species without proper authorization.[8] The term "take" is statutorily defined broadly as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."[9] The definition of "harm" has been defined broadly by regulation as "an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it

[3] Summary of Technical Literature Examining the Physiological Effects of Temperature; McCullogh, D. et al; May 2001
[4] 16 U.S.C. § 1531(b).
[5] Id. at § 1531(c)(1).
[6] Id. at § 1532(3).
[7] Id. at § 1536(a)(1).
[8] Id. at § 1538(a)(1)(B).
[9] Id. at § 1532(19).

actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering."[10],[11]

It is clear that SRKWs are steadily decreasing their presence in what was, historically, their core habitat. Correlations with salmon returns, along with our studies of killer whale feeding habits, make it clear that this absence is due to a need to search for food in other areas. Until overall Chinook runs improve it is likely that we will continue to see as well a decline in the total number of SRKWs.[12] Managing the salmon populations in the Columbia and Snake rivers at the brink of extinction jeopardizes the continued existence of ESA listed Southern Resident Killer Whales. In order to ensure these populations survive, the smolt adult ratio (SAR) needs to be increased to 4-6% and not the measly 1% currently seen in the basin. Historical data suggests that salmon runs within the Columbia River Basin ran well in the millions.[13] It is therefore unacceptable that EPA would suggest "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."[14] Orca Conservancy is appalled at the suggestion and finds it conflicts with the EPA's mission to uphold federal laws, which includes the Endangered Species Act's requirement to protect the critical habitat of endangered Southern Resident Killer Whales, which includes Columbia and Snake River Chinook as a primary constituent element.

There is a growing movement of bipartisan support to ensure that salmon from the Columbia River Basin, and the SRKWs, do not go extinct, and in fact, that we recover these populations with a goal of more nearly reaching historical levels. These two quotes serve as prime examples of this support:

> "Salmon need one thing – they need a river." Idaho Representative Mike Simpson[15]
>
> "The problems faced by orcas and salmon are human-caused, and we as Washingtonians have a duty to protect these species. The impact of letting these two species disappear would be felt for generations." Governor Jay Inslee[16]

Therefore, the TMDL must not only come up with a plan for cooling the rivers to meet current needs, but must also address the challenges of a warming planet in order to secure the future for these related, endangered species.

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[10] 50 C.F.R. § 222.102; see also Babbitt v. Sweet Home Chapter of Cmtys. for a Great Or., 515 U.S. 687 (1995) (upholding same regulatory definition of harm in 50 C.F.R. § 17 3).

[11] 2018. Center for Biological Diversity and Wild Fish Conservancy's 60-day notice of intent to sue the U.S. Department of Commerce, the Secretary of Commerce, the National Marine Fisheries Service (also known as NOAA Fisheries), and the Northwest Regional Administrator for the National Marine Fisheries Service (collectively "NMFS") for violations of the Endangered Species Act (ESA), 16 U.S.C. §§ 1531, et seq.

[12] 2017. Center for Whale Research. https://www.whaleresearch.com/single-post/2017/09/03/The-Whale-Pages-Change-in-Habitat-Use-by-Southern-Resident-Killer-Whales

[13] 2020. Southern Resident Killer Whales & Columbia Snake River Chinook: A Review of the Available Scientific Evidence. Bain, D. PhD.; et al.

[14] May 18, 2020. Total Maximum Daily Load (TMDL) for Temperature in the Columbia and Lower Snake Rivers. Section 1.1.

[15] March 11, 2020. Lewiston Tribune. Barker, Eric.

[16] https://medium.com/wagovernor/inslee-signs-executive-order-to-protect-orcas-chinook-salmon-8eb97d00b41d

The SRKW population is the most intensively studied population of marine mammals in the world, and the best available science tells us that healthy wild Chinook salmon runs are critical to SRKW recovery. The SRKWs historic use of west coast waters qualify this community as an important resource to the states of Washington, Oregon and California, and therefore SRKWs should be considered when evaluating the potential impact of hot waters on fish in the Columbia River Basin. As NMFS recently acknowledged, "new information … confirms that … [S]outhern [R]esidents spend substantial time in coastal areas of Washington, Oregon and California and utilize salmon returns to these areas."[17] These coastal waters are recognized as an essential foraging area for this critically endangered population in the winter and spring, and are currently under consideration to be designated as critical habitat for the SRKW[18], which will include a much larger and densely populated portion of the Chinook salmon range along the Pacific coast.

Between 1976 and 2004 there had been only 11 documented sightings in United States (U.S.) coastal waters.[19] Between 2006 and 2011, 131 acoustic detections were collected by deploying acoustic recorders in seven locations on the continental shelf of the U.S. west coast from Cape Flattery, WA to Pt. Reyes, CA to detect and record endangered SRKWs. Detection rates of SRKWs were greater in 2009 and 2011 than in 2006 - 2008, were most common in the month of March, and occurred with the greatest frequency off the Columbia River and Westport, which was likely related to the presence of their most commonly consumed prey, Chinook salmon.[20] The use of passive acoustic recorders has greatly increased the knowledge of seasonal and annual occurrences of SRKW in the coastal waters of the United States. Satellite tracking of individual SRKWs also revealed the extent to which they used Pacific coastal waters, and their focus on the migratory routes of Chinook for most of this time. Further, use of this portion of the range has increased as Fraser River Chinook runs have declined, indicating Chinook runs from the Columbia River Basin are likely to be more important in the coming years than they were in the first 40 years of intensive study of SRKWs. As noted in the TMDL, current temperature conditions in the Columbia and Snake rivers are not conducive to restoring and sustaining healthy salmon runs. It is imperative that in order to recover the SRKWs, we need to ensure all steps are taken to recover Chinook runs in the Columbia River Basin.

Orca Conservancy believes we need help from the EPA to guide the PNW to a place where abundant wild salmon and steelhead populations can once again support communities, livelihoods, and honor treaty rights, but most importantly wild salmon is needed to sustain the critically endangered Southern Resident killer whales. The 72 remaining SRKWs are a totem species and an icon for the state of Washington. As an organization that has been advocating for this population's recovery, it is undeniable that this population is trying incredibly hard to continue its existence within its core habitat. It is

[17] Michael J. Ford, Nat'l Marine Fisheries Serv., Status Review Update of Southern Resident Killer Whales 26 (2013). In fact, evidence indicates that Southern Residents spend the majority of time in coastal and offshore waters. Cf. M. Bradley Hanson, et al., Assessing the Coastal Occurrence of Endangered Killer Whales Using Autonomous Passive Acoustic Recorders, 134 J. OF THE ACOUSTICAL SOC'Y OF AMERICA 3486, 3486 (2013) [hereinafter Coastal Occurrence] (explaining that "on average the whales occur in inland waters less than half of the days each year").

[18] 12-Month Finding on a Petition to Revise the Critical Habitat Designation for the Southern Resident Killer Whale Distinct Population Segment, 80 FR 9682, published 2/24/2015.

[19] 2004. Krahn, et al.

[20] 2013. M. Bradley Hanson,a, Candice K. Emmons, and Eric J. Ward. Assessing the coastal occurrence of endangered killer whales using autonomous passive acoustic recorders.

also undeniable that we, as humans, continue to create obstacle after obstacle which undermines the SRKWs rightful existence.

Sincerely,

Shari Tarantino

Shari Tarantino
Executive Director
Orca Conservancy

oregon association of CLEAN WATER agencies

Working with community wastewater treatment and stormwater management agencies across the state to protect Oregon's water quality

240 Country Club Road, Suite A
Eugene, Oregon 97401
(541) 485-0165 *www.oracwa.org*

July 21, 2020

Comments emailed to: ColumbiaRiverTMDL@epa.gov

Subject: Comments on the Draft Columbia River Temperature Total Maximum Daily Load (TMDL)

The Oregon Association of Clean Water Agencies (ACWA) appreciates the opportunity to provide comments on the public review draft of the Columbia River Temperature TMDL dated May 18, 2020 (TMDL). ACWA is a not-for-profit organization of Oregon's wastewater treatment and stormwater management utilities, along with associated professional consulting firms, which are dedicated to protecting and enhancing Oregon's water quality. Our members provide wastewater and stormwater services to over 2.5 million Oregonians, serving over 65% of Oregon's homes and businesses.

The TMDL represents a significant undertaking by EPA. We offer the following comments based on our review of the TMDL and potential impacts to Oregon municipalities that discharge to the Columbia River.

Calculation of wasteload allocations

The TMDL divides the 0.3 degrees C human use allocation equally between NPDES point sources and reserve, dams and nonpoint sources, and major tributaries. The wasteload allocations for point sources are based on the design flow and effluent temperature data. We have asked our members to ensure that the design flows and effluent temperatures used in the evaluation accurately portray the discharge characteristics of the wastewater treatment facility. We also urge EPA to work with Oregon Department of Environmental Quality (DEQ) to ensure that the best available information is used to define wasteload allocations for municipal point sources.

Time period and averaging period for wasteload allocations

The TMDL notes that the critical time periods are July to October and available data indicate that temperature criteria exceedances occur during this time period. The TMDL does not define the timeframe when the wasteload allocations would apply. Since a timeframe is not specified, wasteload allocations can be interpreted to apply on a year-round basis. This would mean that municipal wastewater treatment facilities could exceed the wasteload allocations during the wet season when flows are higher. We recommend that the TMDL specify a time period for application of the wasteload allocations that is consistent with the temperature criteria exceedances.

The TMDL also states that the point source inputs were modeled as a continuous load, which is analogous to a point source discharging continuously at its monthly average permit limit. As such, we recommend that the TMDL specifically state that the wasteload load allocations be expressed as a monthly average limit in NPDES permits.

Express wasteload allocations as Excess Thermal Loads
Over the last two decades, Oregon DEQ has developed a number of TMDLs for temperature. Oregon's TMDLs specify wasteload allocations for point sources in terms of "excess thermal load." Excess thermal load is defined as the thermal load that is in excess of the applicable standard. This is an effective means of limiting the application of the thermal loads to the time period when criteria exceedances occur. We recommend that EPA express the point source wasteload allocations in terms of "excess thermal loads."

Reserve Allocation
The TMDL notes that a reserve allocation of 0.01 degrees C is available for future growth, new point source discharges, adjustments for facilities where the assigned wasteload allocation was not representative, and non-point sources that were not considered during TMDL development. The TMDL states that the reserve would be administered by Washington and Oregon, which would include maintaining a system to track the reserve, determining whether a point source can access the reserve, and establishing a process for granting a portion of the reserve. We recommend that a portion of the reserve be allocated to Oregon and a portion to Washington rather than the allocation of the reserve based on first use.

The TMDL estimates that the reserve load is 4.4×10^9 kcal/day, which is similar to the wasteload allocation of a single large discharge in the TMDL area. Since there is limited reserve load available for NPDES point sources, the TMDL should include discussion of other compliance tools. We recommend that the TMDL include a discussion of the actions that the point source can take to offset thermal loads in excess of the TMDL-specified wasteload allocation. For example, a point source may be able to implement a water quality trading program where they conduct riparian planting to generate thermal credits to offset thermal loads from the treatment facility. Providing a framework for utilizing other compliance tools besides limited reserves would enable point sources to fully consider the range of alternatives such as those that provide broader ecological benefits than technology-based solutions.

Stormwater discharges
Section 6.5.3 includes discussion of stormwater discharges and notes that the temperature TMDLs developed by Oregon DEQ and Washington Ecology have not considered stormwater discharges as a significant source of heat load during the summer critical period, primarily because of minimal precipitation in most of the Pacific Northwest during the summer and early fall. The TMDL states that because the temperature impacts from stormwater discharges are minimal and intermittent, EPA did not assign a wasteload allocation to stormwater sources. We support these conclusions. Additionally, we recommend that the TMDL include a specific statement that stormwater sources are considered *de minimis*. This approach would be consistent with the findings made for other sources in section 6.5.2 of the TMDL whose temperature impacts were deemed to be minimal and were considered *de minimis*.

Tributary Allocation
The Columbia River TMDL includes an allocation for all major tributaries of 0.1 degrees C. Oregon DEQ has developed TMDLs for Columbia River tributaries including the Willamette River. In developing these TMDLs, DEQ has used a human use allowance of 0.3 degrees C. EPA should ensure that the tributary allocations noted in the Columbia River TMDL do not conflict with the approach that Oregon DEQ has taken in developing the temperature TMDLs for the Columbia River tributaries. We recommend that the TMDL include specific discussion on how the Columbia River TMDL is consistent with approach used in the tributary TMDLs.

Thank you for your consideration of these comments. Addressing the comments and questions will result in a clear, transparent and implementable TMDL. Please do not hesitate to contact me with any questions you may have.

Sincerely,

Susan L. Smith

Susan L. Smith

Executive Director

Pacific Fishery Management Council

7700 NE Ambassador Place, Suite 101 Portland, OR 97220-1384
Phone 503-820-2280 | Toll free 866-806-7204 | Fax 503-820-2299 | www.pcouncil.org
Philip Anderson, Chair | Charles A. Tracy, Executive Director

July 21, 2020

Chris Hladick, Regional Administrator
U.S. Environmental Protection Agency, Region 10
Park Place Building
1200 6th Avenue
Seattle, WA 98101

Sent via email to: ColumbiaRiverTMDL@epa.gov

Re: TMDL for Temperature in the Columbia and Lower Snake Rivers

Dear Regional Administrator Hladick:

The Pacific Fishery Management Council (Council) has reviewed the *Total Maximum Daily Load Analysis for Temperature in the Columbia and Lower Snake Rivers* (hereinafter, the "TMDL") prepared by the Environmental Protection Agency (EPA), and appreciates the opportunity to comment. The purpose of the TMDL is to meet the 68ºF/20ºC water quality criterion which would avoid temperature related delays as salmon migrate and provide suitable temperatures as salmon spawn and rear in the Columbia and lower Snake rivers. The Council supports EPA's ongoing efforts, including establishing the TMDL, to address the effects of high Columbia and Snake river water temperatures on the survival of Council-managed fishes that are an essential treaty-reserved trust resource for tribes, and provide critical benefits to commercial harvesters and recreational fisheries in our region.

To summarize our comments, (1) the requirement to meet the TMDL for fishways should be explicitly stated in the TMDL, (2) the TMDL should document that the lower Snake River dam impoundments are the primary reason for water quality standard violations in the lower Snake River, (3) the TMDL should include strategies that address climate change effects on the rivers' attainment of TMDL standards in the future, (4) both Oregon and Washington should maintain their state water quality standards, and (5) this EPA TMDL should guide the approach to protection of water quality in all salmon-bearing rivers and streams of the Columbia basin.

Council Authority

The Council is one of eight fishery management councils established by the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The MSA requires fishery management councils to describe, identify, conserve and enhance essential fish habitat (EFH) for species managed under their Federal fishery management plans (FMPs), and requires the Council to comment on activities that, in the Council's view, are likely to substantially affect EFH.[1] EFH includes those substrates and waters and their associated physical, chemical, and biological

[1] *See* MSA, Sec. 305(b)(3)(B).

properties necessary for spawning, breeding, feeding and growth to maturity in support of sustainable fisheries. The Council's Pacific Coast Salmon FMP identifies EFH for Chinook and coho salmon to include the Columbia River downstream of Chief Joseph Dam and the Snake River downstream of Hells Canyon Dam. This is roughly the same geographic scope addressed in the EPA TMDL. Therefore, this TMDL will affect a critical component of EFH for Chinook and coho salmon defined by the thermal environment of the Columbia and Lower Snake rivers.

In accordance with the Council's authorities, the Council has reviewed the TMDL in the context of the MSA mandate for sustainably managed fisheries and conservation of salmon EFH. The Council also recognizes the Federal government's trust responsibility to the Columbia River treaty tribes and to supporting conditions that protect salmon as a treaty-reserved trust resource.

Background

In 2015, Columbia Basin salmon experienced high water temperatures that delayed adult migration and ultimately caused record high mortality among sockeye and summer-run Chinook salmon. Climate change projections predict the increasing frequency of such events. The 2015 event prompted renewed interest in "the long-recognized and largely unaddressed problem of high water temperatures… in the Columbia River Basin."[2] While 2015 was particularly harmful, temperatures in mainstem reaches of the Columbia and lower Snake rivers routinely exceed water quality standards for significant periods of time during the adult migration season.

Comments and Recommendations

Based on the Council's review of the EPA TMDL, we offer the following observations and suggestions to improve the draft TMDL document:

- The TMDL does not address the problem of higher-than-average water temperature in fishways.[3] Water in fishways frequently violates numeric and narrative water quality standards and can create migration blockages, delays, and fallback problems, all of which can result in direct and indirect mortality and decreased reproductive success of salmon. The TMDL must assure that fishway temperatures comply with Clean Water Act (CWA) directives to ensure habitable migratory pathways for salmon.
    - **Recommendation:** Meeting water quality standards in fishways should be an explicitly stated component in the TMDL.
- Data presented in the TMDLs clearly show that water entering the lower Snake River at the Clearwater confluence meets CWA temperature standards for salmon and is cool enough to support salmon migration throughout the summer and fall.[4] However, there is a misconception that upstream conditions are responsible for increased water temperatures.

[2] The Fish Passage Center, Requested data summaries and actions regarding sockeye adult fish passage and water temperature issues in the Columbia and Snake rivers, p. 1 (2015).
[3] *See* TMDL at p. 35 ("All of the TMDL's target sites are at the tailraces of dams.").
[4] *See* TMDL at pp. 47–50 (showing monthly average water temperatures below the 20 degree C water quality criterion at the confluence of the Clearwater and Snake rivers at Lewiston, Idaho).

  - **Recommendation:** To avoid further confusion,[5] the TMDL should clearly explain that the lower Snake River dam impoundments (not upstream conditions) are primarily responsible for water quality standard violations in the lower Snake River.
- With predicted reduced snowpack, lower summer river flows, and increased water temperatures, the frequency of TMDL exceedances will increase in the future. The TMDL baseline conditions and load allocations do not address foreseeable *future* temperature increases linked to climate change. The EPA has committed to "consider climate change effects when developing… load allocations in Total Maximum Daily Loads"[6]; this TMDL should be no exception to that goal. Failing to propose load allocations, or other "adaptive management approach[es],"[7] would be a departure from EPA policy and will quickly result in an insufficient TMDL.
  - **Recommendation:** The TMDL should include strategies that address climate change and its predictable effects on the rivers' future attainment of water quality standards.
- EPA is suggesting that Oregon and Washington remove salmon migration as a designated use of the Columbia and Lower Snake rivers[8, 9]. Weakening state water quality standards will not restore healthy salmon runs or create sustainable fisheries. In fact, doing so would impair Columbia/Snake River salmon migration and survival.
  - **Recommendation:** EPA should withdraw this suggestion from the TMDL and focus on Federal actions to reduce water temperatures.
- The TMDL analysis of water temperature in the Columbia and Lower Snake rivers shows that the lower four Snake River dam impoundments, and certain Columbia River dam impoundments, are a significant source of human-induced temperature increases, along with climate change.[10] Increased water residence time, coupled with greater surface area that leads to increased insolation, are the primary contributors to high summer reservoir temperatures. The TMDL also suggests that the dams prevent the lower Snake from cooling periodically throughout the summer months in a manner that would facilitate fish migration even during otherwise hot years.[11] Overall, the TMDL shows that temperatures in a free-flowing lower Snake River would be much more supportive of successful salmon migration and spawning, and therefore salmon recovery.

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[5] See *Id*.
[6] EPA, National Water Program 2012 Strategy: Response to Climate Change, p. ES-7 (2012).
[7] *Id.* at 58.
[8] TMDL, pp. 2, 71
[9] *See* 40 C.F.R. § 131.10(g)
[10] TMDL at p. 43 ("EPA's analysis of the cumulative nonpoint source heat loading from dam impoundments shows that the dam impoundments have a greater temperature effect than point sources and tributaries.").
[11] *See* TMDL at p. 70 (showing predicted minimum average daily temperatures in the free-flowing Lower Snake), TMDL page 65, Section 6.6 Margin of Safety, Table 6-22 (Minimum and maximum daily average temperatures in RBM10 simulations of free-flowing Columbia and Snake Rivers (1970-2016)), Tables 6-6 through 6-9 (showing monthly cumulative excess dam impact on Columbia and lower Snake rivers' temperatures).

- **Recommendation:** These findings from the Federal agency charged with protecting the integrity and uses of our nation's waterways should guide efforts to restore Columbia River basin salmon populations and fisheries.

Conclusion

We appreciate the hard work by EPA's Region 10 staff on the TMDL and we support EPA's effort to address the temperature problems affecting salmon in the Columbia/Snake system. The Council recommends the TMDL text be revised to more clearly identify the causes of, and solutions to, human-caused temperature exceedances impairing salmon EFH, salmon migration, and survival.

Sincerely,

Phil Anderson
Chairman

JDG/ael

Cc: Mr. Chris Oliver
Council Members
Habitat Committee
Salmon Advisory Subpanel
Laura Watson, Director, Washington Department of Ecology
Richard Whitman, Director, Oregon Department of Environmental Quality

August 20, 2020

Mr. Andrew Wheeler
Administrator
Environmental Protection Agency

Submitted Via Email: ColumbiaRiverTMDL@epa.gov

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 Pacific Northwest Waterways Association (PNWA) regarding the Total Maximum Daily Load for Temperatures for the Columbia and Lower Snake Rivers ("CLSRT TMDL").

Pacific Northwest Waterways Association (PNWA) is a non-profit, non-partisan trade association that advocates for federal policies and funding in support of regional economic development. PNWA is a collaboration of businesses, public agencies and individuals who combine their economic and political strength in support of navigation, energy, trade and economic development throughout the Pacific Northwest.

Established in 1934, PNWA led the way for development of infrastructure for navigation, electric power and irrigated agriculture in the region. Our membership has grown to include 145 entities including public ports, barge companies, steamship operators, grain elevator operators, agricultural producers, forest products manufacturers, electric utilities, irrigation districts, and public agencies throughout Washington, Oregon, and Idaho.

Our organization supports the multiple purposes of the dams in the Columbia Basin. Northwest dams and locks provide the region with clean affordable energy, irrigation water for agriculture, and navigable waterways that ship goods to and from the farthest inland ports in the country. The environmental impacts of these economic benefits are managed with world-class investments that help maintain salmon populations and other ecological benefits. Salmon and other fish are an important part of the river system that need to be protected, and their challenges are multifaceted and occur in both our rivers and in the Pacific Ocean.

We would like to begin by expressing our support for the comments provided by Northwest RiverPartners. As a Northwest RiverPartners member, we firmly agree with their position on the CLSRT TMDL and the need for its revision. If these revisions are not made, the TMDL as written will threaten the vitality of the Federal Columbia River Power System ("FCRPS") and the multiple purposes for the system as established by the United States Congress.

(continued)

KEY POINTS OF EMPHASIS

- The states of Washington and Oregon are signaling their intention to base energy and environmental policy on the CLSRT TMDL. This outcome is problematic because, as EPA notes, "The current water quality conditions present a significant challenge to achieving downstream water quality standards in Washington and Oregon."[1] This challenge arises because water temperatures entering Washington state from Canada and from Idaho often significantly exceed the respective states' water quality standards during the peak summer months. This confounding situation raises the possibility that the FCRPS dams will be held to unattainable standards.

- The CLSRT TMDL relies upon the one-dimensional RBM10 model, which lacks the detail and sophistication necessary to provide precise results for a river system with the complexity of the Columbia-Snake river system.

- Tellingly, the TMDL did not attempt to simulate the entire Columbia River Basin with its RBM10 model, but instead truncated the Columbia and Snake rivers near the Washington state borders. This artificial limitation doesn't allow the model to accurately account 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).

- The TMDL, as written, includes significant arbitrary assumptions, such as including large storage dams in a "free flowing" state. These larger dams can release cool water during the summer. This inconsistent treatment (i.e., including some dams but excluding others) places an unfair temperature standard on the downstream dams.

- A 2002 study under the U.S. Army Corps of Engineers ("USACE") compared pre-lower Snake River dam measurements from 1955-1958 to measurements taken after the lower Snake River dams were constructed. The study found no evidence that river temperatures had increased, and instead remained unchanged or slightly lower after completion of the four lower main stem dams.[2] This real-life finding runs contrary to what we are seeing in the TMDL's modeling output.

- 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. This finding is much more consistent with the 2002 USACE finding described above.

(continued)

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[1] Columbia and Lower Snake River Temperature Total Maximum Daily Load. 5/18/2020. US EPA, p 42.
[2] Water Temperatures and Passage of Adult Salmon and Steelhead in the Lower Snake River

RECOMMENDATION

Per the Columbia River System Operations Draft Environmental Impact Statement, we know that our dams provide relatively low-cost, carbon-free energy that cannot be replicated by other resources. They provide critical balancing and contingency reserves for Bonneville Power Administration ("BPA"). They also have a unique ramping capability, which means they can reduce generation to very low levels when demand is low and increase (i.e., ramp) generation with little notice to meet daytime peaks. This is especially important as the Northwest increasingly relies on intermittent solar and wind power to reach carbon goals.

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. Pacific Northwest Waterways Association supports Northwest RiverPartners' recommendation that EPA revise its Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers and provide a revised Draft TMDL which addresses the concerns mentioned in these comments.

Thank you again for the opportunity to comment.

Sincerely,

Kristin Meira

Kristin Meira, Executive Director
Pacific Northwest Waterways Association (PNWA)

PNGC Power
Smart. Local. Connected.

July 21, 2020

The Honorable Andrew Wheeler
Administrator
Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460

RE: EPA's Establishment of 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 PNGC Power ("PNGC Power" or "PNGC") regarding EPA's establishment of a Total Maximum Daily Load ("TMDL") to address temperature loading in the mainstems of the Columbia and lower Snake Rivers in Washington and Oregon. Given the long-term implications of this TMDL on federal dams critical to the Pacific Northwest's reliable and economical carbon-free power supply, it is important that EPA's TMDL accurately assess the impacts of federal dams on water quality. Along these lines, we urge EPA to revisit and correct what we understand to be flaws in its temperature model, and issue a revised Draft TMDL with notice and public comment.

PNGC Power is a Portland, Oregon-based electric generation and transmission ("G&T") cooperative owned by 15 Northwest electric distribution cooperative utilities. As one of the Bonneville Power Administration's ("BPA's") largest power customers, PNGC is an aggregator of geographically diverse loads in a seven-state region (Oregon, Washington, Idaho, Montana, Utah, Nevada, and Wyoming). In the context of a rapidly changing energy environment, PNGC supports policy solutions that balance the dual priorities of environmental stewardship and a universal desire for economic growth and prosperity. Central to this effort, is protecting our access to federal hydropower from the Columbia River System ("CRS").

We appreciate that the Administration recognizes the importance of this critical federal energy infrastructure to the Northwest. In its October 19, 2018 *Presidential Memorandum on Promoting the Reliable Supply and Delivery of Water in the West* ("Memorandum" or "Presidential Memorandum"), the President describes the Federal Government's enormous investment in water infrastructure throughout the western United States. Specifically, its contribution "to reduce flood risks to communities; to provide reliable water supplies for farms, families, business, and fish and wildlife; and to generate dependable hydropower." In Section 6, the Memorandum specifically acknowledges "hydropower operations challenges" in the CRS, and directs the streamlining of regulatory processes and removal of unnecessary burdens on Columbia River Basin Water Infrastructure.[1]

[1] Presidential Memoranda. *"Presidential Memorandum on Promoting the Reliable Supply and Delivery of Water in the West"* October 19, 2018.

Although Section 6 is focused on the ongoing National Environmental Policy Act ("NEPA") work on the CRS, we view the intent of the policy directive to extend broadly to all regulatory processes impacting critical western federal water infrastructure. As such, we ask EPA to take into account the policy content of this Presidential Memorandum in its approach to establishing the full suite of precedent-setting Clean Water Act ("CWA") regulations on CRS federal hydroelectric generating facilities currently under consideration.

Related to the proceeding on this TMDL, is EPA's ongoing consideration of unprecedented National Pollutant Discharge Elimination System ("NPDES") permits for these federal projects. In PNGC's May 1, 2020 comments regarding EPA's draft NPDES proposal (also applicable to this TMDL), we pointed out that currently, over eighty percent of PNGC's power supply comes from the Bonneville Power Administration ("BPA"). While the Corps of Engineers ("the Corps") is congressionally authorized to operate the hydroelectric generating facilities requiring CWA permitting, BPA is the federal agency directed by Congress to market and distribute the power generated at these facilities.

BPA is self-financed and therefore covers all of its costs with revenues from Northwest ratepayers such as PNGC and other purchasers of its power and transmission products and services. BPA receives no annual appropriations from Congress. **Therefore, costs applied to these hydroelectric facilities as a result of new permitting processes increase BPA's power rates, which in turn impact utility ratepayers throughout the region.** This includes the nearly 200,000 member homes, farms and businesses PNGC serves, many in rural, disadvantaged communities.

In this context, we are concerned about the broader impact of EPA's TMDL given its relationship to the agency's consideration of lower Columbia and lower Snake River NPDES permits. If these federal hydroelectric generating facilities become subject to temperature limitations as proposed in EPA's TMDL through the incorporation of the load allocations into the NPDES permits, the Corps would likely be required to make costly changes to the operations of these projects.

Compounding this concern, is the requirement precipitated by the NPDES permitting action, to acquire a water quality certification from the Washington Department of Ecology ("Ecology") under section 401 of the CWA. Ecology's May 7, 2020 401 certifications for each of the federal dams imposed a significant set of conditions on the operations of the CRS facilities. If upheld, the stringent conditions in the 401 certifications must be incorporated by EPA when the agency issues the final NPDES permits. One of the conditions Ecology is looking to impose through the 401 certifications is compliance with this TMDL.

Troublingly, EPA's TMDL findings about temperature impacts of the federal dams appear to be inaccurate due to flaws in the agency's model. The TMDL relies upon a one-dimensional mathematical temperature model, which lacks the detail necessary to provide accurate results for a river system with the complexity of the CRS. Additionally, the model appears to make arbitrary assumptions by keeping some dams in and leaving others out of its analysis, such as including Dworshak Dam as part of its free-flowing river scenario. Due to these and other shortcomings, the model lacks the precision necessary to meet EPA's stated objective of a TMDL, which is "to determine the loading capacity of the waterbody and to allocate that load among different pollutant sources so that the appropriate control actions can be taken and water quality standards achieved."[2]

[2] epa.gov/tmdl. Overview of Total Maximum Daily Loads (TMDLs).

As a not-for-profit, member-owned electric cooperative that relies on these federal dams for over eighty percent of our power supply, we are concerned that this TMDL if finalized inaccurately, could have long-term negative implications on our region's critical energy infrastructure. In the spirit of the Administration's October 19, 2018 Presidential Memorandum, we ask that to the extent permitted by law, EPA approach the interrelated CWA regulations on the CRS broadly, with a look toward minimizing unnecessary regulatory burdens and fostering more efficient decision making so that these federal projects are better able to meet the demands of their authorized purposes.

Specific to this proceeding, we again strongly urge EPA to establish a TMDL that accurately assesses the impacts of federal dams on water quality. To assist the agency in this assessment, we are attaching the comprehensive comments and cited documentation provided by Northwest RiverPartners, of which PNGC is a member and fully supports. This input focuses on the following key issues for EPA's consideration:

- This TMDL relies upon the one-dimensional RBM10 model, which lacks the detail and sophistication necessary to provide precise results for a river system with the complexity of the CRS.
- This TMDL did not attempt to simulate the entire Columbia River Basin with its RBM10 model, but instead truncated the Columbia and Snake rivers near the Washington state borders. This arbitrary limitation does not allow the model to accurately account 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).
- This TMDL includes significant arbitrary assumptions, such as including large storage dams in its "free flowing" state. These larger dams can release artificially cool water during the summer. This inconsistent treatment (i.e., including some dams but excluding others) places an unfair temperature standard on the downstream dams.
- A 2002 study prepared by the Corps compared pre-lower Snake River dam measurements from 1955-1958 to measurements taken after the lower Snake River dams were constructed. The study found no evidence that river temperatures had increased, and instead remained unchanged or slightly lower after completion of the four lower main stem dams. This finding runs contrary to what we are seeing in this TMDL's modeling output (see NWRP's comments for citation).
- 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. This finding is consistent with the Corp's 2002 finding described above.

Thank you in advance for your consideration of our comments. We look forward to working with EPA as the agency continues to consider its TMDL for temperature in the Columbia and lower Snake Rivers.

Best regards,

R. Ashley Slater

Ashley Slater

Vice President, Government Affairs and Policy
PNGC Power

August 20, 2020

Mr. Andrew Wheeler
Administrator
Environmental Protection Agency
ColumbiaRiverTMDL@epa.gov

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 the Port of Clarkston regarding the *Total Maximum Daily Load for Temperatures for the Columbia and Lower Snake Rivers* ("CLSRT TMDL"). The Port of Clarkston recognizes that river temperatures can be a serious environmental concern pertaining to salmonid migration, but defines the problem differently than the EPA, or the states of Washington and Oregon. Therefore, we believe EPA's approach in the CLSRT TMDL to be flawed and that major revisions are needed.

INTRODUCTION

The Port of Clarkston is the second furthest inland seaport on the Columbia/Snake River navigation system. It is located at the confluence of the Snake and Clearwater Rivers at Snake River Mile (RM) 139, which happens to be the geographical starting point for CLSRT TMDL on the Snake. It is of interest to note that this major river has: a) covered nearly 900 miles[1] through Wyoming, Southern Idaho, between Idaho and Oregon, and then Washington, b) passed through at least three major storage dams contributing heat units, and c) passed through narrow canyons with extreme heat before it reaches the first temperature gauge the CLSRT TMDL finds worthy of consideration. The river then travels nearly 30 additional miles with similar Hells Canyon heat impacts[2] and finally enters the CLSRT TMDL study area.

[1] To be precise, the Snake River is 1,078 miles long. The CLSRT TMDL assigns the area of interest as only the last 139 miles. What really occurs on the 939 remaining miles—which happen to be 100% within the United States--is of little interest and barely appears relevant within the CLSRT TMDL.

[2] The mostly unpopulated canyon stretching for 110 miles upstream from CLSRT TMDL's starting point at RM 139 is named "Hells Canyon" because of extremely hot air temperatures during summer months. Hells Canyon is North America's deepest gorge, its recreational and geologic features are unparalleled, and parts have been named Hells Canyon National Recreation Area. The elevation at Hells Canyon Dam's tailrace at RM 247 is approximately 1,480 feet above sea level. The narrow canyon created by amazing geologic forces over millennia traps and keeps heat. (Hereinafter, this is referenced as the "Hells Canyon heat impact.") Within ½ mile of both sides of the river, hillsides frequently are 1,500 - 3,000 feet above the river's elevation. Within 2.5 miles on both sides of the river, the *difference* in elevation between the river and mountains is frequently 4,500 feet.

Port Clarkston
A NEW WAY TO GROW.

849 Port Way | Clarkston, WA 99403 | (509) 758-5272 | (509) 758-1746 fax | portofclarkston.com

At the Port of Clarkston, we handle river commerce, which presently involves transporting wheat and serving the cruise boat industry. Our community has been tied to water transportation since the 1860s. Our constituent base includes residents of Asotin County, but our collaborative economic efforts impact at least five counties in North Central Idaho and four counties in Southeast Washington. Grain moving through our port originates from Washington, Idaho, Oregon and, to a lesser degree, Montana. We earn our livings on the river; we recreate on the river; it is the reason we live here and nowhere else.

KEY DISCUSSION POINTS

The CLSRT TMDL needs an expanded footprint to create a manageable, practical standard that is fair, consistent and replicable elsewhere in the United States.

EPA, by virtue of being a federal agency with national oversight, cannot simply adopt two interested states' limited footprint when conditions in five states and one foreign country are impacting measurements. Thus, the Port concludes the CLSRT TMDL has a starting point that fails to achieve assignment to pollutant sources that is meaningful. EPA is required to take a broader, more comprehensive look at sources in order to set a fair and equitable standard. Accepting the boundaries defined by only Oregon and Washington—which are difficult even for those states to defend--is to foster political goals by creating artificial boundaries.

As discussed in the Introduction above, the Port is disappointed that over 900 miles and hundreds of tributaries feeding into waters at RM 139--the starting point on the Snake River for the CLSRT TMDL--are dismissed. We recommend the following full watershed depicted in the map below be fully included in the analysis and modeling in the CLSRT TMDL. To leave out so much area of significant impact creates an unreliable model no matter how careful the analysis might have been in creating boundary assumptions.

Figure 1: Watershed of Columbia/Snake. Source: RMJOC-II cited within Appendix G to CLSRT TMDL

The CLSRT TMDL needs to properly define the river temperature problem.

Salmonids do not need the average temperature in the river at any given place[3] to be exactly 20°C[4] or lower. They need cool water zones or channels within tributaries, rivers and reservoirs through which they can move[5].[6] According to the 2006 PNNL[7] study, temperatures measured near the surface and at various depths indicated that while the surface temperature may have been higher than 20°C, at greater depth, temperatures were below the standard, depending on the depth. That the species have survived over millennia where temperatures were high in the summer lends weight to the conclusion that basic assumptions in the CLSRT TMDL about average and exact temperatures are incorrect and need re-evaluated.

As the graph from a 2006 examination of water temperatures immediately below shows, there are a range of temperatures at different depths that serve the fish well. Water stratifies to cooler layers as depth grows.

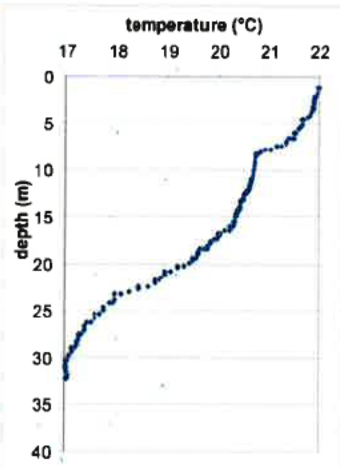

Figure 2: Sample temperatures at various depths.

[3] Currently, tailraces at the dams have been selected as measurement points. However, these have no direct connection to salmonid migration. Other locational discussion revolved around the forebay, but it was too stratified to provide an average. An average number forces a standard on the entire width of the river, when a small transportation corridor is what is needed. As far as the Port can tell the only reason only these two locations were considered is because measurements were already occurring there.

[4] To set this one single number as a standard by which success or failure is identified is arbitrary. Why not some other temperature such as 20.3°C? Forcing one single average number presumes all species have exactly the same requirement at every stage of their life cycles and at every location in the river in which they might happen to be.

[5] The EPA's draft Cold Water Refuge Plan (2019) established the importance of pockets of cold water and stratified layers within rivers used by salmon and steelhead during migration. Other sources linking stratification of water temperatures and migration cited in the CLSRT TMDL are Goniea, et.al. 2006, and Keefer, et.al. 2009.

[6] In Liscom's et.al's 1985 study for BPA in which fish were tagged to capture migration of travel times for steelhead and Chinook, during periods of warm water, tracking was difficult or impossible because fish descended into deeper water for period long enough to be undetected from either plane or boat. ("Radio-Tracking Studies of Adult Chinook Salmon and Steelhead to Determine the Effect of Zero River Flow during Water Storage at Little Goose Dam on the Lower Snake River.)

[7] Pacific Northwest National Laboratory, January 2006. "Lower Snake River Hydraulic Characteristics." pdfs.semanticscholar.og/cf1b9d6d5aa1ab67639c9d29e39fefac11ac.pdf

Salmonids need cooler water at different locations, depending where they are in their life cycles:

1) As smolts move downstream, cooler water needs to be near foraging or resting areas closer to shore, and,
2) As adults migrate upstream to spawn, they require deeper but narrower channels of cool water.

The key to getting the right answer to the river temperature problem is to have adequate information to properly define the problem. For each species, for the point in their life migration cycle, at what specific location in the river is cool water needed and at what temperature? For smolts, how much does spill help and how much does it hinder because spill of warmer surface water destroys stratification at tailraces. For adults, does the pathway from the cooler water make its way to the fish ladders, or are there bottlenecks? What about the temperatures at the top of the fish ladders, which can be as close as 8 feet from the surface of the reservoir? Can pit tags be modified to provide more feedback as to conditions through which fish are traveling so that mapping of locations where cool water is needed can be established?

Releasing cold water to cool down 100% of the river is a luxury when water is scarce. Water will become more scarce in the near future as 10-90% of the regional snowpack goes away due to climate change.[8] This situation demands a thoughtful, careful approach once the real problem is identified.[9]

The CLSRT TMDL needs to give appropriate weight to historical data, in order to properly identify heat pollutant sources.

The inadequacy of the boundary defined in the CLSRT TMDL is discussed above. Instead of using relevant information, the CLSRT TMDL simulated heat impacts outside the narrow footprint through a model (RBM10) that has an arbitrary cap and compares results to so-called "free flowing" rivers during periods of time dammed up river water was released to cool the Snake and Columbia Rivers for the benefit of salmonids. To follow this simulation and to *ignore historical pre-dam and pre-Dworshak cold water release data* is the only way to incorrectly force a conclusion that the four lower Snake River dams contribute to water temperature warming.[10]

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[8] Appendix G of the CLSRT TMDL discussed loss of snowpack, but cited only the more conservative estimates from the 2018 RMJOC-II study. An exact quote from p. 70 of RMJOC-II cited in the "By the 2050s, the hydrological model simulations ... indicate decreases of more than 70 percent in these same areas, and a 90 percent decrease by the 2080s."

[9] Climate change is a compelling reason to step back from traditional assumptions and ask the question what additional water storage facilities need to be constructed to prepare for human as well as salmonid needs with future increasing air temperatures, changing precipitation patterns and lack of snowpack.

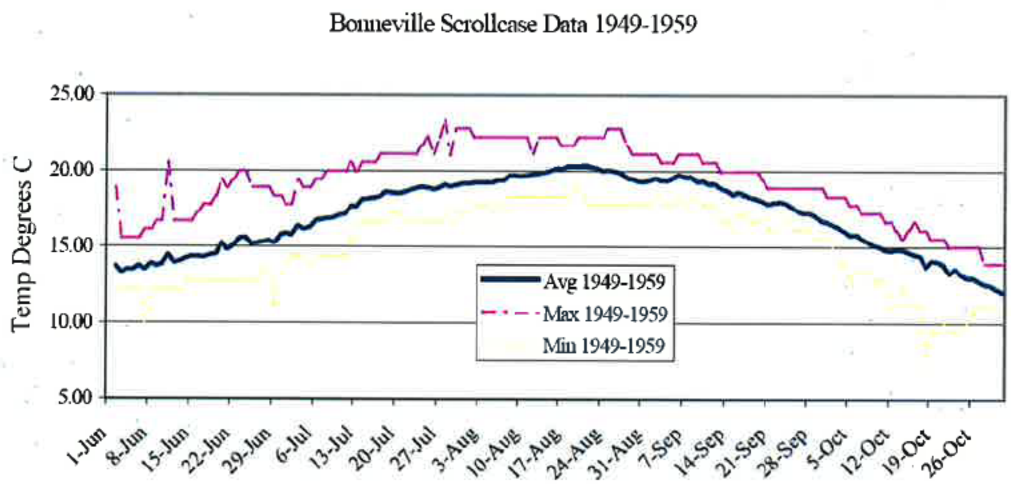
[10] The four lower Snake River dams have long been targeted for removal by dam-breaching advocates who seek every method they can to get dams removed. This now includes water quality as it relates to heat units, not for the benefit of fish--since ratepayer investments provide funding for studies, habitat improvements, hatchery programs, predation removal and more--but because they simply like the concept of a free-flowing river. Political pressure forces these run-of-the-river dams into a combined analysis that does not yield good scientific conclusions. We hope that EPA can ignore political pressure and treat run-of-the-river dams as a separate category and expand boundaries for analysis rather than embracing the broad wildly-inaccurate boundary condition assumptions for the Snake River that currently exist in the RBM10 model.

By failing to include actual impacts of heat coming from the non-federal storage dams--Brownlee, Oxbow and Hells Canyon--upstream on the mainstem of the Snake River (resulting from human activity) and non-human activity heat impacts created in the summer in Hells Canyon from RM 247 to RM 139 and from readings from the gauge at Orofino before Dworshak cold water releases mitigate temperatures, the CLSRT TMDL has created such a weak foundation as to make all subsequent conclusions flawed.[11]

Historic information which should be considered to determine the contribution of run-of-the-river dams to heat pollutants follows.

- Early ancillary data from the Lower Columbia River downstream of Portland, OR, can be found in the 1878 Report of the Commissioner on Fish and Fisheries, which on p. 807, discussed 1875 findings where water temperatures were 20°C or greater for 39% of the days in July and 31% of the days in August.
- Historic water temperatures of the lower Snake River commonly exceeded the 20°C standard in July and August, sometime being as high as 25 to 27° C (Peery, C.A., and T.C. Bjornn, 2002—Source in Footnote 13).
- Additional evidence of warm historic temperatures can be seen in the Bonneville scrollcase data. From 1949 to 1959, a period when few mainstem dams were in place, temperature records indicate that both maximum and average temperatures regularly exceeded 20°C during August for that period.

Figure 3 Data from DART



- Some relevant data was collected in the Snake River prior to completion of Brownlee, Owbox and Hells Canyon Dams, specifically information collected by the USFWS from 1955 to 1957. They reported that the average daily temperature for July and August in 1957 for sites near Hells Canyon met to exceeded 20°C between 61 and 100% of the time (see Figure 4).

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[11] In addition, there is unfairness in that one group of citizens—hydropower ratepayers—assume financial burdens for facilities that are not the cause of the pollutant. Many of those to whom the financial burdens fall are subsistence level, elderly and/or hit hard by Covid-19 economic impacts.

- Prior to construction of seven Snake River dams[12], water temperatures at the mouth of the Snake River during the four years 1955 through 1958 were consistently over 20°C from early July until mid-September. The number of days the mean water temperature exceeded 20°C averaged 70.5 days for the four years, ranging from 61 days in 1955 to 86 days in 1958. Monthly water temperatures during June, July, August and September during 1955 through 1958 averaged 17.2°, 22.0°, 23.3° and 20.3°C respectively. The following shows data from 1957 depicting the percentage of days when average temperatures exceeded 20°C:

	% of Days when Avg. Temp >= 20C	
	1957	
	July	August
Clarkston, WA	61%	84%
Oxbow Dam Site	100%	87%
Brownlee Dam Site	100%	84%

Figure 4: 1957 temperatures

Compare this to results from 1973-81, (after the seven dams were constructed but prior to cold water releases from Dworshak for cooling purposes became a standard practice), water temperatures at the mouth averaged 14.5°, 19.0°, 21.9° and 20.1°C from July to mid-September. (Peery, C.A., and T.C. Bjornn, 2002).[13] *Each one of these comparisons show lower water temperatures after the Snake River was impounded, but before Dworshak cold water releases began in 1992 for the specific purpose of reducing water temperature.*

- In their 2009 Water Quality Plan, the U.S. Army Corps of Engineers concluded that historically, the Columbia and Snake rivers have always experienced warm water exceeding 20°C during specific times of the year.
- Before the mid-1990s, the Lower Granite Reservoir received waters up to 26° C from the Snake River (Anatone gauge) and 25° C from the Clearwater (Spaulding gauge). (John McKern—Appendix 1)

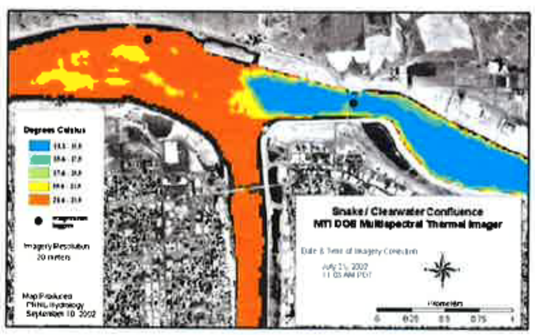


Figure 5: Multispectral Thermal Image on 7-21-2002; Source: PNNL 2006. (See Footnote 7)

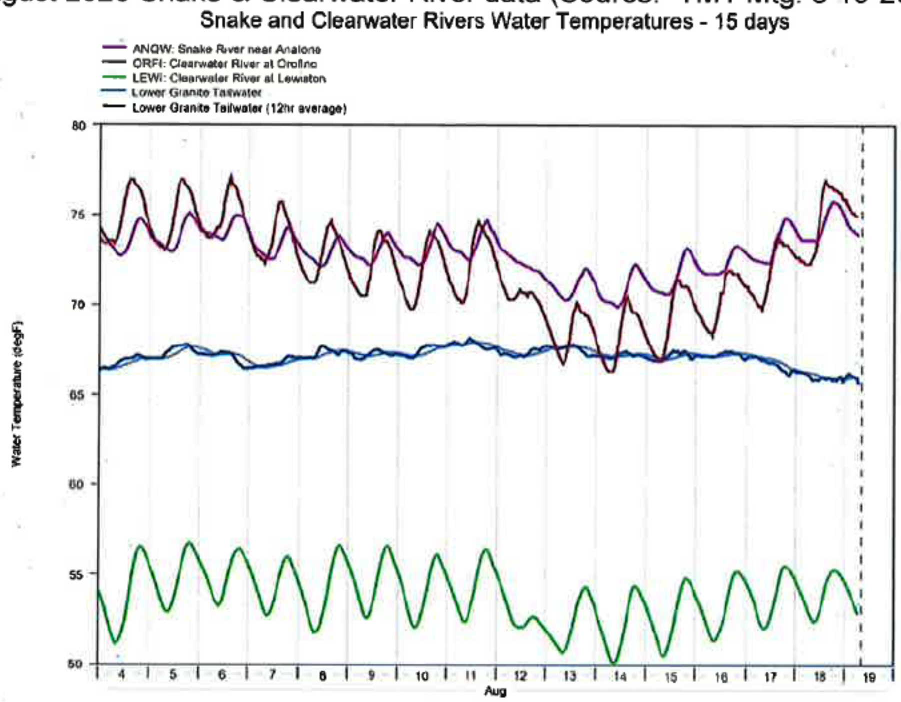
[12] This includes the four lower Snake River dams (Ice Harbor, Lower Monumental, Little Goose and Lower Granite) AND the three non-federal Hells Canyon complex dams (Brownlee—constructed 1959, Owbox—completed 1961 and Hells Canyon dam—completed 1967).

[13] 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. This finding is consistent with the Peery/Bjornn study cited, whose source is C. A. Peery and T. C. Bjornn. 2002. Water Temperatures and Passage of Adult Salmon and Steelhead in the Lower Snake River. U. S. Geologic Survey, Idaho cooperative Fish & Wildlife research Unit, Moscow, ID. It is also illustrated in Figure 6 which show water temperature inflows and outflows for Lower Granite for August 2020.

Run-of-the-river-dams, specifically the four lower Snake River dams--contrary to statements in the CLSRT TMDL--do not contribute heat and instead moderate water temperature extremes.

The following graph showing Lower Granite Dam temperature input and outputs couldn't be more current. It records information as of 8 a.m. yesterday morning. This graph shows high water temperatures upstream of Dworshak on the Clearwater River and on the mainstem Snake River near Anatone, Washington. Also, the graph shows the moderating effect of Dworshak cold water releases at the Lewiston gauge, and lastly, the graph demonstrates the moderating effects of the reservoir, as illustrated by the fact that input temperatures are increasing, cold water releases from Dworshak are slightly decreasing, but the water temperatures at the Lower Granite tailwater is decreasing August 17 – 19, 2020 when the expected result would be continued increase in temperatures.

Figure 6: August 2020 Snake & Clearwater River data (Source: TMT Mtg. 8-19-2020)



The incorrect assignment of water warming to run-of-the-river dams—forced by EPA only through manipulation of the boundary inputs of the RBM10 model, with states guiding EPA to this conclusion for political, not scientific, reasons—is for the purpose of forcing federal agencies to solve a water quality problem that is not from human activities but from air temperatures in existence prior to human record. To assert that run-of-the-river dams contribute to heat load is to ignore historic data discussed above.

Looking forward—Climate Change impacts

Numerous studies have projected that as warming continues, snowpack in the Columbia River Basin is likely to decline, winter streamflows will tend to increase, peak seasonal snowmelt season will tend to occur earlier in the spring, and summer flows will likely decrease (CRSO FEIS, July 2020, Chapter 4).

The pattern emerging from this data results in the conclusion that much of the problem attempting to be solved through a TMDL is not created by human activities and therefore requires solutions that are beyond setting a simple water quality standard for an incredibly complex series of situations.

The states of Washington and Oregon attempted to develop TMDLs, and their failure to do so is telling. How could they force a single solution when the problem is global? One single measurement does not signify success or failure for the salmonids themselves. Their needs do not align with current measurement points, and key data is lacking to determine—regardless of the heat source—what would be best for fish. Unlike the TMDLs in existence, there is not one single source of the heat problem; the most significant contribution comes from sources other than human activities (see Figure 6), and with climate change the non-human source will become more significant in the future. Where some responsibility may be attributed to storage dams, so many of the point sources are outside the study area.

The default position by the states and now EPA is to assign responsibility to the managers of just 15 federal dams. The Port theorizes that this assignment occurs because federal dam operations include resources (such as Dworshak Dam) which can, in the short-term and through very careful management, mitigate non-human sources and/or sources of heat from non-federal dams. The fairness and equity of forcing that solution needs to be carefully considered.

There's a childhood story about the people who wanted gold faster, killing the goose that laid golden eggs. There are several geese that lay golden eggs in this situation that are endangered by the CLSRT TMDL. The first is Dworshak dam. The people who live near that dam have call against the water collected there. At some point as water becomes more scarce, releases to solve warming water temperatures for fish can migrate will slow so significantly as to make little impact on increasing heat inputs or cease altogether. The fight for water will begin with the Clearwater River and specifically Dworshak dam, and then how will compliance with the CLSRT TMDL fare?

The entire Columbia/Snake hydropower system is another goose providing golden eggs—this in the form of carbon-free energy generation in facilities that are already constructed and merely need maintained. At some point, operational feasibility of the dams will cease, particularly as more and more resources for managing for fish are demanded, which occurs unfairly through the CLSRT TMDL. Politics enter that fray as well, since hydropower doesn't even get to be named "renewable" although it is essential for integrating wind and solar (which will never be adequate to serve the needs in the northwest), has zero carbon releases, and is as renewable as gravity and precipitation can make it.

EPA must not embrace narrow, short-term limited thinking on this issue. Should EPA agree with the Port that the preponderance of impact comes from natural, not human-caused conditions, they should withdraw this discussion from the TMDL arena and start asking difficult but very important questions, such as what new storage facilities should be built in the Columbia/Snake River watershed to assure that people in the Pacific Northwest have water to drink? This point in time is a tipping point. EPA can go with a political flow and keep an inadequate model that forces a unmeaningful result, or it can take on leadership responsibilities and partner with agencies in a discussion with more far-reaching longer-term benefits. We're at war with conditions that individual agencies or small collections of agencies managing 15 dams cannot begin to address on their own. It is essential that we recognize that we're at war and start planning accordingly, instead of playing games with simulations to get outcomes that satisfy popular opinion.

This is the time to begin looking forward.

OTHER COMMENTS/INFORMATION

As discussed earlier, we offer for consideration Attachment 1 to this letter, which is a white paper titled "Summary Review of State and Federal Temperature Standards, Lower Snake River" by John McKern. Mr. McKern has decades of experience first with the U.S. Army Corps of Engineers, and most recently as a consultant, on Columbia/Snake River fish issues, particularly relating to water temperature.

In addition, we would like to express our support for the comments provided by Northwest RiverPartners. As a Northwest RiverPartners member, we firmly agree with their position on the CLSRT TMDL and the need for, at a minimum, its revision.

RECOMMENDATION

The Port of Clarkston requests that EPA more deeply consider the complex problem it seeks to address in its *Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers* and provide, at a minimum, a revised 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.

If revisions are not made, the TMDL, as written, needlessly threatens the vitality of the Federal Columbia River Power System ("FCRPS") and the multiple purposes for the system as established by the United States Congress. This would contribute higher carbon load, thus increasing ambient temperatures and global climate change.

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 clean energy goals, and billions of dollars of extra costs forced on Northwest families.

Thank you again for the opportunity to comment.

Sincerely,

Wanda Keefer

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APPENDIX 1

Information from John McKern

SUMMARY REVIEW OF STATE AND FEDERAL TEMPERATURE STANDARDS, LOWER SNAKE RIVER

BY JOHN MCKERN, FISH PASSAGE SOLUTIONS, LLC
June 2020

1. This is an update of a declaration I made on temperature regulation in response to Civil No. 99-442-FR filed by the National Wildlife Federation, et. al. against the US Army Corps of Engineers for exceeding temperature and dissolved gas standards in the lower Snake River (LSR). In addition to the personal information in my declaration, I have been a consultant on Columbia Basin fish issues for over 20-years since I retired from the Corps in 2000.

2. Many of the sources of information for water temperature information have changed since the 1990s when I assembled my declaration. For example, the US Geologic Service has reduced the information reported from many of their stream gauging stations including temperature data, but some, like the Anatone gauge on the Snake River above Lower Granite Reservoir, are still being funded under the Corps Dissolved Gas Monitoring Program. Additional information is accessible through the University of Washington Data access in Real Time program (http://www.cbr.washington.edu/dart). Another significant change has been the impact of the COVID 19 Pandemic on the availability of information because many on-line library services are less accessible.

3. Extensive searching for current information and review of past information has not changed my opinion on the ability to regulate the temperature of the lower Snake River to the 20° C (68° F) standard pressed for by the plaintiffs in 1999 or in the current political atmosphere. That is:

- Historic water temperatures of the lower Snake River commonly exceeded the 20° C standard in July and August, sometime being as high as 25 to 27° C (Peery and Bjornn, 2002).

- The free-flowing Snake River ran through a 2,000 foot to 200-foot-deep arid canyon with high temperatures over 43° C in the Lewiston, ID area to 46° C near Pasco, WA. Searing summer sun and hot winds heated the shallow river too hot for summer Chinook and steelhead passage and too hot for fall Chinook spawning (Tom Meekin, Washington Department of Fisheries, pers comm). Combined with low summer flows, water temperatures were higher then than after impoundment by Ice Harbor (IHR), Lower Monumental (LMO), Little Goose (LGO), and Lower Granite (LGR) dams.

- Several commenters have stated that the primary source of water heating in reservoirs is from solar energy and mixing with hot air due to wind-wave action. This is less pronounced in the LSR reservoirs because they are run-of-river reservoirs with constant downstream water movement whereas storage reservoirs like Dworshak have far more pronounced stratification because the water is not moving. The LSR reservoirs are in a relatively narrow canyon and have converted what was a shallow, warm summertime river to four reservoirs around 20-feet deep at the upper end to 100+feet deep at the next dam. In contrast, Dworshak Reservoir (DWR) on the Northfork Clearwater River ranges from a cold mountain river a few feet deep at the upper end to 602 feet deep 2-mile-wide reservoir at the dam. The LSR reservoirs under pre-1990s circumstances did not stratify to any extent. That is, the surface water would only be a degree or so warmer than the underlying, flowing reservoir water. Dworshak, a storage reservoir, is designed to capture winter and spring flood water and store it for release over the summer. In summer, Dworshak stratifies at 24° C in the top layer, up to 20-feet deep, and 50° F (10°C) down to 40° F (4.4 °C) in the lower and deepest parts of the reservoir.

- Before the mid-1990s, LGR received waters up to 26° C from the Snake River (Anatone gauge) and 25° C from the Clearwater (Spaulding gauge). The hot water passed through LGR and about a week later reached LGO. Similarly, a week or so later, the hot water reached LMO, and another week, IHR. Liscom, et. al., 1985 published temperature data (Appendix B.6) that corroborates what I reported from Corps Annual Fish Count Reports through 1998 (EXCEL spreadsheet).

- Starting in the 1990s, the fishery agencies and tribes represented by the Fish Passage Center requested spring releases of cool water from DWR with the expressed purpose of cooling the LSR for adult salmon and steelhead migration. The Corps complied with the request and cold-water releases from DWR have morphed into a routine that enabled keeping the lower Snake River below 21° C during most summers for over two decades. Graphic representation of this affect is demonstrated in the PowerPoint file labeled Port Temperatures.Water from Hells Canyon typically enters LGR at Lewiston at up to 25° C, while Clearwater River water enters at 10° to 14° C. Thus LSR reservoirs now have significant temperature stratification because hotter Snake River water rides above the colder Clearwater River water all the way to LGR (PNNL – 15532.pdf, 2006). There colder water is passed through turbines or under normal spill gates and hotter water passes over the overflow spillway weir. The PNNL study measured temperatures near the surface and at various depth**s** that indicated surface temperature exceeding the 20° C criterion while at greater depth, temperatures were below the standard depending on the depth. That juvenile salmon and steelhead equilibrate total dissolve gas at 120 to 125 percent normal is an argument of the fishery agencies and tribes for more spill. Similarly, the fact that adult salmon and steelhead would migrate in the cooler, deeper waters should be accounted for. The ability of fall Chinook juveniles rearing in the reservoirs likewise would be able to regulate temperatures by utilizing deeper water. Turbine passage studies show that fall Chinook are distributed deeper than stream type Chinook which are guided better by turbine intake screens, and deeper than steelhead smolts that guide best by turbine intake screens. Guiding efficiency is governed by their depth in the water as it enters the turbine intakes.

- The PNNL study measured water velocities at the various sample sites too. They found that the reservoirs were flowing downstream more or less continuously even with the low summertime flows. This causes constant mixing, so stratification is not a highly defined as it is in Dworshak Reservoir.
- The current spill program has significantly changed the nature of the water temperature regimes of the LSR reservoirs. Mass spill to 120 or 125 percent TDG passes large quantities of water from about 50-feet in depth under the standard spill gates. There are seven standard gates at LGR, LGO, and LMO, and nine at IHR. Cooler water would be passed downstream through turbines because their intakes are 75 to 85-feet below the surface. Overflow weirs, one at each dam, pass 5,000 to 10,000 cfs while late summer flows range from 20,000 to 40,000 cfs.

- Hot water was entering the surface exits of the LGR and LGO fish ladders causing adult fish to delay until a pump system was installed to bring colder water up from depth around each exit so adult fish migration would not be hindered by a temperature block. Installing such features at all four LSR dams is included in the Columbia River System Operation EIS alternatives currently under public consideration.

- The EPA Columbia and Snake River TMDL report (2020) corroborates the fact that the Snake River (Anatone Gauge) mean maximum temperature exceeds the 20° C standard by 2 to 4° C during July, August, and September (2011 to 2016) while cold water from the Clearwater River typically keeps the lower Snake River 1 to 2° C cooler (Table 6.2) at LGR. Figures 6.1 through 6.3 show how water temperatures at Anatone, LGR, LGO, LMO, and IHR exceed the 20° C standard during July, August, and September (2011 to 2016).
- The EPA Columbia and Snake River TMDL report (2020) also details the temperature contribution of each dam (turbine cooling water) which is miniscule for the LSR dams. If point source permits were required, cooling water and potential oil spills would be the sources. Non-toxic vegetable oils have been used in the turbines for decades. Similarly, polychlorobiphenyl (PCB) oils were eliminated from transformers at the dams years ago.

- Case No. 18-cv-3521, COMPLAINT FOR DECLATORY RELIEF AND INJUNCTIVE RELIEF makes the case that the defendants were arbitrary, capricious, and did not act accordance with the law (Administrative Procedures Act). It appears that the defendants used the best available science in making their decisions, thus were not in violation of the APA.

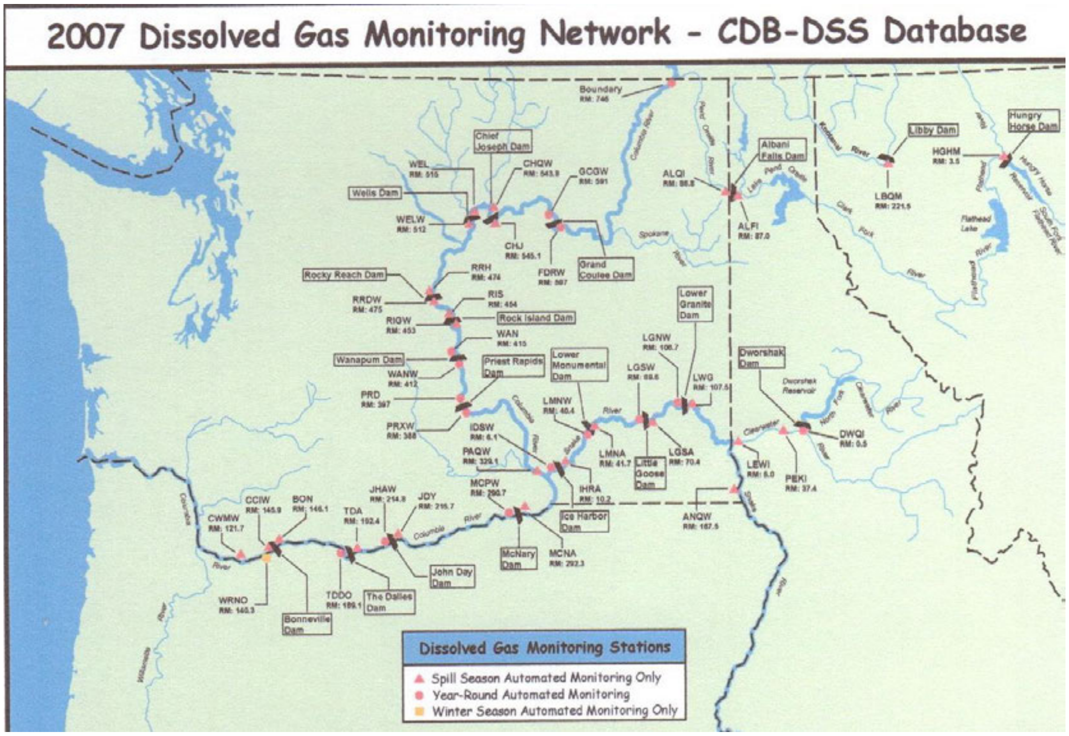
4. Although there is a great deal more information available now (some of which I was able to review), my opinion about adhering to the 20° C water temperature TMDL is not practical for the LSR. Historically, that standard was routinely exceeded during the summer months in the free flowing LSR. Installation of the four reservoirs reduced the maximum temperature to some degree by creating four deep pools that were heated by solar and air sources at a lesser degree than the shallow river. This has been reduced further with the cold water releases from Dworshak Reservoir. Though unable to meet the 20° C standard consistently, more tolerable water temperatures have been achieved. This has not occurred without complications. Now, temperature differences between the Snake River and the Clearwater River waters have caused stratification in the reservoirs as warm water has flowed above the colder water. This caused thermal block problems at LGR and LGO fish ladder exits that have been corrected. Correction of similar problems at LMO and IHR are included in future plans (CRSO-20EIS).

5. Opponents of the LSR dams appear to be pushing temperature problems as a means of forcing removal or breaching of the dams. Unfortunately, that would probably worsen rather than lessen the temperature problem. The shallow more turbulent river would be more subject to heating in the arid desert-like canyon than the deeper reservoirs experience. The PNNL report indicates that cold-water releases from Dworshak Reservoir regain some temperature from the dam down to Lewiston due to mixing with Clearwater River water from above Orofino, and due to solar and wind action in the lower Clearwater canyon.

6. It could be suggested that more cold water could be released from Dworshak Reservoir. However, Dworshak National Fish Hatchery pumps the majority of its rearing water from the Northfork below the dam. Installing a large enough pipeline from the reservoir with temperature control would be very expensive. Changing the rearing regime would be more problematic than it has been by changes thus far. The growth of steelhead and Chinook reared at DNFH is governed by water temperature. Further cooling the water pumped into the hatchery could force 1-year rearing to smolt size to 2-year rearing, reducing the mitigation capacity of the hatchery.

7. So the question remains, how do you cool the lower Snake River to meet the 20° C standard? The only way that seems feasible to me would be to install temperature control on existing storage reservoirs above Hells Canyon. Given the vast area utilizing the stored water in southern Idaho and eastern Oregon and the thermal stratification of Brownlee Reservoir, this does not seem very promising. Another option would be to construct more storage reservoirs for the purpose of providing cold water. A large storage reservoir on the Salmon River, ID, could contribute cold water like Dworshak does now, but that concept would be politically unfavorable. While I was working at the Corps, reconnaissance level studies were initiated on more storage reservoirs in the Clearwater Basin in ID, and in OR on the Grande Ronde River and Catherine Creek. A More extensive study was carried out on the Weiser River, ID. Galloway Dam was studied as a method of providing up to 700,000 acre-feet of supplementation to offset or add to the 427,000 acre-feet being supplied by the Bureau of Reclamation reservoirs under the current Water Budget. At over 300-feet high and as a direct tributary to Brownlee Reservoir, Galloway could be equipped with temperature control outlets and contribute to the cooling of Brownlee. Adding temperature control at Brownlee Dam could then contribute cooler water through Hells Canyon.

FIGURES:



https://www.nwd.usace.army mil/CRWM/Water-Quality/

REFERENCES: (Files transmitted separately)

ABSTRACTS: a variety of articles related to water temperatures, sources, authors, and dates listed.

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Case No. 3:01-CV-00640-SI, DECLARATION OF JOHN L. MCKERN IN RESPONSE TO THE INJUNCTION MOTIONS OF THE NWF PLAINTIFFS AND THE STATE OF OREGON

Case No. 18-cv-3521, COMPLAINT FOR DECLATORY RELIEF AND INJUNCTIVE RELIEF, US District Court, Northern District of California, 2018.

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PowerPoint Presentation: TEMPERATURE REGULATION LGR.

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University of Washington DART River Environment Graphics & Text:
http://www.cbr.washington.edu/dart/querv/river

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Attorneys for Federal Defendant

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF OREGON

NATIONAL WILDLIFE FED'N, et al.,	)	
	)	Civil No. 99-442-FR
Plaintiffs,	)	
	)	
v.	)	DECLARATION OF
	)	JOHN MCKERN
UNITED STATES ARMY CORPS OF ENGINEERS,	)	
	)	
Defendant.	)	

I, JOHN MCKERN hereby state and declare as follows:

1. I have been an employee of the Walla Walla District, US Army Corps of Engineers since March 1971. I have a Bachelor's Degree in Wildlife Science (1968) and a Master's Degree in Fisheries Science (1971), both from Oregon State University. I was hired by the Corps as a Fisheries Biologist to assist with fish passage facilities and operations at district dams including the lower Snake River Dams. During my career I have also served as a Fish and Wildlife Biologist in Operations Division, Chief of Fish and Wildlife Section in Operations Division, Chief of Environmental Resources Branch in Planning Division, and Special Assistant to the Commander for Environmental Policy. My current assignment is Chief of the Fisheries Management Unit in Operations Division with responsibility for fish passage and management at the McNary, Ice Harbor, Lower Monumental, Little Goose, Lower Granite, and Dworshak dams. I have been involved 28 years with fisheries issues related to the dams. I have been asked to address water temperature conditions in the lower Snake River.

2. Water temperature data has been collected in association with adult fish passage operations at Bonneville (1938), McNary (1953), The Dalles (1958), Ice Harbor (1961), John Day (1968), Lower Monumental (1969), Little Goose (1970), and Lower Granite (1975) dams since each of the dams became operational (Attachment 1). As recommended by the fishery agencies, scroll case temperatures (temperature taken from gages on the scroll cases of the turbine units) are recorded and reported with daily adult fish passage reports. Scroll case temperature was thought by the fishery agency representatives to provide the best daily average river temperature measurement. The Portland District, Corps of Engineers, provided this information to the fishery agencies, water quality agencies, and any other person on the mailing list until the advent of the Internet system. The information is currently available to the public via Internet through the Northwest Division, Corps of Engineers homepage

(http://www.nwp.usace.army.mil/op/fishdata/Adultfishcounts.htm). Annual Fish Passage Reports have been published each year by the Portland District of the Corps, and are available from 1938 through 1998. Daily temperature information is available for each day at each dam in these publications.

3. Many times during the course of my career, I have reviewed the temperature situation at the projects, and diagnosed "temperature problems." Some of my findings and conclusions over the years are represented in the following paragraphs:

4. Before the dams were constructed, water temperatures in the lower Snake River reached higher temperatures than have occurred since the dams have been in operation. The Proceedings of the Twelfth Pacific Northwest Symposium on Water Pollution Research (Public Health Service (PHS) 1963) provides the following: "The Snake River normally reaches a temperature of 65ºF late in June and quickly exceeds 70ºF. where it remains throughout the summer months…." Figure 3 on Page 47 of that document (Attachment 2) shows a maximum temperature in 1958 of approximately 80ºF, and periods exceeding 68ºF lasting for 60 to 75 days in 1955, 1956, 1957, and 1958. Ice Harbor Dam was installed in 1961, Lower Monumental in 1969, Little Goose in 1970, and Lower Granite in 1975. Therefore, water temperatures in the free flowing river before the dams were constructed exceeded the water temperature standards.

5. Many of the declarations by the plaintiffs' contain generalities about storage reservoirs that do not apply to the lower Snake River run-of-river reservoirs. From the PHS, 1963: "In general, it can be said that large and deep impoundments will decrease downstream water temperatures in the summer and increase them in the winter, if withdrawal depths are low; that shallow impoundments with large surface areas will increase downstream water temperatures in the summer; that water periodically withdrawn from the surface of a reservoir will increase

downstream water temperatures; that a reduction in normal stream flow below and impoundment will cause marked temperature increases, and **that 'run-of-river' impoundments, when the surface area has not been markedly increased over the normal river area, will produce only small increases in downstream water temperatures…."**

6. The lower Snake River reservoirs are run-of-river reservoirs that are for the most part narrow and deep. My review of the temperature data for the four reservoirs over the years indicates that temperature rises start with waters entering Lower Granite Reservoir (early to mid-July) and progress downstream through Ice Harbor Reservoir (mid July to early August) with little additional increase within the reservoirs (Attachment 3). As cool water enters Lower Granite Reservoir in late August or September, the reverse occurs with a cooling trend progressing downstream through the series of reservoirs.

7. I have reviewed the maximum water temperatures reached at each of the four lower Snake River dams for each year since they became operational. Attachments 4, 5, 6, and 7 show maximum water temperatures at Ice Harbor, Lower Monumental, Little Goose, and Lower Granite dams since they have been in place. The trend lines on these graphs show that the maximum water temperatures have declined since the dams were installed.

8. Water temperatures vary with the climate, general level of discharge, and timing of discharge in the lower Snake River. During drought years, flows all year long are typically lower than normal and water temperatures in the summer are higher. During wet years, flows may be above normal during the spring freshet, and may be above or below normal during the rest of the summer with water temperatures that are generally lower. In hot, low flow summers, warmer water enters the lower Snake River from the Clearwater and Snake rivers resulting in Lower Granite and the other reservoirs having higher water temperatures.

9. The trends of water temperatures at the four dams are downward since they went into operation (Attachments 4, 5, 6, and 7). This phenomenon is strongly influenced by the release of cold water from Dworshak Reservoir. This practice was started by the Corps on an experimental basis in 1991, and became a regular operation in the 1995 as a measure to cool off the lower Snake River for the benefit of ESA listed fall chinook. The effect is most dramatic at Lower Granite Dam where temperatures have been 71ºF or lower for the five of the past six years. From 1975 to 1991, maximum temperatures ranged from 72 to 78ºF.

10. The typical pattern of water warming up in the lower Snake River is almost entirely dependent on the inflow of warm water from the Clearwater and Snake rivers into Lower Granite and then Little Goose Reservoir. There are no significant tributaries from the confluence of the Snake and Clearwater until below Little Goose Dam. The Palouse and Tucannon rivers enter Lower Monumental Reservoir below Little Goose Dam and influence temperatures in Lower Monumental and Ice Harbor reservoirs.

11. The maximum water temperature of record at the Spalding Gage on the Clearwater River above Lower Granite Reservoir was 82ºF (28ºC), August 13, 1963. However, temperatures at the Spalding Gage are influenced by cold water discharges from Dworshak Reservoir on the North Fork of the Clearwater River. Just up the main Clearwater River above the North Fork at the Orofino gage where temperatures are not affected by Dworshak releases, water temperatures reached 85ºF (29.5ºC), July 25, 1994, and 78ºF (25.5ºC), August 7, 1997 (USGS, 1997). Temperatures at the Anatone Gage in the Snake River just above Lower Granite Reservoir reflect the combined water temperatures from the Salmon, Grande Ronde, and Imnaha rivers, and the Snake River from Hells Canyon. Hells Canyon water temperatures are affected by the

temperatures of releases from Brownlee Reservoir (a storage reservoir) as passed through the Oxbow and Hells Canyon (run-of-river) reservoirs. Maximum water temperature at the Anatone gage was 78ºF (25.5ºC), August 26, 1991, and 74ºF (23.5ºC), August 6-7, 22-23 in 1997 (USGS, 1997). In 1998, maximum water temperatures equaled the 1991 mark of 78ºF (USGS, 1998). In summary, this data shows that as discharge from the Snake and Clearwater rivers warms up in the summer, the lower Snake River warms up starting with Lower Granite Reservoir and working on downstream over a matter of a few days. As the weather cools, and cool water starts coming in from the Clearwater and Snake rivers, the reservoirs cool off from Lower Granite working downstream to Ice Harbor Reservoir.

12. The four lower Snake River reservoirs are run-of-river reservoirs, not to be confused with storage reservoirs. Storage reservoirs are typically large reservoirs with large surface areas. The surface waters warm during the summer, and the reservoirs typically stratify (develop layers of warm water above the cool water below). Currents in run-of-river reservoirs typically mix the water and prevent stratification even during summer low flow periods. There may be localized warming in shallow areas, but the reservoirs are usually within 1 or 2ºF from top to bottom. This is the case with the lower Snake River reservoirs.

13. The allegation is made that the Snake River reservoirs have increased the number of days the temperature exceeds the 68ºF (20ºC) standard. I found that from 1955 through 1958 (before the dams were in operation), temperatures exceeded 68ºF for 60 to 75 days per year (Attachment 2). At Ice Harbor Dam, the number of days that water temperatures exceeded 68ºF ranged from 0 in 1993 to over 81 in 1987 (Attachment 8). The average number of days over 68ºF was 49 days, considerably less that the 60 to 75 days from the 1955 – 1958 data. At Lower Monumental, Little Goose, and Lower Granite dams, the average number of days exceeding the standard was

45, 44, and 44 days respectively, again well below the number of days from the period before the dams. Trends for maximum temperatures have been downward at all four dams (Attachments 9, 10, 11, and 12). At Little Goose Dam, where there is a significant break in the data because fish counting was discontinued for a number of years, the trend for days exceeded is slightly upward (Attachment 11). The trend is consistently downward at the other three dams. Low flows from the Clearwater and Snake rivers and hot summertime temperatures contributed to the longer period of exceeding the standard in some years, but maximum temperatures have been lower since 1991 in all four reservoirs due to cold water releases from Dworshak Reservoir. The cooler waters from the Clearwater have mixed with the warmer waters from the Snake River resulting in cooler waters in the lower Snake River reservoirs.

14. When I looked at when temperatures exceeded the standard, it was apparent that the first day of exceeding typically came earlier at Lower Granite Dam than at Little Goose. The first day at Little Goose typically came before the first day at Lower Monumental and the first day at Lower Monumental before the first day at Ice Harbor (Attachment 8). This indicates that warm water from the Snake and Clearwater rivers was moving down through the system. The same trend was apparent for the last day exceeding the standard. This indicates that cool water was moving from the Snake and Clearwater rivers down through the reservoir system. If the reservoirs were causing significant heating in the river, and the temperatures of the tributaries were not having a significant influence, I would expect the warming trend to progress from Ice Harbor reservoir, upstream. The reason why is because the canyon is shallower, and the climate hotter and dryer in the Ice Harbor area than in the area of the upper reservoirs.

15. The plaintiffs allege that the way the Corps is operating the dams causes increased water temperatures. I am convinced that the water temperatures in the reservoirs are controlled

primarily by the water temperatures coming into Lower Granite Reservoir from the Snake and Clearwater rivers, and into the lower two reservoirs from the Tucannon and Palouse rivers. There are no operational measures that I know of that the Corps could take at the Lower Snake River dams that would measurably reduce the temperature of the waters in the reservoirs. The Corps is making cold water releases from Dworshak Reservoir that, as I have described, make a substantial difference in lowering water temperatures in the lower Snake River.

16. Based on my review of the data, and over 28 years of experience in dealing with temperature issues related to dam operations, it is my conclusion that the water of the lower Snake River does not get as warm as it did before the dams were installed. It is also my conclusion that water temperatures are determined more by the temperature of inflow from the main river and tributaries than by the heating of surface waters in the run-of-reservoirs. The reservoirs may slow the passage of hot water down the river, but the length of time criteria are exceeded is less than it was before the dams were installed.

17. Pursuant to 28 U.S.C. §1746, I declare under penalty of perjury that the foregoing is true and correct. Executed on September 24, 1999.

____

John McKern
Chief, Fisheries Management Unit
Walla Walla District
U.S. Army Corps of Engineers

MAXIMUM WATER TEMPERATURES AT CORPS DAMS

YEAR	BON		MCN		IHR					LMO					LGO					LWG				
	Degrees F	Degrees C	Degrees F	Degrees C	Degrees F	Degrees C	Days over 68	First Day	Last Day	Degrees F	Degrees C	Days over 68	First Day	Last Day	Degrees F	Degrees C	Days over 68	First Day	Last Day	Degrees F	Degrees C	Days over 68	First Day	Last Day
38	72	22.22																						
39	70	21.11																						
40	70	21.11																						
41	73	22.78																						
42	71	21.67																						
43	71	21.67																						
44	68	20.00																						
45	71	21.67																						
46	70	21.11																						
47	69	20.56																						
48	67	19.44																						
49	71	21.67																						
50	70	21.11																						
51	70	21.11																						
52	70	21.11																						
53	70	21.11																						
54	66	18.89	64	17.78																				
55	69	20.56	68	20.00																				
56	71	21.67	71	21.67																				
57	69	20.56	71	21.67																				
58	74	23.33	73	22.78																				
59	68	20.00	68	20.00																				
60	70	21.11	70	21.11																				
61	72	22.22	73	22.78			No data.	---	---			No data.	---	---			No data.	---	---			No data.	---	---
62	71	21.67	69	20.56	76	24.44	60	16 July	13 Sept.			No data.	---	---			No data.	---	---			No data.	---	---
63	70	21.11	72	22.22	76	24.44	71	13 July	21 Sept.			No data.	---	---			No data.	---	---			No data.	---	---
64	69	20.56	68	20.00	72	22.22	47	15 July	30 Aug.			No data.	---	---			No data.	---	---			No data.	---	---
65	72	22.22	71	21.67	75	23.89	42	21 July	31 Aug.			No data.	---	---			No data.	---	---			No data.	---	---
66	68	20.00	70	21.11	75	23.89	60	14 July	11 Sept.			No data.	---	---			No data.	---	---			No data.	---	---
67	73	22.78	72	22.22	76	24.44	75	12 July	30 Sept.			No data.	---	---			No data.	---	---			No data.	---	---
68	71	21.67	69	20.56	75	23.89	54	9 July	9 Sept.			No data.	---	---			No data.	---	---			No data.	---	---
69	70	21.11	70	21.11	73	22.78	57	19 July	13 Sept.			No data.	---	---			No data.	---	---			No data.	---	---
70	71	21.67	71	21.67	73	22.78	61	13 July	11 Sept.	74	23.33	No data.	---	---			53	10 July	3 Sept.			No data.	---	---
71	73	22.78	70	21.11	74	23.33	54	25 July	16 Sept.	75	23.89	54	22 July	13 Sept.	76	24.44	54	18 July	9 Sept.			No data.	---	---
72	70	21.11	69	20.56	73	22.78	36	9 Aug.	13 Sept.	73	22.78	39	5 Aug.	13 Sept.	73	22.78	42	1 Aug.	12 Sept.			No data.	---	---
73	72	22.22	71	21.67	72	22.22	42	22 July	7 Sept.	72	22.22	43	25 July	5 Sept.	74	23.33	46	13 July	2 Sept.			No data.	---	---
74	71	21.67	70	21.11	72	22.22	46	30 July	13 Sept.	71	21.67	48	27 July	12 Sept.	74	23.33	51	23 July	14 Sept.			No data.	---	---
75	70	21.11	69	20.56	71	21.67	29	28 July	31 Aug.	70	21.11	33	31 July	1 Sept.	70	21.11	37	25 July	30 Aug.	76	24.44	35	21 July	25 Aug.
76	69	20.56	67	19.44	71	21.67	44	30 July	16 Sept.	70	21.11	41	7 Aug.	7' Sept.	71	21.67	38	28 July	13 Sept.	72	22.22	51	18 July	10 Sept.
77	74	23.33	73	22.78	73	22.78	43	27 July	7 Sept.	71	21.67	35	27 July	11 Sept.	72	22.22	26	10 Aug.	4 Sept.	76	24.44	49	28 June	5 Sept.
78	72	22.22	71	21.67	72	22.22	28	3 Aug.	8 Sept.	72	22.22	38	30 July	5 Sept.	72	22.22	29	30 July	27 Aug.	75	23.89	35	20 July	10 Sept.
79	72	22.22	72	22.22	73	22.78	74	19 July	30 Sept.	73	22.78	67	24 July	28 Sept.	74	23.33	64	22 July	24 Sept.	74	23.33	59	17 July	17 Sept.
80	71	21.67	69	20.56	72	22.22	48	31 July	16 Sept.	71	21.67	40	24 July	2 Sept.	73	22.78	43	22 July	3 Sept.	74	23.33	39	21 July	28 Aug.
81	74	23.33	70	21.11	73	22.78	55	29 July	30 Sept.	74	23.33	55	1 Aug.	24 Sept.	73	22.78	61	23 July	21 Sept.	78	25.56	64	17 July	18 Sept.
82	72	22.22	70	21.11	72	22.22	35	14 Aug.	17 Sept.	72	22.22	52	26 July	15 Sept.	73	22.78	49	29 July	15 Sept.	74	23.33	46	26 July	12 Sept.
83	71	21.67	71	21.67	73	22.78	40	8 Aug.	16 Sept.	74	23.33	42	5 Aug.	17 Sept.		-17.78	No data.	---	---	74	23.33	41	30 July	9 Sept.
84	71	21.67	72	22.22	73	22.78	60	20 July	17 Sept.	73	22.78	49	26 July	12 Sept.		-17.78	No data.	---	---	74	23.33	46	23 July	6 Sept.
85	73	22.78	74	23.33	75	23.89	51	17 July	5 Sept.	73	22.78	54	10 July	1 Sept.		-17.78	No data.	---	---	74	23.33	49	7 July	28 Aug.
86	72	22.22	72	22.22	75	23.89	73	9 July	19 Sept.	74	23.33	52	9 July	20 Sept.		-17.78	No data.	---	---	74	23.33	62	30 June	12 Sept.
87	72	22.22	70	21.11	72	22.22	81	4 July	22 Sept.	71	21.67	71	12 July	20 Sept.		-17.78	No data.	---	---	73	22.78	74	26 June	15 Sept.
88	71	21.67	71	21.67	72	22.22	53	27 July	17 Sept.	72	22.22	50	25 July	12 Sept.		-17.78	No data.	---	---	73	22.78	85	25 June	20 Sept.
89	71	21.67	70	21.11	71	21.67	50	25 July	12 Sept.	71	21.67	49	25 July	11 Sept.		-17.78	No data.	---	---	74	23.33	47	13 July	28 Aug.
90	75	23.89	71	21.67	73	22.78	70	24 July	1 Oct.	73	22.78	59	30 July	26 Sept.		-17.78	No data.	---	---	77	25.00	77	3 July	18 Sept.
91	73	22.78	72	22.22	74	23.33	49	1 Aug	18 Sept.	74	23.33	44	5 Aug.	17 Sept.	76	24.44	55	23 July	16 Sept.	76	24.44	55	12 July	12 Sept.
92	73	22.78	71	21.67	71	21.67	43	16 July	10 Sept.	71	21.67	50	10 July	13 Sept.	72	22.22	49	4 July	10 Sept.	72	22.22	25	* 1 July	* 28 Aug.
93	72	22.22	70	21.11	68	20.00	0	---	---	68	20.00	0	---	---	72	22.22	40	8 Aug.	29 Sept.	69	20.56	8	18 Aug.	5 Sept.
94	73	22.78	73	22.78	70	21.11	18	16 July	5 Aug.	71	21.67	30	* 13 July	* 20 Sept.	72	22.22	28	* 8 July	* 2 Oct.	73	22.78	32	* 17 July	* 11 Sept.
95	72	22.22	71	21.67	70	21.11	18	25 July	11 Aug.	70	21.11	23	19 July	10 Aug.	72	22.22	26	16 July	9 Aug.	68	20.00	0	---	---
96	71	21.67	69	20.56	70	21.11	41	23 July	1 Sept.	70	21.11	41	20 July	29 Aug.	71	21.67	53	12 July	2 Sept.	70	21.11	23	22 July	16 Aug.
97	72	22.22	70	21.11	71	21.67	44	21 July	5 Sept.	71	21.67	28	3 Aug.	8 Sept.	71	21.67	57	1 Sept.	26 Sept.	71	21.67	26	21 Aug.	17 Sept.
98	75	23.89	74	23.33	73	22.78	52	* 19 July	* 8 Oct.	73	22.78	75	17 July	30 Sept.	72	22.22	82	12 July	1 Oct.	70	21.11	36	* 10 July	* 25 Sept.

NOTES:
Highest temperatures usually occur in August at all dams, but with unseasonably warm weather, may occur in late July or with prolonged hot weather, in September.
Blanks for Little Goose (1983-90) are for years when data was not reported.

* Temperatures over 68 degrees F occurred between 2 periods.

IH, 1998 19 July-5 Sept., 46 days over 68 F
3 Oct.-8 Oct., 6 days over 68 F

LM, 1994 13 July-21 July, 9 days over 68 F
31 Aug.-20 Sept., 21 days over 68 F

LGO, 1994 8 July-4 Aug., 28 days over 68 F
24 Aug.-2 Oct., 40 days over 68 F

LWG, 1992 1 July, 1 day over 68 F
5 Aug.-28 Aug., 25 days over 68 F

LWG, 1994 17 July-19, 3 days over 68 F
13 Aug.-11 Sept., 29 days over 68 F

LWG, 1998 10 July-July 22, 5 days over 68 F
7 Aug.-25 Aug., 7 days over 68 F
2 Sept.-25 Sept., 24 days over 68 F

CEREO

Many people have expressed concern about the lower Snake River reservoirs raising water temperatures threatening the salmon runs.

The Snake River starts in Yellowstone Park where it runs into Jackson Lake then flows out at Teton Dam in Wyoming as a sizable river. For the first many miles it flows through Grand Teton National Park as a cold-water river. In Grand Teton Park and from its boundary southward, waters are diverted for irrigation. From there it flows into the Grand Canyon of the Snake toward the border with Idaho. Palisades Dam downstream in Idaho stores water for irrigation backing water back to the border and for a short distance in Wyoming.

The Snake River Plain extends from Palisades west and north to Boise. The area of southern Idaho from Palisades to Milner Dam is heavily irrigated, some 250,000 acres, with water from the Snake, tributaries, and pumped from the aquafer. The flow at Milner Dam has been zero at times in recent years. Wastewater laden with silt, chemicals and nutrients returns to the river or is pumped or drained back into the aquifer.

On downstream, water returns to the Snake at Thousand Springs, and supplemented by runoff and flow from other tributaries, it is a sizable river once again. Dams downstream on the Snake and major tributaries impound the waters for irrigation of the Snake River Plain, another 300,000 or more acres. The Snake is loaded with silt, chemicals, and nutrients and water is heated in the storage reservoirs and on the land before it returns.

In Hells Canyon, Brownlee and Oxbow dams are storage dams for flood control and power, and Hells Canyon Dam reregulates flows and generates power. Heated waters from southern Idaho flow through Hells Canyon to the lower Snake where they typically enter Lower Granite Reservoir with high temperatures up to 78 degrees.

Water coming in from the Clearwater River historically reached up to 75 degrees. In the mid-1990s, the Corps began releasing cool water from Dworshak Reservoir to cool the lower Snake River. This was a complex procedure because Dworshak Hatchery pumps water from the North Fork below the dam for rearing steelhead and spring Chinook salmon. Juvenile salmon growth is controlled by water temperature, so temperature of water released at the dam had to be carefully regulated to rear fish to release size in one year. This was achieved with regulating gates in the dam and cool water from Dworshak has allowed the Corps to keep lower Snake River below 70 degrees almost every year and below 68 degrees much of the summer each year.

In Lower Granite Reservoir, the cool water from the Clearwater flows under the warm water from Hells Canyon. In an infrared photography project in the 1990s, photographs of barge tows on the reservoir clearly showed the wake stirred up cool water while the surface water ahead and to the sides of the tow was notably warmer. Incidentally the infrared pictures of water entering the Snake from the Grand Ronde and Imnaha, undammed tributaries, was in the high 70’s.

Because the warm water rides above the cool water warm water in the Lower Granite fish ladder was a concern. The Corps solved this problem by pumping cool water up at the fish ladder exit where it goes into the ladder. Before, warm water caused fish to stop in the ladder, where they now pass safely upstream. This problem can occur to a lesser degree at Little Goose, Lower Monumental, and Ice Harbor dams, but now a solution to the problem is known. Nonetheless, warm water continues from Hells Canyon downstream, and in a deposition in a 1990s lawsuit by environmentalists against the Corps for violating temperature and total dissolved gas state standards, I tracked the progress dam by dam, and it clearly showed that the warm water was coming from Hells Canyon and the Clearwater River, not heating up in the lower Snake River Reservoirs.

In that same deposition I found historic data that showed the undammed lower Snake River reached up to 83 degrees whereas after Ice Harbor Dam began operating, the maximum temperature was 77 degrees. University of Idaho researchers corroborated my finding with 1950s data showing the temperature of the Snake at the mouth up to 80 degrees.

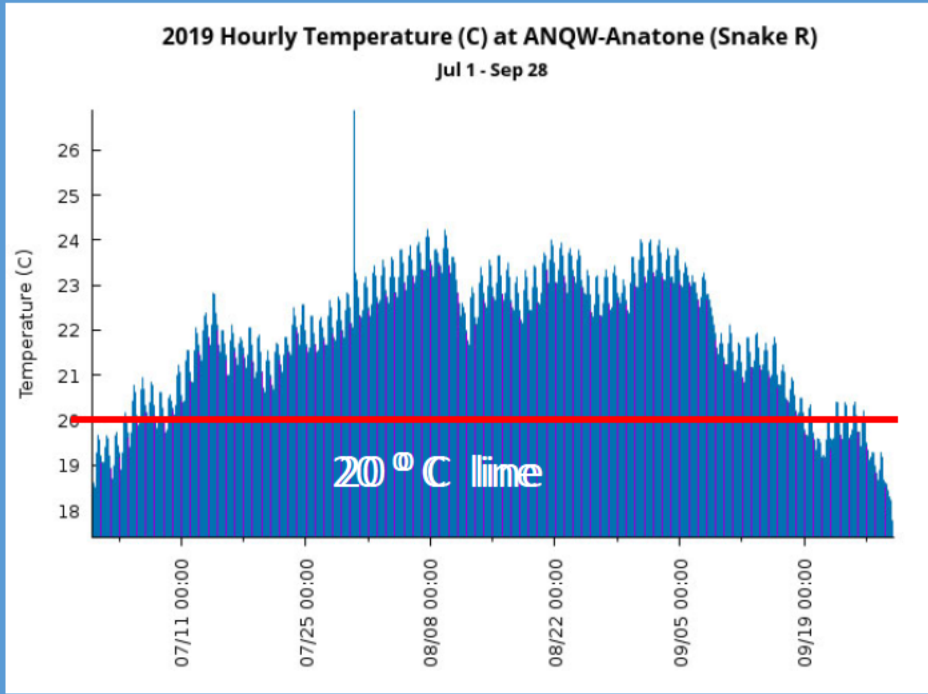
In current and recent lawsuits, environmentalists have asserted that water in all reservoirs heats up. That is true in reservoirs where there is no current to mix warmer water with cooler water. Storage reservoirs like those in southern Idaho and Dworshak Reservoir are subject to surface warming in the summer. They stratify with a warmer layer above and colder water below. If you have gone swimming in Dworshak Reservoir in August, you may have been in 75-degree water with your toes in 50-degree water. The lower Snake River reservoirs are run-of-river reservoirs. Limnology studies showed that except in limited backwater areas, there is very little heating of surface waters because they are continually moving. Even during low flows of late summer or in the winter, the waters are mixing all the time.

In the deposition mentioned above, I reiterated that the state dissolved gas standards, set in the 1970s when gas supersaturation caused by the dams was the big concern for salmon survival, were set at 110 percent. They would have been set even lower, but water coming from Hells Canyon was already at 108 percent. Since then, the fishery agencies and tribes have concluded that salmon can swim deeper in the water and can withstand up to 120 percent. Now they are going even higher, temporarily raising the limits to 125 percent. Those of us who were involved in the 1970s compare this to putting more bullets in the gun while playing Russian Roulette.

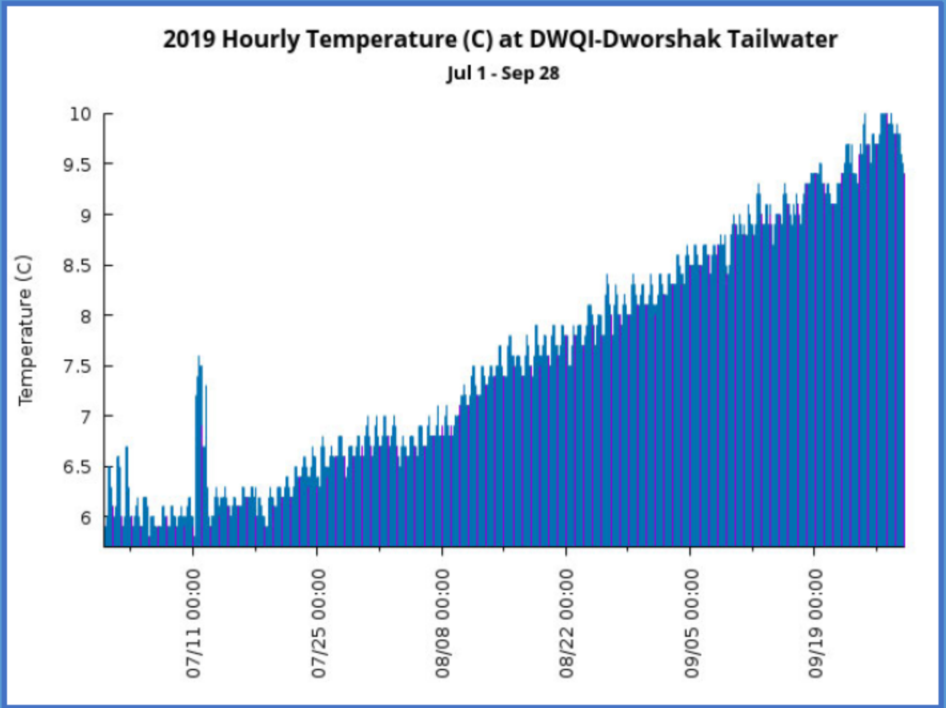
So why have there been continuous efforts to breach the lower Snake River dams for three decades? It’s the water. Idahoans do not want anybody taking any of their water. Any water than gets out of Idaho without irrigating a crop or generating a kilowatt is wasted. The Idaho legislature made this clear. So, they target the lower Snake River dams.

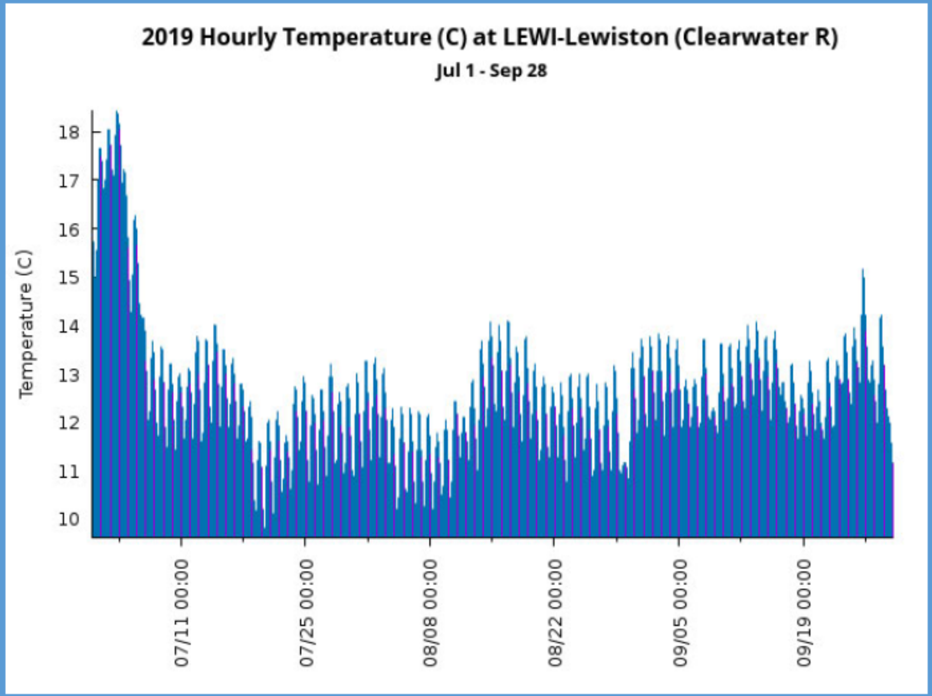
John McKern, Fish and Wildlife Biologist

Retired 2000

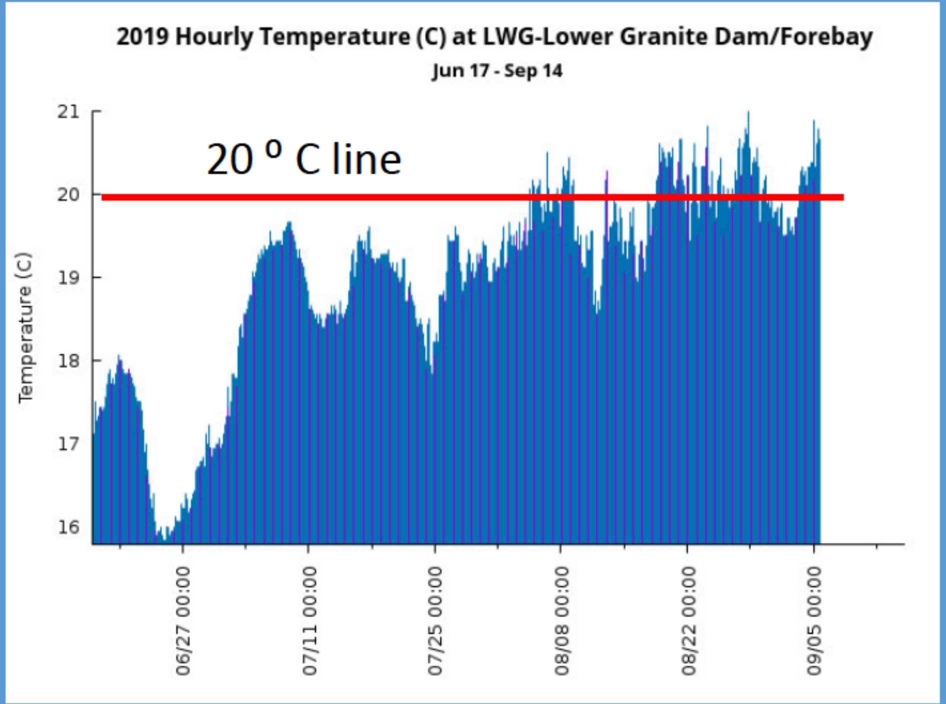


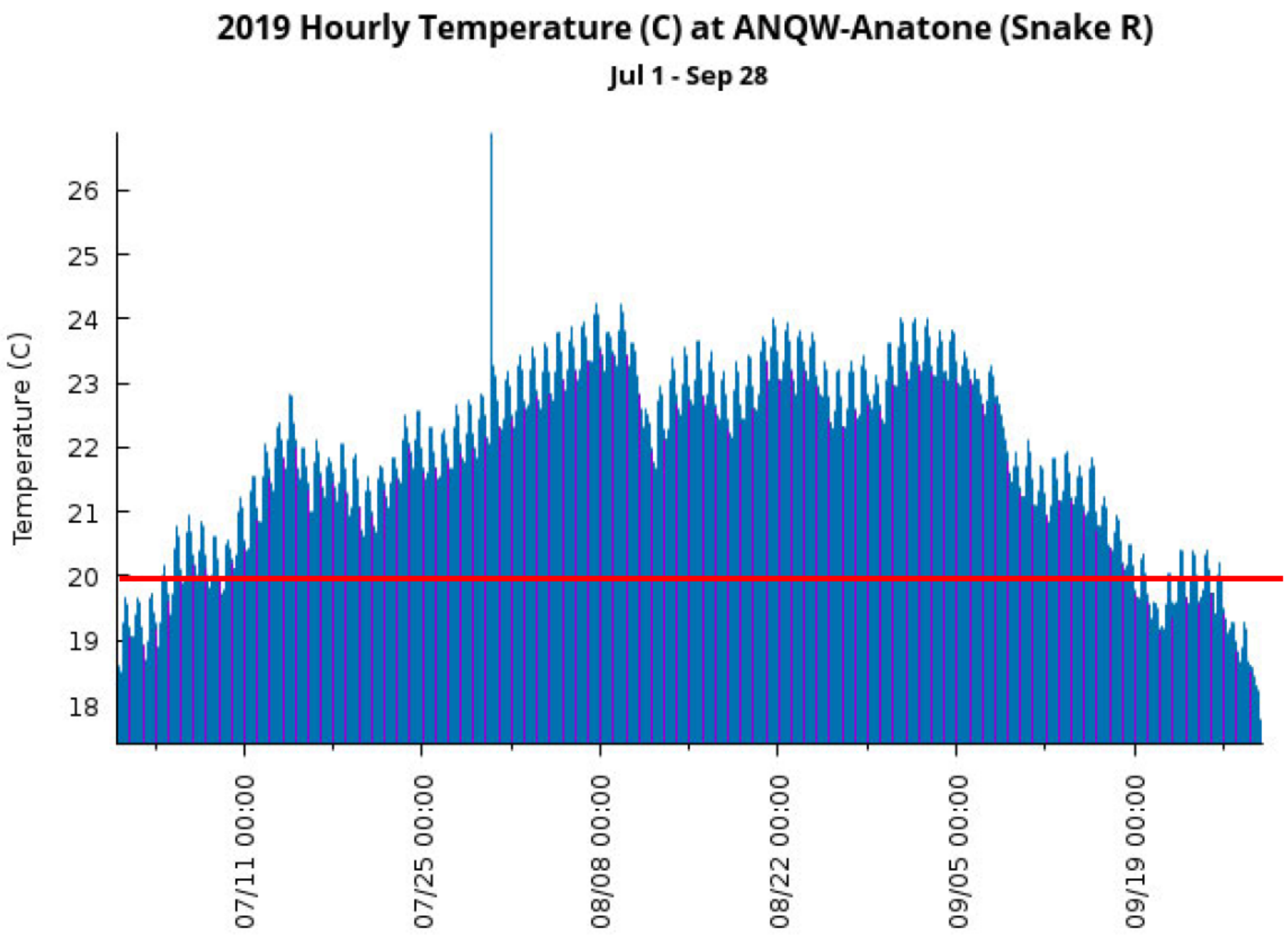
TEMPERATURE EFFEST OF COLD WATER RELEASES FROM DWORSHAK RESERVOIR - 2019



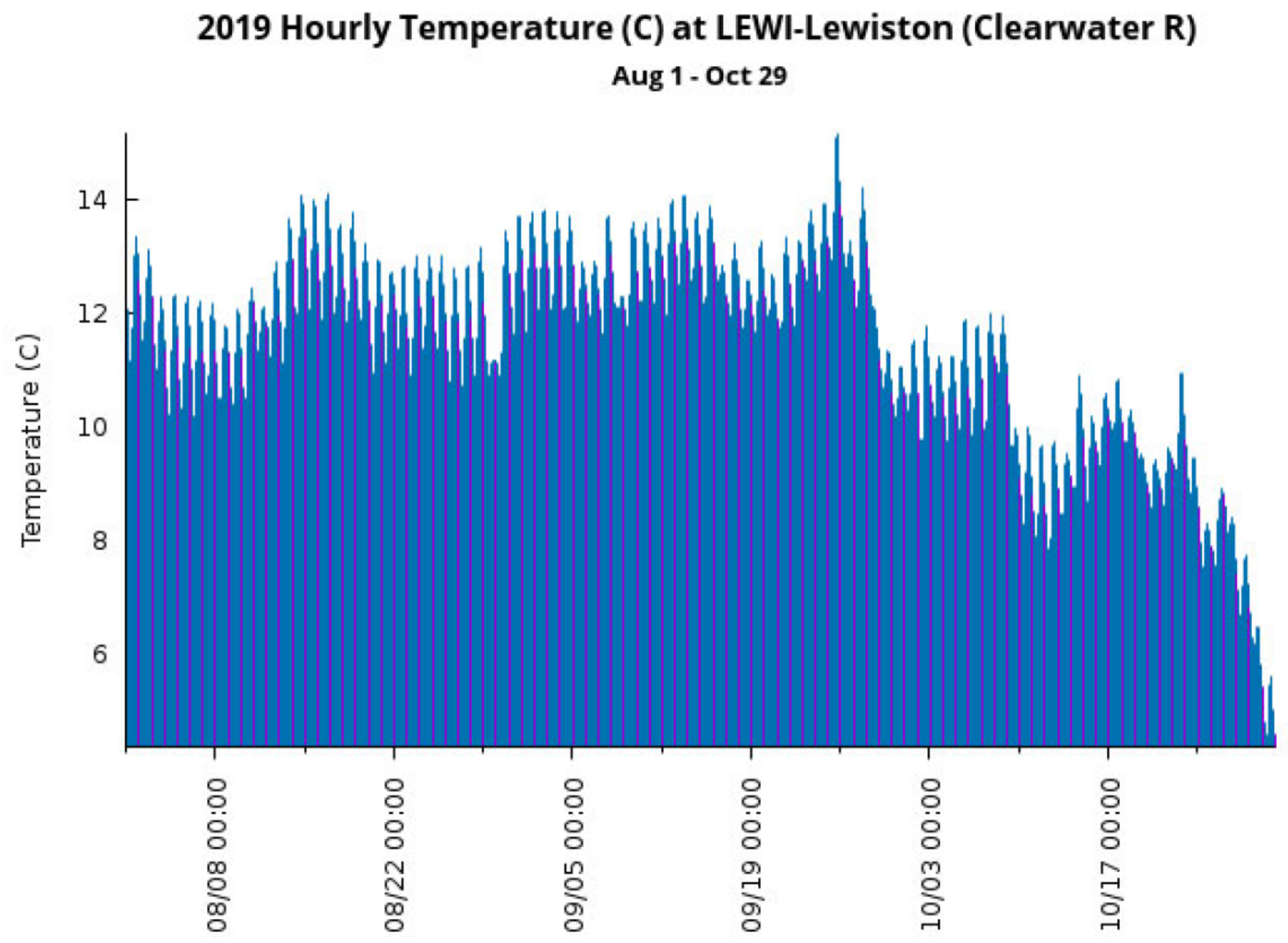


NOTE THE DIFFERENT TE,MPERATURE SCALES OF THE GRAPHS

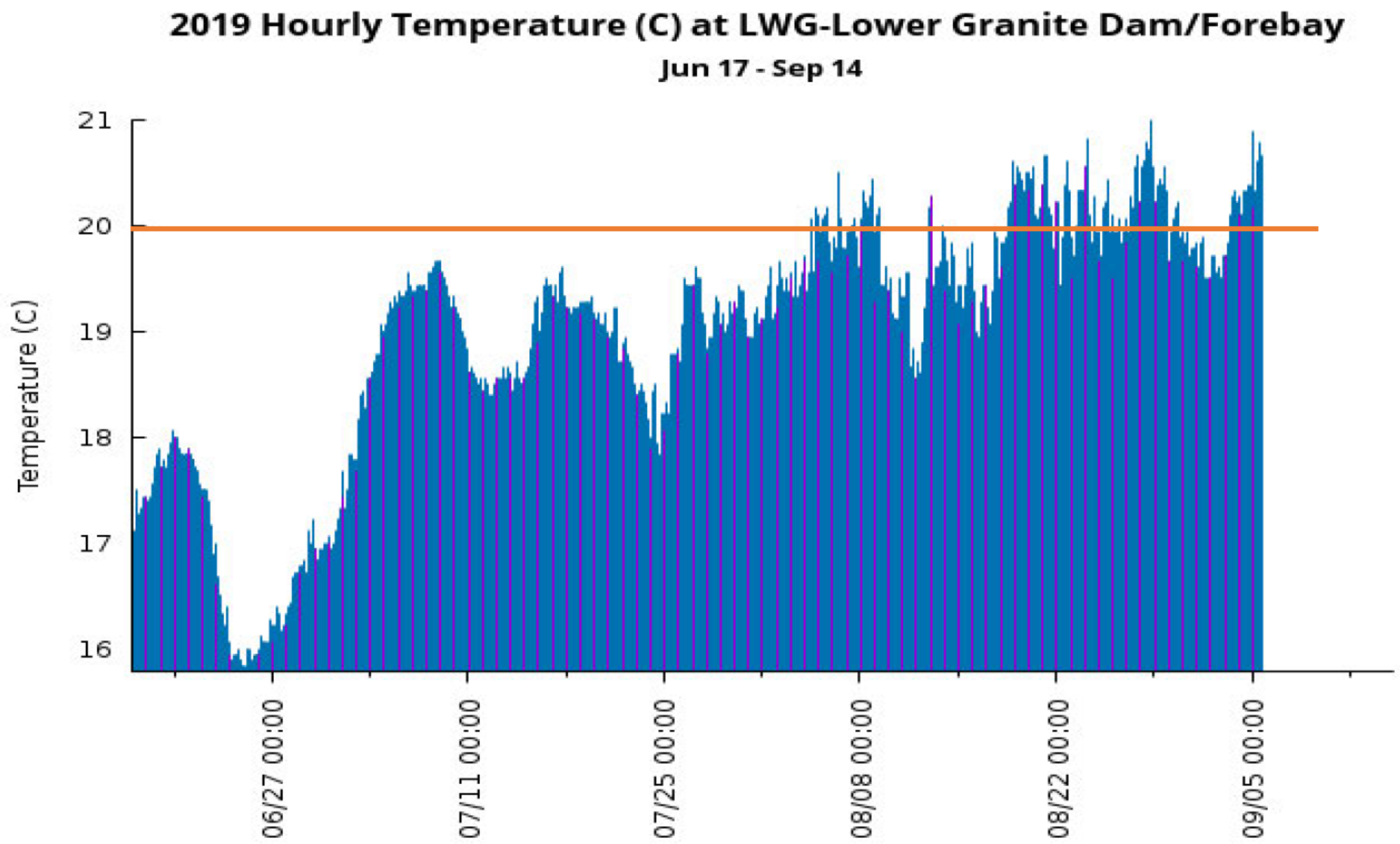


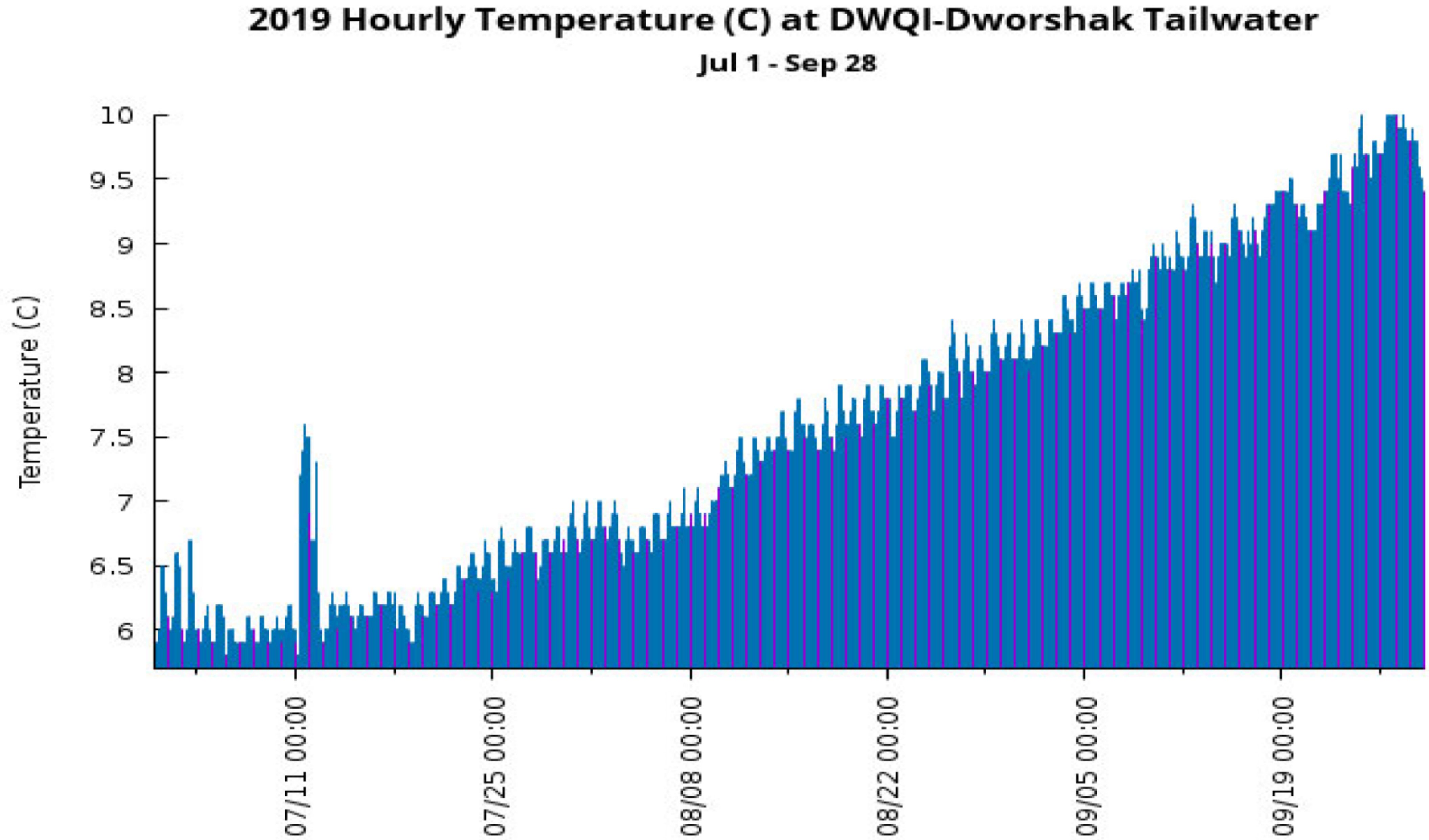


2019 Hourly Temperature (C) at ANQW-Anatone (Snake R)
Jul 1 - Sep 28
Temperature (C)
26
25
24
23
22
21
20
19
18
07/11 00:00
07/25 00:00
08/08 00:00
08/22 00:00
09/05 00:00
09/19 00:00



2019 Hourly Temperature (C) at LEWI-Lewiston (Clearwater R)
Aug 1 - Oct 29
Temperature (C)
14
12
10
8
6
08/08 00:00
08/22 00:00
09/05 00:00
09/19 00:00
10/03 00:00
10/17 00:00


2019 Hourly Temperature (C) at LWG-Lower Granite Dam/Forebay
Jun 17 - Sep 14
Temperature (C)
21
20
19
18
17
16
06/27 00:00
07/11 00:00
07/25 00:00
08/08 00:00
08/22 00:00
09/05 00:00


2019 Hourly Temperature (C) at DWQI-Dworshak Tailwater
Jul 1 - Sep 28
Temperature (C)
10
9.5
9
8.5
8
7.5
7
6.5
6
07/11 00:00
07/25 00:00
08/08 00:00
08/22 00:00
09/05 00:00
09/19 00:00

July 21, 2020

Mr. Andrew Wheeler
Administrator
Environmental Protection Agency

Ms. Mary Lou Soscia
Columbia River Coordinator
Environmental Protection Agency

Ms. Laurie Mann
Washington TMDL Program Manager
Environmental Protection Agency

Dear Mr. Wheeler, Ms. Soscia and Ms. Mann:

On behalf of the Port of Whitman County Commissioners, thank you for the opportunity to comment on the *Total Maximum Daily Load for Temperature on the Columbia and Lower Snake Rivers*.

The Port of Whitman County is a public port district located in southeastern Washington. Our mission to improve the quality of life for all citizens of Whitman County through industrial real estate development, preservation of multi-modal transportation, facilitation of economic development and provision of on-water recreational opportunities.

We own and operate three on-water ports along the lower Snake River in Washington: Port of Wilma, Port of Almota and Port of Central Ferry. Together, these ports employ 357 people and generate nearly $30 million in gross regional product, according to a 2017 economic analysis. In addition, we operate and maintain Boyer Park & Marina in Colfax, Washington, which offers one of the few places to recreate on water in Whitman County. As you know, two federal dams – Lower Granite and Lower Monumental – make these sites possible.

They also provide our community with water, navigation, trade and power. The river system is truly the lifeblood of our rural communities and businesses. Its benefits to trade are dramatic on the Palouse, where the greatest amount of wheat of any county in the nation is grown and transported internationally – much of which first travels to Portland by barge.

We support the measures outlined in the preferred alternative of the Columbia River System Operations Draft Environmental Impact Statement (DEIS), which will improve fish passage, while continuing to operate the dams for their many Congressionally mandated purposes. On March 17, we issued a public comment on the DEIS to express this viewpoint.

Similarly, we would like to see a balance achieved in this TMDL process. While water temperature is a significant concern for fish populations, assigning unattainable standards sets dam operators up for certain failure. It is clear that the states of Washington and Oregon intend to base energy and environmental policy on this report. Unfortunately, this could force a dam breaching outcome, which would run counter to the objective of the TMDL.

“Opponents of the LSR dams appear to be pushing temperature problems as a means of forcing removal or breaching of the dams,” writes John McKern, U.S. Army Corps of Engineers fish and wildlife biologist (retired). “Unfortunately, that would probably worsen rather than lessen the temperature problem. The shallow, more turbulent river would be more subject to heating in the arid desert-like canyon than the deeper reservoir’s experience.”

Recently, Mr. McKern wrote an update to his 1999 declaration on temperature regulation in response to Civil No. 99-442-FR filed by the National Wildlife Federation, et. al. against the U.S. Army Corps of Engineers for exceeding temperature and dissolved gas standards in the lower Snake River. Extensive research on current information sources has not changed the biologist’s opinion on the ability to regulate the temperature of the lower Snake River to the 20°C (68°F) standard.

KEY POINTS

These are the key points drawn from Mr. McKern’s research:

- A 2002 study of historic water temperatures in the Lower Snake River for the U.S. Army Corps of Engineers (USACE) found that the lower portion of the free-flowing Snake River commonly exceeded the 20°C (68°F) standard in July and August, sometimes running as high as 25-27°C[1].
- The free-flowing Snake River ran through a 2,000-foot to 200-foot deep arid canyon with high temperatures over 43°C in the Lewiston, ID area to 46° C near Pasco, WA. Searing summer sun and hot winds heated the shallow river to temperatures too high for summer Chinook and steelhead passage, as well as fall Chinook spawning. Combined with low summer flows, water temperatures were higher than after impoundment by Ice Harbor (IHR), Lower Monumental (LMO), Little Goose (LGO) and Lower Granite (LGR) dams.
- Installation of the four reservoirs along the Lower Snake River in the 1960s and 70s reduced peak temperatures by creating four deep pools, ranging from 20 feet deep at the upper end to over 100 feet deep at the next dam. These pools are heated by solar and air

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

sources to a lesser degree than a shallow, free-flowing river. Cold-water releases from Dworshak Reservoir have further reduced temperatures. Though unable to meet the 20°C standard consistently, more tolerable water temperatures have been achieved.

- Several commenters have stated that the primary source of water heating in reservoirs is from solar energy and mixing with hot air due to wind-wave action. This is less pronounced in the Lower Snake River reservoirs because they are run-of-river reservoirs with constant downstream water movement; whereas, storage reservoirs like Dworshak have far more pronounced stratification because the water is not moving.
- Starting in the 1990s, the fishery agencies and tribes represented by the Fish Passage Center requested spring releases of cool water from DWR with the expressed purpose of cooling the Lower Snake River for adult salmon and steelhead migration. The Corps complied with the request and cold-water releases from DWR have morphed into a routine that enabled keeping the lower Snake River below 20°C during most summers for over two decades.

RECOMMENDATION

Based on this research, as well as the comments of our partner organization, Northwest RiverPartners, we recommend the implementation of a multi-dimensional model for analysis. As Northwest RiverPartners commented, "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 should rest."

The selected model should be able to replicate the effects of river impoundment shown in the 2002 USACE study, maintain consistency in its inclusion or exclusion of dams as part of the free-flowing river and incorporate the entirety of the Columbia and Snake river basins.

Thank you again for the opportunity to comment. We ask that you please incorporate these recommendations, as well as the attached summary review of temperature research, into your report. In addition, we respectfully request the issuance of a revised TMDL and the ability for stakeholders to participate in a public comment period before it is finalized.

Respectfully,

Port of Whitman County Commissioners

Kristine Ann Meyer

Kristine Meyer	Tom Kammerzell
District 2	District 3

SUMMARY REVIEW OF STATE AND FEDERAL TEMPERATURE STANDARDS, LOWER SNAKE RIVER

BY JOHN MCKERN, FISH PASSAGE SOLUTIONS, LLC
June 2020

1. This is an update of a declaration I made on temperature regulation in response to Civil No. 99-442-FR filed by the National Wildlife Federation, et. al. against the US Army Corps of Engineers for exceeding temperature and dissolved gas standards in the lower Snake River (LSR). In addition to the personal information in my declaration, I have been a consultant on Columbia Basin fish issues for over 20-years since I retired from the Corps in 2000.

2. Many of the sources of information for water temperature information have changed since the 1990s when I assembled my declaration. For example, the US Geologic Service has reduced the information reported from many of their stream gauging stations including temperature data, but some, like the Anatone gauge on the Snake River above Lower Granite Reservoir, are still being funded under the Corps Dissolved Gas Monitoring Program. Additional information is accessible through the University of Washington Data access in Real Time program (http://www.cbr.washington.edu/dart). Another significant change has been the impact of the COVID-19 pandemic on the availability of information because many on-line library services are less accessible.

3. Extensive searching for current information and review of past information has not changed my opinion on the ability to regulate the temperature of the lower Snake River to the 20° C (68° F) standard pressed for by the plaintiffs in 1999 or in the current political atmosphere. That is:

- Historic water temperatures of the lower Snake River commonly exceeded the 20° C standard in July and August, sometime being as high as 25 to 27° C (Peery and Bjornn, 2002).
- The free-flowing Snake River ran through a 2,000 foot to 200-foot-deep arid canyon with high temperatures over 43° C in the Lewiston, ID area to 46° C near Pasco, WA. Searing summer sun and hot winds heated the shallow river too hot for summer Chinook and steelhead passage and too hot for fall Chinook spawning (Tom Meekin, Washington Department of Fisheries, pers comm). Combined with low summer flows, water temperatures were higher than after impoundment by Ice Harbor (IHR), Lower Monumental (LMO), Little Goose (LGO), and Lower Granite (LGR) dams.
- Several commenters have stated that the primary source of water heating in reservoirs is from solar energy and mixing with hot air due to wind-wave action. This is less pronounced in the LSR reservoirs because they are run-of-river reservoirs with constant downstream water movement whereas storage reservoirs like Dworshak have far more pronounced stratification because the water is not moving. The LSR reservoirs are in a relatively narrow canyon and have converted what was a shallow, warm summertime river to four reservoirs around 20-feet deep at the upper end to 100+feet deep at the next dam. In contrast, Dworshak Reservoir (DWR) on the Northfork Clearwater River ranges from a cold mountain river a few feet deep at the upper end to 602 feet deep 2-mile wide reservoir at the dam. The LSR reservoirs under pre-1990s circumstances did not stratify to any extent. That is, the surface water would only be a degree or so warmer than the underlying, flowing reservoir water. Dworshak, a storage reservoir, is designed to capture winter and spring flood water and store it for release over the summer. In summer, Dworshak stratifies at 24° C in the top layer, up to 20-feet deep, and 50° C down to 40° C in the lower and deepest parts of the reservoir.
- Before the mid-1990s, LGR received waters up to 26° C from the Snake River (Anatone gauge) and 25° C from the Clearwater (Spaulding gauge). The hot water passed through LGR and about a week later reached LGO. Similarly, a week or so later, the hot water reached LMO, and another week, IHR. Liscom, et. al., 1985 published temperature data (Appendix B.6) that corroborates what I reported from Corps Annual Fish Count Reports through 1998 (EXCEL spreadsheet).

- Starting in the 1990s, the fishery agencies and tribes represented by the Fish Passage Center requested spring releases of cool water from DWR with the expressed purpose of cooling the LSR for adult salmon and steelhead migration. The Corps complied with the request and cold-water releases from DWR have morphed into a routine that enabled keeping the lower Snake River below 21° C during most summers for over two decades. Graphic representation of this affect is demonstrated in the PowerPoint file labeled Port Temperatures.
- Water from Hells Canyon typically enters LGR at Lewiston at up to 25° C, while Clearwater River water enters at 10° to 14° C. Thus, LSR reservoirs now have significant temperature stratification because hotter Snake River water rides above the colder Clearwater River water all the way to LGR (PNNL – 15532.pdf, 2006). There colder water is passed through turbines or under normal spill gates and hotter water passes over the overflow spillway weir. The PNNL study measured temperatures near the surface and at various depths that indicated surface temperature exceeding the 20° C criterion while at greater depth, temperatures were below the standard depending on the depth. That juvenile salmon and steelhead equilibrate total dissolve gas at 120 to 125 percent normal is an argument of the fishery agencies and tribes for more spill. Similarly, the fact that adult salmon and steelhead would migrate in the cooler, deeper waters should be accounted for. The ability of fall Chinook juveniles rearing in the reservoirs likewise would be able to regulate temperatures by utilizing deeper water. Turbine passage studies show that fall Chinook are distributed deeper than stream type Chinook which are guided better by turbine intake screens, and deeper than steelhead smolts that guide best by turbine intake screens. Guiding efficiency is governed by their depth in the water as it enters the turbine intakes.
- The PNNL study measured water velocities at the various sample sites too. They found that the reservoirs were flowing downstream more or less continuously even with the low summertime flows. This causes constant mixing, so stratification is not a highly defined as it is in Dworshak Reservoir.
- The current spill program has significantly changed the nature of the water temperature regimes of the LSR reservoirs. Mass spill to 120 or 125 percent TDG passes large quantities of water from about 50-feet in depth under the standard spill gates. There are seven standard gates at LGR, LGO, and LMO, and nine at IHR. Cooler water would be passed downstream through turbines because their intakes are 75 to 85-feet below the surface. Overflow weirs, one at each dam, pass 5,000 to 10,000 cfs while late summer flows range from 20,000 to 40,000 cfs.
- Hot water was entering the surface exits of the LGR and LGO fish ladders causing adult fish to delay until a pump system was installed to bring colder water up from depth around each exit so adult fish migration would not be hindered by a temperature block. Installing such features at all four LSR dams is included in the Columbia River System Operation EIS alternatives currently under public consideration.
- The EPA Columbia and Snake River TMDL report (2020) corroborates the fact that the Snake River (Anatone Gauge) mean maximum temperature exceeds the 20° C standard by 2 to 4° C during July, August, and September (2011 to 2016) while cold water from the Clearwater River typically keeps the lower Snake River 1 to 2° C cooler (Table 6.2) at LGR. Figures 6.1 through 6.3 show how water temperatures at Anatone, LGR, LGO, LMO, and IHR exceed the 20° C standard during July, August, and September (2011 to 2016).
- The EPA Columbia and Snake River TMDL report (2020) also details the temperature contribution of each dam (turbine cooling water) which is miniscule for the LSR dams. If point source permits were required, cooling water and potential oil spills would be the sources. Non-toxic vegetable oils have been used in the turbines for decades. Similarly, polychlorobiphenyl (PCB) oils were eliminated from transformers at the dams years ago.
- Case No. 18-cv-3521, COMPLAINT FOR DECLATORY RELIEF AND INJUNCTIVE RELIEF makes the case that the defendants were arbitrary, capricious, and did not act accordance with the law (Administrative Procedures Act). It appears that the defendants used the best available science in making their decisions, thus were not in violation of the APA.

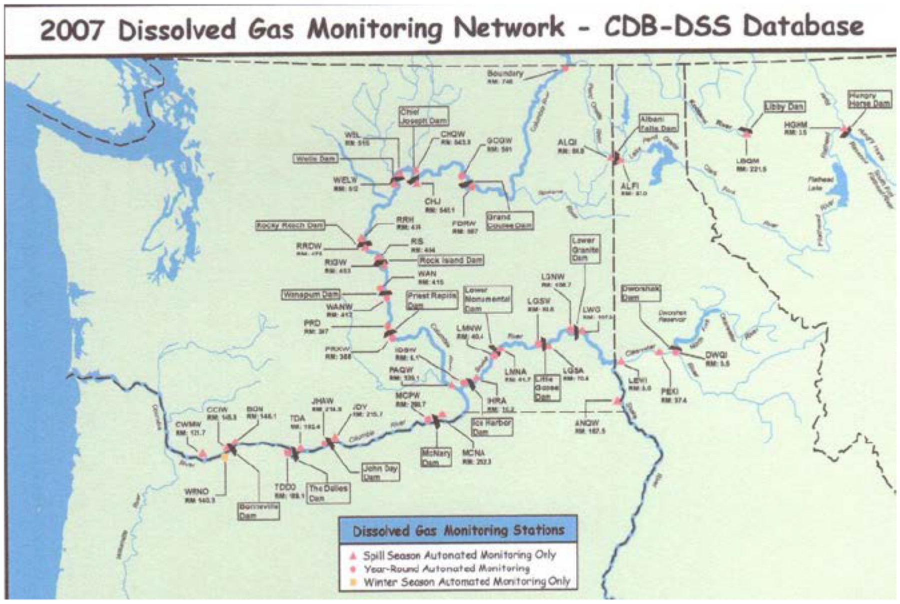
4. Although there is a great deal more information available now (some of which I was able to review), my opinion about adhering to the 20° C water temperature TMDL is not practical for the LSR. Historically, that standard was routinely exceeded during the summer months in the free flowing LSR. Installation of the four reservoirs reduced the maximum temperature to some degree by creating four deep pools that were heated by solar and air sources at a lesser degree than the shallow river. This has been reduced further with the cold-water releases from Dworshak Reservoir. Though unable to meet the 20° C standard consistently, more tolerable water temperatures have been achieved. This has not occurred without complications. Now, temperature differences between the Snake River and the Clearwater River waters have caused stratification in the reservoirs as warm water has flowed above the colder water. This caused thermal block problems at LGR and LGO fish ladder exits that have been corrected. Correction of similar problems at LMO and IHR are included in future plans (CRSO-20EIS).

5. Opponents of the LSR dams appear to be pushing temperature problems as a means of forcing removal or breaching of the dams. Unfortunately, that would probably worsen rather than lessen the temperature problem. The shallow more turbulent river would be more subject to heating in the arid desert-like canyon than the deeper reservoirs experience. The PNNL report indicates that cold-water releases from Dworshak Reservoir regain some temperature from the dam down to Lewiston due to mixing with Clearwater River water from above Orofino, and due to solar and wind action in the lower Clearwater canyon.

6. It could be suggested that more cold water could be released from Dworshak Reservoir. However, Dworshak National Fish Hatchery pumps the majority of its rearing water from the Northfork below the dam. Installing a large enough pipeline from the reservoir with temperature control would be very expensive. Changing the rearing regime would be more problematic than it has been by changes thus far. The growth of steelhead and Chinook reared at DNFH is governed by water temperature. Further cooling the water pumped into the hatchery could force 1-year rearing to smolt size to 2-year rearing, reducing the mitigation capacity of the hatchery.

7. So the question remains, how do you cool the lower Snake River to meet the 20° C standard? The only way that seems feasible to me would be to install temperature control on existing storage reservoirs above Hells Canyon. Given the vast area utilizing the stored water in southern Idaho and eastern Oregon and the thermal stratification of Brownlee Reservoir, this does not seem very promising. Another option would be to construct more storage reservoirs for the purpose of providing cold water. A large storage reservoir on the Salmon River, ID, could contribute cold water like Dworshak does now, but that concept would be politically unfavorable. While I was working at the Corps, reconnaissance level studies were initiated on more storage reservoirs in the Clearwater Basin in ID, and in OR on the Grande Ronde River and Catherine Creek. A More extensive study was carried out on the Weiser River, ID. Galloway Dam was studied as a method of providing up to 700,000 acre-feet of supplementation to offset or add to the 427,000 acre-feet being supplied by the Bureau of Reclamation reservoirs under the current Water Budget. At over 300-feet high and as a direct tributary to Brownlee Reservoir, Galloway could be equipped with temperature control outlets and contribute to the cooling of Brownlee. Adding temperature control at Brownlee Dam could then contribute cooler water through Hells Canyon.

FIGURES:



https://www.nwd.usace.army mil/CRWM/Water-Quality/

REFERENCES: (Files transmitted separately)

ABSTRACTS: a variety of articles related to water temperatures, sources, authors, and dates listed.

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C. B. Cook, B. Dibrani, M.C. Richmond, M.D. Bleich, P.S. Titzler, and T. Fu. 2006. Hydraulic Characteristics of the Lower Snake River During Periods of Juvenile Fall Chinook Salmon Migration. PNNL – 15532. Richland, WA.

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University of Washington DART River Environment Graphics & Text:
http://www.cbr.washington.edu/dart/query/river

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July 28, 2020

US Environmental Protection Agency, Region 10
Dan Opalski

Submitted electronically

RE: TMDL for Temperature in the Columbia and Lower Snake Rivers

The Public Power Council (PPC) appreciates the opportunity to comment on EPA's Total Maximum Daily Load (TMDL) for temperature in the Columbia and Lower Snake Rivers. The TMDL addresses waters in the Columbia and Lower Snake Rivers that are designated as impaired for temperature water quality criteria in Oregon and Washington.

Introduction

PPC represents the non-profit, community-owned public utility customers that have statutory priority to purchase the output of the Federal Columbia River Power System (FCRPS) from the Bonneville Power Administration (BPA). BPA's wholesale power customers depend on hydropower from the federal system to serve the residents of the Northwest with affordable, reliable, carbon-free power at cost. The wholesale power rates paid by Northwest public power recover the costs of the FCRPS, including extensive fish and wildlife mitigation programs throughout the region.

PPC and its members are committed to these fish and wildlife mitigation responsibilities and recognize that river temperature is an important water quality criterion for fish survival and spawning. Actions and investments by the U.S. Army Corps of Engineers (Corps) and the Bureau of Reclamation (Bureau), supported by public power and paid for through their power rates, have resulted in improved water temperature management along the Lower Snake and Columbia Rivers. These efforts have improved fish survival and enhanced fish habitat throughout the region. PPC is supportive of mitigation work that effectively and cost-effectively addresses the impacts of the FCRPS.

PPC is concerned, however, that as it is currently written, the temperature TMDL is not practicable, sets unattainable goals, and will create an undue and unequitable financial burden because it sets unrealistic allocations for the dams and could result in prolonged litigation given the history of the TMDL. These unrealistic allocations are an outcome of the inherent limitations of the TMDL's boundary, its inability to consider temperature impacts holistically on a basin-wide scale, as well as specific modeling assumptions.

Water entering the Columbia and Snake Rivers from Idaho and Canada frequently exceeds the numeric temperature standards used by EPA in the TMDL, making attainment of the water quality criteria within the TMDL's boundary impossible. The TMDL does not provide a solution to this problem. Additionally, these standards are likely unattainable because they are based on generic fish biology considerations and are not representative of water temperatures in free-flowing Columbia or Lower Snake rivers, which could frequently exceed twenty degrees Celsius. Compounding these issues is the impact of climate change on river temperatures, which is one of the largest contributors to water quality temperature exceedances but has not been incorporated into the TMDL due to its scope.

EPA acknowledges that these issues all present challenges to creating the TMDL. Given the flaws noted above, EPA should consider re-working the TMDL. If the TMDL moves forward, policymakers in the region should be aware of these limitations as they create an Implementation Plan and should avoid assigning mitigation actions and responsibilities that are unduly burdensome, not cost effective or are not substantiated. Notwithstanding these broader issues and objections, EPA needs to rework specific parts of the TMDL documentation to resolve incorrect assumptions, modeling errors, and data limitations. Several of these are listed below, and others are enumerated in comments submitted by the Bonneville Power Administration, the US Army Corps of Engineers, and the Bureau of Reclamation.

- EPA should incorporate uncertainty and error ranges into its allocations, as these allocations are based on modeling assumptions and likely do not accurately reflect real-world conditions.
- EPA should remove cooling water impacts of Dworshak from the free-flowing scenario used to calculate allocations. This cooling water impact is not representative of water temperatures in a free-flowing river without dams and is inappropriate.
- EPA should correct calculations for allocations below BON for the October 15 to March 31 timeframe. River temperatures were calculated based on averaging the month of October, when the water quality criterion changes mid-month. Using the monthly average over-estimates river temperatures for days after October 15.

Limitations of TMDL Scope

EPA's documentation clearly describes the incomplete scope of the TMDL and the resulting limitations. For example, the TMDL is limited to the geography and water quality standards in Washington and Oregon, but the Columbia and Snake River basins extend deep into Idaho and Canada. Incoming water from these upstream locations frequently exceeds Oregon and Washington temperature standards, but the TMDL takes these upstream conditions as given. To this point, TMDL documentation acknowledges that,

> Even if all the allocations in this TMDL are implemented and the temperature reductions envisioned are fully realized, it is unlikely that the numeric criteria portion of the WQS will be met at all times and all places. Sources outside the allocation structure of this TMDL contribute to warmer temperatures.[1]

These temperature sources outside the TMDL's geographic scope are material. During the summer and early fall, incoming water temperatures regularly exceed Washington water quality standards by two to three degrees Celsius.[2] These exceedances are higher than any single source identified in the TMDL and are frequently greater than the impact of the entire FCRPS.[3]

Not only is the physical temperature of incoming boundary waters higher than Washington's water quality standards, but the upstream water temperature *standards* are higher as well. Both Canada and Idaho have set water quality standards that are several degrees higher than those in Washington. This means that even if Canada and Idaho develop TMDLs for the Columbia and Snake Rivers, those waters would not necessarily be managed to reach Washington's standards. This jurisdictional disconnect creates an additional barrier to generating a practicable TMDL. Taking these boundary conditions as a "given" and assigning pollution allocations and mitigation responsibilities to a subset of the region is unreasonable and unequitable.

Climate Change

In addition to boundary conditions, EPA also recognizes that climate change has impacted river temperatures in the Columbia and Snake. EPA's analysis estimates that since 1960, increases in air temperature have led to water temperature increases between one and two degrees Celsius.[4] Even though climate change is one of the largest drivers of water temperature increases, it is essentially treated as "out of scope," because EPA does not have jurisdiction to enforce a broad climate policy to mitigate for this. This puts the burden of mitigating the impacts of climate change on river temperatures on specific subsets of regional stakeholders, particularly dams and dam operators.

Hydropower is an extremely flexible and valuable carbon-free resource. It is the primary driver of the low carbon content of the Northwest grid and can help to integrate additional renewable energy resources in the future. Rather than acknowledging

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[1] EPA TMDL for Temperature in the Columbia and Lower Snake Rivers, p. 2
[2] EPA TMDL for Temperature in the Columbia and Lower Snake Rivers, Table 6-2 and 6-3
[3] EPA TMDL for Temperature in the Columbia and Lower Snake Rivers, Table 6-6
[4] EPA TMDL for Temperature in the Columbia and Lower Snake Rivers, p.30

hydropower's contribution to combatting climate change, the TMDL places the burden for mitigating the impacts of climate change on river temperature squarely on hydro facilities. As air temperatures continue to warm, dams will increasingly be called upon to mitigate rising river temperatures. This feedback loop is intrinsic to the limited scope and nature of the TMDL and will result in unequitable and unreasonable obligations as hydro facilities are tasked with mitigating the impacts of a global issue to which they do not contribute.

Limitations of Using Designated Water Quality Criteria

In comparison to numerous TMDLs which were developed using "natural condition" provisions for water temperature, EPA chose to base this TMDL on the existing numeric criteria from Washington and Oregon's water quality standards. While this decision is understandable given the limitations of scope addressed above and the limits of the RBM10 model, it results in the use of water quality criteria which are disconnected from reality and are often unachievable.

The relevant Oregon and Washington water quality standards are largely based on fish biology and are not representative of the natural state of the Columbia and Lower Snake Rivers. For example, Washington has set a water quality criterion of twenty degrees Celsius for the Lower Snake River, but natural conditions would likely often exceed this limit. There is no leeway in this criterion, and it is taken as given. As the TMDL is currently written, dams will be tasked with meeting water quality standards over which they do not have control and cannot meet, because the standards are unattainable and disconnected from actual river temperatures.

Free-flowing rivers are experiencing increases in warm water temperatures and frequently exceed standards that are based on fish biology. Recently, the Fraser River, a major free-flowing river on the West Coast of Canada, has experienced numerous days above the twenty-degree Celsius threshold.[5] As with the Columbia River, these high water temperatures have increased in frequency and severity as air temperatures have increased. Increases in water temperatures in the Fraser River, and other free-flowing rivers in Alaska, point to the fact that climate change, not dams, is the leading cause of increasing river temperatures.[6]

There is a balance between protecting fish and other wildlife and setting standards which are unreasonable and unattainable. Failing to consider natural conditions when forming the TMDL creates standards that are unreasonable and unattainable. Exemplifying another approach, Idaho DEQ has rejected EPA's more stringent and protective

[5] See, for example: CBC News, 8/3/18, https://www.cbc.ca/news/canada/british-columbia/sockeye-salmon-water-temperature-1.4771607
[6] CNN, 8/17/19, https://www.cnn.com/2019/08/16/us/alaska-salmon-hot-water-trnd/index html

temperature criteria because DEQ is concerned that these criteria are unattainable.[7] DEQ's opinion reflects the fact that the approach that EPA has chosen is not universally accepted.

EPA points to the possibility of Washington and Oregon conducting a Use Attainability Analysis (UAA) to change their relevant water quality standards. The UAA process would allow Oregon and Washington to revise their standards based on attainability as well as cost considerations. PPC believes that UAAs may be useful in specific parts of the TMDL, such as revising water temperature standards below Bonneville dam (see *Temperature Calculations at Bonneville* below), and PPC is supportive of pursuing UAAs to amend unattainable standards.

Limitations of Modeling Approach

Because there is no way to measure river temperatures in a free-flowing Columbia or Lower Snake River, EPA is relying on a mathematical model to inform its TMDL documentation. Basing the TMDL on a model presents significant challenges, as allocations and mitigation responsibility can be significantly impacted by model assumptions and design. The RBM10 model used in this TMDL analysis is a simple, one-dimensional thermal model of the Columbia and Lower Snake rivers.

RBM10 does not include dam operations, account for changes in water temperature at different depths, or look at maximum daily temperatures. Its simplicity gives it a fast-run time and provides the ability to look at long time periods. However, this simplicity, especially when combined with gaps in data availability, means that the model cannot reflect real-world conditions with a high degree of accuracy or certainty.

As in other areas, EPA provides documentation acknowledging the limitations of the TMDL modeling and the uncertainty inherent in its analysis. EPA confirms a mean error of roughly one half a degree Celsius when comparing the RBM10 model's outputs to actual measured water temperatures.[8] This error calculation is for the current conditions scenario and has been calibrated with measured data. It is likely that average error and uncertainty for the free-flowing river scenario is even greater, given that there is no current data from which to calibrate the model, and assumptions must be made about river flows and bathymetry.

Although there is uncertainty and error in its modeling outputs, EPA has not included any error or uncertainty in the calculated allocation exceedances. Instead, EPA has opted to be "conservative" with its assumptions to "ensure that impacts are not underestimated."[9] This approach results in allocation exceedances which appear to be definite and clear, but

[7] Idaho DEQ, 7/15/20, https://www.deq.idaho.gov/water-quality/surface-water/temperature/
[8] EPA TMDL for Temperature in the Columbia and Lower Snake Rivers Appendix D, p.10
[9] EPA TMDL for Temperature in the Columbia and Lower Snake Rivers Appendix D, p.8

are in fact uncertain and may exaggerate and provide an incomplete view of dam impacts on river temperatures. As with other areas of the TMDL, this approach can also lead to unequitable and unreasonable mitigation responsibilities.

Other research into dam impacts on river temperatures has highlighted both similar takeaways as well as potential flaws in EPA's analysis. For example, a study of the Lower Snake River using the MASS1 model concurred with EPA's conclusion that dams impact seasonal river temperatures because they increase thermal mass and cause rivers to heat up and cool down more slowly.[10] However, that same analysis found that dams decreased water temperature variability and did not necessarily increase overall warming. There is enough uncertainty about the impacts of dams on river temperatures that models and simulations must be used very carefully in forming policy decisions.

EPA should rework its TMDL documentation to bring forward uncertainty and modeling error into its results. The current format of the TMDL creates a false sense of certainty about dam impacts when there is in fact substantial modeling uncertainty to bring into question some of the TMDL's findings. Policymakers need to be aware of these limitations in the TMDL, especially when developing the Implementation Plan and considering mitigation responsibilities.

Specific Modeling Assumptions and Calculations

Among other issues, there are two specific modeling assumptions and calculations in the TMDL that PPC believes are unreasonable or incorrect and should be changed. The first is the inclusion of cool water discharges from Dworshak in the free-flowing river scenario. The second is the calculation for river temperatures at Bonneville dam for October. These are discussed in greater detail below.

Dworshak Cool Water Discharges

Cool water releases from Dworshak should not be included in the free-flowing scenario used to determine dam impacts. In both the current and free-flowing RBM10 scenarios used to calculate the allocation exceedance for dams on the Lower Snake, Dworshak operations are modeled as providing a cooling effect on river temperatures at the Clearwater Confluence. For the current scenario this is perfectly reasonable, as it represents current operations and river temperatures. However, including cooling water from Dworshak in the free-flowing scenario, which should not include *any* dams, is unreasonable and creates a false comparison or standard.

Water will tend towards equilibrium with the air temperature around it and assumptions about incoming water temperatures can create an artificial impact downstream as water

[10] Regional Scale Simulation of Water Temperature in the Columbia River Basin, Richmond et. all

cools or warms to reach equilibrium with the surrounding air temperature. By including cool water from Dworshak in the free-flowing scenario, EPA creates a false comparison between temperatures in a free-flowing river and an impounded river. As shown in Figure 3-22 from Appendix D below, if the Lower Snake River were not being cooled by Dworshak, the Lower Snake dams would not raise river temperatures in July.

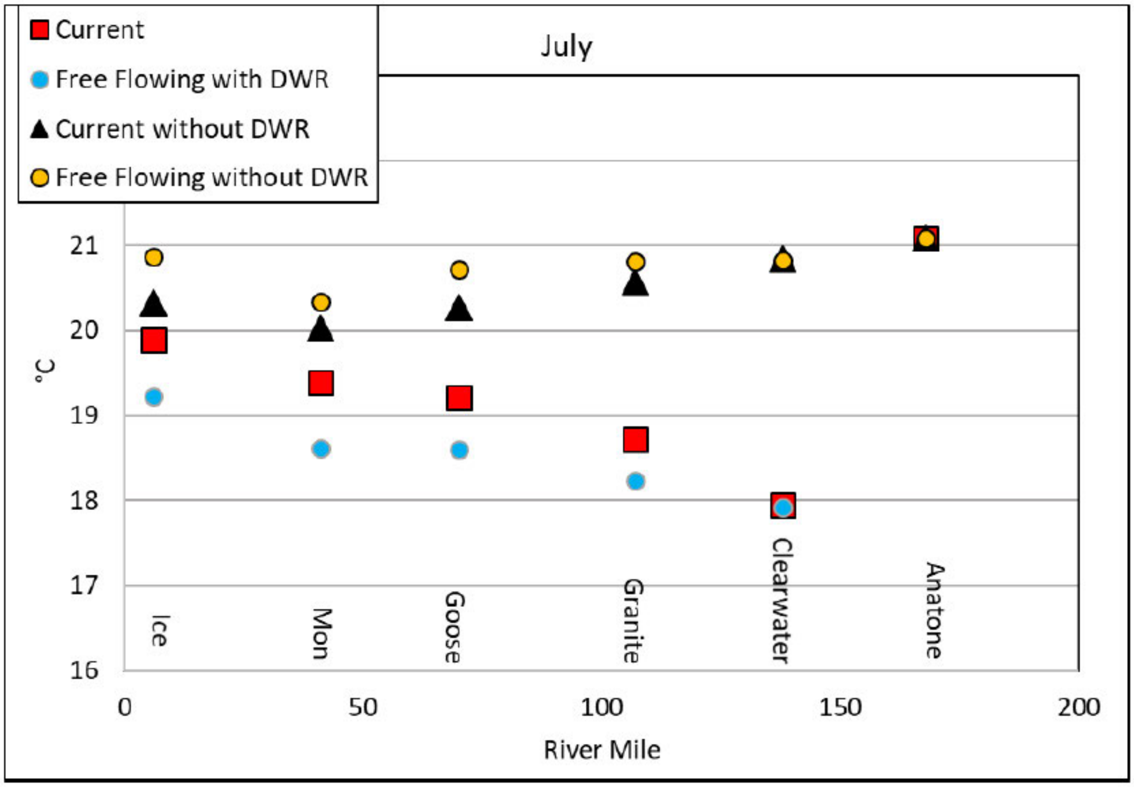

Figure 3-22 Comparison of Dworshak Dam impact scenarios (2011 – 2016; July)

Boundary conditions at Idaho and Canada serve as a limit to EPA's model and the overall scope of the TMDL, and we do not know and cannot measure boundary temperatures of a free-flowing Snake or Columbia River. For this reason, it is impossible to accurately determine the impacts of the dams within the current scope of the TMDL. If the TMDL moves forward, EPA should at the very least rework TMDL documentation for the Lower Snake and assign allocation exceedances based on a free-flowing Lower Snake River that has not been altered by cool water discharges from Dworshak.

Temperature Calculations at Bonneville

EPA has set load allocations below BON in October based on Oregon's water quality criteria intended to protect spawning salmon. Oregon's standard changes from twenty degrees Celsius to thirteen degrees Celsius on October 15th. Although the more stringent standard only applies to half of the month, starting on October 15th, EPA has averaged the entire month of October in its calculations.

This treatment results in artificially raised temperatures for the more stringent compliance period because air and water temperatures in early October tend to be warmer than those in late October. EPA should rework the calculation for this segment of the river to include only the October 15th to March 31st period when the more stringent standard applies. This will correct a misapplication of the standard and lead to a more reasonable allocation.

Oregon should also monitor and consider modifying this specific water quality criterion. The more stringent thirteen-degree standard is intended to protect salmonid spawning, but fish passage data shows that these fish do not arrive until November 1. Maintaining the more stringent standard when there is no need is unreasonable and unwarranted.

Human Use Allowances

PPC does not object to EPA's incorporation and treatment of the .3-degree Celsius Human Use Allowance. While EPA's decision to split the .3 degrees between dams, point source discharges, and tributaries is not specifically supported, it is not unreasonable given the minor impacts of point sources and tributaries to river temperatures. Including additional mitigation and monitoring requirements for these would be unduly burdensome and would not materially impact river conditions.

Thank you for your consideration of the comments.

July 21, 2020

Mr. Andrew Wheeler
Administrator
U.S. Environmental Protection Agency
ColumbiaRiverTMDL@epa.gov

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 Benton PUD regarding the *Total Maximum Daily Load for Temperatures for the Columbia and Lower Snake Rivers* (CLSRT TMDL).

Benton PUD is a not-for-profit electric utility that was formed in 1934 and currently serves electricity to nearly 55,000 customers in Benton County, Washington. Benton PUD is a preference customer of the Bonneville Power Administration (BPA) and relies primarily on hydropower, including that from the lower Snake River dams (LSRDs), to sustain a 95% clean power supply portfolio.

Benton PUD is committed to our fish and wildlife mitigation responsibilities as a customer of the BPA and we recognize that river temperature is an important water quality criterion for fish survival and spawning. With that said, we are deeply concerned the CLSRT TMDL as currently written could unfairly and negatively impact the LSRDs and our ability to deliver affordable, reliable and clean power in the years to come.

We would like to express our support for the comments provided by Northwest RiverPartners. As a Northwest RiverPartners member, we firmly agree with their position on the CLSRT TMDL and the need for its revision. If these revisions are not made, the TMDL, as written, needlessly threatens the vitality of the Federal Columbia River Power System ("FCRPS") and the multiple purposes for the system as established by the United States Congress.

KEY POINTS OF EMPHASIS

- The states of Washington and Oregon are signaling that they intend to base energy and environmental policy on the CLSRT TMDL. This outcome is problematic because, as EPA notes, "The current water quality conditions present a significant challenge to achieving downstream water quality standards in Washington and Oregon."[1] This challenge arises because water temperatures entering Washington state from Canada and from Idaho often significantly exceed the respective states' water quality standards during the peak summer months. This confounding situation raises the possibility that the FCRPS dams will be held to unattainable standards.

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

- **Due to the possibility described above, the stakes are very high for the CLSRT to be extremely accurate.**
- **The CLSRT TMDL relies upon the one-dimensional RBM10 model, which lacks the detail and sophistication necessary to provide precise results for a river system with the complexity of the Columbia-Snake river system.**
- Tellingly, the TMDL did not attempt to simulate the entire Columbia River Basin with its RBM10 model, but instead truncated the Columbia and Snake rivers near the Washington state borders. This artificial limitation doesn't allow the model to accurately account for all 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).
- The TMDL, as written, includes significant arbitrary assumptions, such as including large storage dams in its "free flowing" state. These larger dams can release artificially cool water during the summer. This inconsistent treatment (i.e., including some dams but excluding others) places an unfair temperature standard on the downstream dams.
- A 2002 study under the US Army Corps of Engineers ("USACE") compared pre-lower Snake River dam measurements from 1955-1958 to measurements taken after the lower Snake River dams were constructed. The study found no evidence that river temperatures had increased, and instead remained unchanged or slightly lower after completion of the four lower main stem dams.[2] This real-life finding runs contrary to what we are seeing in the TMDL's modeling output.
- 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. This finding is much more consistent with the 2002 USACE finding described above.

RECOMMENDATION

Benton PUD supports Northwest RiverPartners' recommendation that EPA revise its *Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers* and provide a revised 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 clean energy goals, and billions of dollars of extra costs forced on Northwest families.

Sincerely,

Rick Dunn, General Manager
Benton PUD

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

  

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August 17, 2020

Submitted via Electronic Mail

Mr. Daniel Opalski
U.S. Environmental Protection Agency
Region 10
1200 Sixth Ave
Mail Code 10-C09
Seattle, WA 98101
ColumbiaRiverTMDL@epa.gov

Re: Comments and Request for Revisions from Public Utility District No. 1 of Chelan County on the Initial Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers Issued by EPA on May 18, 2020

Dear Mr. Opalski:

The Public Utility District No. 1 of Chelan County ("Chelan PUD") appreciates the opportunity to comment on the Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers (the "Initial TMDL") issued by the U.S. Environmental Protection Agency ("EPA") on May 18, 2020. Chelan PUD is a leading provider of sustainable, reliable, and affordable electricity to citizens in Washington and other Western states. Our three federally licensed hydropower Projects provide renewable energy generation important to achieving the goals of the Washington Clean Energy Transformation Act.[1] Two of these Projects, Rocky Reach and Rock Island, are in the middle reaches of the Columbia River and will be directly affected by the implementation of the TMDL.

Environmental stewardship is a core value of Chelan PUD's daily operations and long-term strategy. To that end, we have collaborated with other partners in the watershed to address water quality concerns, including temperature. A key focus of those efforts is protecting Chinook salmon, sockeye salmon, coho salmon and steelhead through an active Fish & Wildlife Program and first-of-their kind, multi-party hydropower Habitat Conservation Plans for the

[1] *See, e.g.*, Wash. Rev. Code § 19.405.050(a) ("It is the policy of the state that nonemitting electric generation and electricity from renewable resources supply one hundred percent of all sales of electricity to Washington retail electric customers by January 1, 2045.").

Rocky Reach and Rock Island Projects to ensure no-net-impact on salmon and steelhead.[2] We also support the long-term recovery of listed, threatened, and resident species through a variety of environmental measures incorporated into federal licenses and state certifications for Chelan PUD's Projects. Notably, these measures include a Water Quality Management Plan to address temperature. All of Chelan PUD's efforts promote the same basic goal as the Initial TMDL: long-term improvements in water quality and preservation of aquatic species, with particular emphasis on salmon.

In this letter, Chelan PUD provides 1) proposed revisions to Initial TMDL Table 6-13, which are necessary to accurately reflect existing conditions at Chelan PUD's facilities (Section V); 2) comments that recognize aspects of the Initial TMDL that are worth emphasizing as a point of alignment (Sections II-IV); and 3) proposed clarifications of technical provisions included in the Initial TMDL (Section VI).

On July 14, 2020, Chelan PUD requested that EPA extend the comment period on the Initial TMDL for an additional 30 days to allow adequate time for Chelan PUD to develop more accurate flow and temperature information in support of proposed revisions to the wasteload allocations (WLAs) in Table 6-13 for Chelan PUD's facilities. Chelan PUD appreciates EPA granting our extension request. The proposed revisions to the WLAs and supporting flow and temperature information are set forth and described in the body of this letter (Section V) and summarized in the following table:

Proposed Revisions to the Flows, Temperatures, and Wasteload Allocations in Table 6-13 of the Initial TMDL

Facility Name	Permit Number	Location (RM)	Flow (MGD)	Temp (°C)	WLA (kcal/day)
Rocky Reach Dam	WA0991033	473.5	34.3	27.0	3.50E+09
Eastbank Hatchery	WAG135011	473.8	29.5	17.5	1.95E+09
Chelan Hatchery	WAG135006	504.5	17.3	17.5	1.14E+09
Rock Island Dam	WA0991032	453.5	26.9	26.0	2.64E+09

[2] Chelan PUD meets and in many respects exceeds the no-net-impact standard, which is defined in the Habitat Conservation Plans as 91% Project adult and juvenile survival, 7% hatchery compensation, and 2% funding contribution for tributary enhancements and improvements. *See* Rocky Reach Anadromous Fish Agreement and Habitat Conservation Plan at 1; Rock Island Anadromous Fish Agreement and Habitat Conservation Plan at 1; FERC Order Granting Intervention; Approving Anadromous Fish Agreements, Settlement Agreement, and Applications to Amend Licenses; and Terminating Proceeding, June 21, 2004.

I. BACKGROUND

Elevated temperatures in the Columbia and Snake Rivers have been under review for the last two decades.[3] As the Initial TMDL recognizes, elevated temperatures that exceed the current temperature criteria would occur even if all dams were removed. For this reason, development of a temperature TMDL was a challenging task. The Initial TMDL was developed at the direction of the U.S. Court of Appeals for the Ninth Circuit.[4]

As the Initial TMDL recognizes, the geographic scope of this regulatory action is immense.[5] TMDLs are established to attain and maintain the applicable narrative and numeric water quality criteria, considering seasonal variation, and accounting for uncertainty through a margin of safety.[6] The TMDL seeks to address spatially and seasonally varying numeric temperature criteria and designated uses under the legal frameworks of two states and several tribal reservations.[7]

Of particular relevance to Chelan PUD is a stretch of the middle Columbia River labeled "Jurisdictional Reach D" by the Initial TMDL.[8] This reach extends from Grand Coulee Dam to Priest Rapids Dam, thereby encompassing Chelan PUD's Rocky Reach and Rock Island Projects.[9] The Washington Department of Ecology ("Ecology") has defined the aquatic life use for this reach as salmonid spawning, rearing, and migration; this use has a corresponding temperature criterion of 17.5°C for the seven-day average of the daily maximum temperature ("17.5°C 7-DADM"), which is not to be exceeded at a probability frequency of more than once every ten years on average.[10] When the criterion is exceeded, human sources may cumulatively increase the 7-DADM river temperature by up to 0.3°C.[11]

II. THE INITIAL TMDL APPROPRIATELY RECOGNIZES THE ROLE OF EXTERNAL FACTORS

The breadth and variety of the study area inevitably means that many different factors influence its temperatures. The Initial TMDL recognizes these factors, as well as the fact that these factors make it unlikely that the standard will be met at all times at all places. The TMDL focuses on the point and nonpoint sources within the TMDL boundary, while also identifying other options to address the inability to achieve the standard.[12] Chelan PUD supports the Initial TMDL in both respects.

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[3] *See, e.g.*, *Columbia Riverkeeper v. Wheeler*, 944 F.3d 1204, 1206-07 (9th Cir. 2019).
[4] *Id.* at 1211-12.
[5] *See* Total Maximum Daily Load (TMDL) for Temperature in the Columbia and Lower Snake Rivers at 28 (May 18, 2020) [hereinafter "Initial TMDL"].
[6] 40 C.F.R. § 130.7(c)(1).
[7] *See* Initial TMDL at 12 tbl. 2-2; *see also id.* app. A.
[8] *See id.* app. A at 1, 3-4, 11-12.
[9] *See id.*
[10] *See id.* app. A at 11-12; Wash. Admin. Code §§ 173-201A-200 tbl. 200(1)(c); 173-201A-200(1)(c)(iii); 173-201A-602 tbl. 602.
[11] *See* Wash. Admin. Code § 173-201A-200(1)(c)(i).
[12] *See* Initial TMDL at 2.

A. Dams and other sources within the TMDL area are, at most, only one of several contributors to river temperature.

First, many types of sources contribute to elevated river temperatures, not just regulated facilities that are within or that discharge to the river. Many of these sources are natural or outside the geographic scope of the Initial TMDL area, and thus cannot be addressed by it. For example, there are long-term trends in climatic conditions and air temperature in the Columbia and Snake River basins. The Initial TMDL estimates that these trends alone account for a river temperature increase of approximately1.5°C.[13] River temperatures might also change due to natural variation in local hydrology, geomorphology, or vegetation patterns.[14] EPA has correctly acknowledged that exceedances in the mainstem of the Columbia River are, to a significant degree, caused by temperature impacts originating in Canada or Idaho.[15]

In fact, current temperature levels are not unique; they have been elevated for decades.[16] Research from another federal agency, NOAA Fisheries, indicates that temperatures in some reaches often exceeded 20°C, and sometimes even 25°C, prior to the construction of many dams.[17] Other research, assisted by EPA using the same model as the Initial TMDL, found that even dam removal would do little to reduce temperature exceedances.[18] In the Initial TMDL, that model again finds that the applicable numeric criterion would often be exceeded even in a no-dam, free-flowing scenario.[19] In fact, the modeling shows that, in some instances, dams have a cooling effect on water temperatures.[20]

B. The TMDL cannot account for the principal sources of the temperature criteria exceedances.

Second, the Initial TMDL cannot adequately account for these extraneous or extra-territorial sources of river warming. There is no evaluation of natural and anthropogenic sources of thermal loading originating in Canada, and there is no current technical record or TMDL process to justify allocations for sources in Idaho.[21] Even within the study area, a TMDL is not an appropriate or effective mechanism for accounting for global temperature trends caused by climate change. The time horizon of such changes is long and their root causes diffuse. In contrast, the Initial TMDL is necessarily fashioned on a set of temperature data from a relatively

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[13] *See id.* at 28, 70; *see also id.* at app. G 2 ("Research . . . shows that water temperatures are primarily driven by, and can be modeled as a function of, air temperatures . . . . Air temperature increases are especially important drivers of water temperature increases[.]").
[14] *See id.* at 28.
[15] *See id.* at 2, 10, 15, 28.
[16] *See id.* at 30; *see also id.* at app. G at 5, tbl. 2-2.
[17] *See* NOAA Fisheries, 2015 Adult Sockeye Salmon Passage Report at 15 (2015).
[18] *See id.* at 19.
[19] *See, e.g.*, Initial TMDL at 48 tbl. 6-7 (listing 18.83°C for the free-flowing scenario at Rocky Reach in August).
[20] *See id.* at 45 ("In some months, a dam cools rather than warms the reach that it impounds.").
[21] *See, e.g., id.* at 10 (noting that Idaho temperature criteria are substantially higher than those in Washington).

short period reflecting current conditions.[22] Load allocations implemented by near-term regulatory actions cannot hope to address long-term global trends in temperature.

As discussed above, even in a free-flowing scenario, the temperature standard would not be met. Moreover, run-of-the-river facilities such as those of Chelan PUD, with modest storage, have little or no effect on river temperatures, and, accordingly, little or no ability to reduce them.

III. THE INITIAL TMDL APPROPRIATELY RECOGNIZES THAT RUN-OF-THE-RIVER PROJECTS ARE NOT THE CAUSE OF ELEVATED TEMPERATURES OR IMPAIRED USES

A. Neither Rocky Reach nor Rock Island Dam substantially contributes to temperature criteria exceedances.

As previously noted, Chelan PUD operates two Projects on Columbia River segments subject to the TMDL: the Rocky Reach Dam at river mile 472 and the Rock Island Dam at river mile 453. Both Projects are situated within Jurisdictional Reach D, hold hydropower licenses from the Federal Energy Regulatory Commission ("FERC"), and have received Section 401 water quality certifications from Ecology. Both Projects, moreover, operate in run-of-river mode with relatively modest storage capacities. As a result, their impacts on river temperature are small.

That conclusion has been affirmed, for example, by the Comprehensive Settlement Agreement for the Rocky Reach Project. This agreement was joined by a large number of stakeholders in the Rocky Reach relicensing proceedings before FERC. Its component Water Quality Management Plan finds that "[r]un-of-river hydroelectric projects, such as the Rocky Reach Project, have a *de minimis* effect on water temperatures" and that past EPA modeling found less than a 0.1°C effect on summertime Columbia River temperatures.[23]

Although the Initial TMDL's analysis differs in its details, it too demonstrates that Chelan PUD's facilities are not a substantial source of elevated temperatures in the Columbia River. We interpret tables 6-6 through 6-9 of the Initial TMDL to indicate that, in July and August, when there is a small amount of modeled reach-specific heating within the Chelan PUD Project reaches (no more than a total of 0.4 °C), the cumulative contributions of dams above the Snake River confluence, including the Chelan PUD dams, either do not exceed the Initial TMDL's 0.1 °C cumulative allocation (July) or exceed the allocation by only a small amount (a maximum of 0.4 °C in August). In September and October, when there is a cumulative allocation exceedance, the reach-specific heating within the Chelan PUD Project river reach is zero or negative, meaning the run-of-the-river nature of the Projects' contributes to *cooling* the river.

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[22] *See, e.g., id.* at 13, 65 (using 2011-2016 data).
[23] *See* Rocky Reach Water Quality Management Plan at 2-9.

Moreover, the Initial TMDL's analysis of the temperature effects of dams is based on assumptions that are designed to allow a margin of safety, such that the actual effects are less than the analysis indicates. For example, the Initial TMDL determines exceedances based only on the highest daily temperatures during a particular month, even though the applicable criterion for Jurisdictional Reach D is a seven-day average of daily maxima.[24] The temperature effects of the dams are also assessed using a daily average temperature, which the Initial TMDL recognizes is "a more conservative indicator of dam impact" than use of a daily maximum. This is because dams dampen diel temperature fluctuations, resulting in less effect on daily maximum temperatures—the basis for the temperature criteria—than daily average temperatures.[25] Based on the above, it is likely that Rocky Reach and Rock Island Dams are even smaller contributors to the observed temperature exceedances in the river than the small contributions identified in tables 6-6 to 6-9.

Any small temperature increases caused by the Chelan PUD Projects should also be assessed against the measures Chelan PUD has already taken to address temperature. The Initial TMDL recognizes that tributary restoration projects can reduce temperatures in the mainstem.[26] For example, the Habitat Conservation Plans in which Chelan PUD participates fund projects to restore tributary habitat. Through these projects, Chelan PUD and its partners identify restoration projects that also help to improve tributary temperature.

B. Aquatic life uses are successful at Rocky Reach and Rock Island Projects.

Perhaps more importantly, the success of the Habitat Conservation Plans is also strong evidence that Chelan PUD's Projects do not impair salmonid spawning, rearing, or migration, the use protected by the numeric criterion. The Habitat Conservation Plans achieved no-net-impact on listed species by 2013, and this achievement occurred despite the warming temperatures. Annual returns to the Chelan PUD Projects have dramatically improved over the last two decades.[27] This success demonstrates that the measures being implemented to protect aquatic species such as salmon are working – and that the temperature exceedances are not resulting in adverse impacts on those species.

IV. THE INITIAL TMDL APPROPRIATELY RECOGNIZES LIMITS ON IMPLEMENTATION

A TMDL is not self-executing, and it must be implemented through later regulatory actions.[28] Yet the final TMDL will still play an important role in guiding implementation by Washington and Oregon agencies. The Initial TMDL, for instance, rightly acknowledges that Best Management Practices ("BMPs") are one of the primary feasible options available for

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[24] *See* Initial TMDL at 39, 65.
[25] *Id.* at 65.
[26] *See id.* at 28 n.8
[27] *See* Chelan PUD, Protecting a Resource: Habitat Conservation Plans (2015) (displaying graphs of average annual returns for five species in the 1990s compared to the period of the Habitat Conservation Plan).
[28] *See, e.g.*, *Pronsolino v. Nastri*, 291 F.3d 1123, 1128-29 (9th Cir. 2002).

addressing impacts from non-point sources.[29] The Initial TMDL is also correct to promote the use of voluntary or incentive-based measures as efficient and cost-justified means of improving water quality.[30] As noted above, the work of Chelan PUD and its partners in the Habitat Conservation Plans demonstrates that these types of programs can protect aquatic life uses while avoiding unnecessary costs. Thus, it is important that the final TMDL retain the language promoting the use of such implementation measures.

The Initial TMDL also explains that the temperature criteria are likely not achievable, due to the external factors described above. For this reason, EPA appropriately acknowledges that a use attainability analysis may be appropriate. The federal regulations, adopted by Ecology, explain that a designated use may be removed when it either no longer exists or is not attainable.[31] Federal regulations allow revision of a designated use if its attainment is not feasible due to one of six factors.[32] One such factor is whether human caused conditions (such as climate change) limit the attainment of the highest aquatic life uses and cannot be remedied or would cause more environmental damage to correct than to leave in place.[33] Another factor is whether changes to dams (within or outside the TMDL boundaries) or their operations necessary to attain the use would be infeasible.[34] Chelan PUD agrees that the applicable temperature criteria are unattainable and warrant revision. Moreover, the TMDL should recognize that negative operational restrictions on hydropower projects could adversely impact the watershed by increasing emissions, further exacerbating the climate change that is one of the predominant causes of the temperature increases.

Additionally, the final TMDL should recognize that it may be appropriate to reconsider the numeric temperature criteria.[35] As described herein, Chelan PUD and its partners have undertaken significant work to protect aquatic species, and specifically salmon. The success of this work demonstrates that cold water species are supported, despite the temperature exceedances during the critical period addressed in the TMDL. Where, as here, the attainable condition of existing and designated use is protected and the existing criteria are not achievable, consideration of site-specific criteria is appropriate.[36] Thus, it is important that the final TMDL recognizes this concept as an option for changing the applicable criteria.

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[29] *See* Initial TMDL at 72 (quoting 40 C.F.R. § 130.2(i)).
[30] *See* Initial TMDL at 72.
[31] 401 C.F.R. § 131.10(g); Wash. Admin. Code § 173-201A-440(a).
[32] 40 C.F.R. § 131.10(g).
[33] *Id.* § 131.10(g)(3).
[34] *Id.* § 131.10(g)(4).
[35] *See* Wash. Admin. Code § 173-201A-430, discussing development of site-specific criteria.
[36] *Id.*

V. REVISIONS TO TABLE 6-13, "WLAS FOR 'MINOR FACILITY' NPDES PERMITTED FACILITIES LOCATED ON THE COLUMBIA RIVER"

A. EPA should revise the Wasteload Allocations for Chelan PUD facilities to more accurately reflect their discharge flows and temperatures.

As previously mentioned, Chelan PUD respectfully requests that EPA revise the flow, temperature and WLA values in Table 6-13 of the Initial TMDL to those shown in Table 1 below, in order to more accurately reflect the discharges from these Chelan PUD facilities. Table 6-13 is described as using "facility-specific design flow and maximum temperature data (or temperatures representative of the industry sector if effluent data were not available) to derive wasteload allocations for each facility."[37] The flow and temperature values listed in Table 6-13, however do not accurately reflect the design flows and maximum discharge temperatures for the four facilities owned by Chelan PUD listed in the table. The flow, temperature, and WLA values in Table 1, below, more accurately reflect conditions of maximum heat discharge for each facility. They are based on the best available information, including design and planned specifications and measurements, and for the hatcheries, the applicable temperature criterion for the Columbia River.

Table 1: Proposed Revisions to the Flows, Temperatures, and Wasteload Allocations in Table 6-13 of the Initial TMDL.

Facility Name	Permit Number	Location (RM)	Flow (MGD)	Temp (°C)	WLA (kcal/day)
Rocky Reach Dam	WA0991033	473.5	34.3	27.0	3.50E+09
Eastbank Hatchery[1]	WAG135011	473.8	29.5	17.5	1.95E+09
Chelan Hatchery[1]	WAG135006	504.5	17.3	17.5	1.14E+09
Rock Island Dam	WA0991032	453.5	26.9	26.0	2.64E+09

Notes: 1. Initial TMDL Table 6-13 lists the maximum discharge temperatures for the hatcheries as 16.8°C, based on industry data. Chelan PUD's hatcheries, however, are subject to a general NPDES permit that allows a discharge temperature of up to 17.5°C. The hatcheries, then, cannot discharge at a higher temperature even if the discharged heat load were less than the proposed WLA.

In deriving the Table 1 flows for the point source discharges from Rocky Reach and Rock Island Dams that will be subject to a National Pollutant Discharge Elimination System (NPDES) permit, Chelan PUD excluded intermittent discharges such as drainage flows and sump pumps that are not expected to add a significant heat load to the river. Furthermore, the Table 1 temperatures listed for the dams are not the maximum discharge temperatures of all the NPDES sources at the dams, but rather are the maximum discharge temperatures, during conditions of maximum heat discharge, of those NPDES sources with sufficiently high discharge flows to be the primary component of the heat load to the river. For example, under some operating

[37] Initial TMDL at 52.

conditions, some low-flow discharges have been measured up to 35°C at Rock Island Dam and 45°C at Rocky Reach Dam.

The flows indicated for the hatcheries in Table 1 were derived based on best available information regarding current and planned operating conditions and HCP fish production goals. In Table 6-13 the industry average temperatures that are used for the Eastbank and Chelan hatcheries are below the corresponding numeric temperature criterion that is applicable at the point of discharge. Furthermore, the NPDES permits under which these hatcheries presently operate prohibit discharges to temperature-impaired waterbodies at temperatures in excess of the applicable temperature criterion. Sources that discharge at or below the numeric criterion cannot contribute to an exceedance of the criterion. For this reason, in both Oregon and Washington, existing temperature TMDLs typically include WLAs that are calculated on the basis of the heat that is discharged at or above the temperature criterion.[38] Therefore, we respectfully request that EPA consider providing WLAs for the hatcheries that are derived from the current applicable numeric temperature criterion as indicated in Table 1.

Recognizing the uncertainties in temperature and discharge that affect the calculation of the WLAs, the Initial TMDL appropriately sets aside a reserve allocation for point sources to be used for, amongst other purposes, "[a]djustments to the calculated WLAs if, for example, the data that EPA considered during TMDL development are not representative of the existing discharge."[39] Chelan PUD notes that the Rocky Reach Dam and Rock Island Dam NPDES permits are in the application process. For all four facilities, data more representative of existing discharges may be forthcoming in the future, which may warrant Ecology drawing on the reserve to adjust the WLAs for individual point sources as described in the Initial TMDL. For these reasons, we support inclusion of a reserve allocation to be managed by Washington and Oregon during implementation.

B. EPA should correct the description of a permit WA0501487.

Finally, Chelan PUD offers a minor correction in the Initial TMDL related to the description of a facility incorrectly attributed to Chelan PUD and the Rock Island Dam. Table 6-13 of the Initial TMDL describes NPDES Permit WA0501487 as held by Rock Island Dam.[40] Chelan PUD understands that this permit is in fact held by the City of Rock Island for its wastewater treatment plant.

[38] *See, e.g.,* Wenatchee River Temperature TMDL (Ecology Publication No. 05-03-011); Western Hood Basin Temperature TMDL: Revision to the 2001 Western Hood Subbasin TMDL (Oregon Department of Environmental Quality 2018).
[39] Initial TMDL at 61.
[40] Initial TMDL at 55.

VI. THE FINAL TMDL SHOULD CLARIFY CERTAIN TECHNICAL PROVISIONS

A. EPA should consider an alternative terminology for "free-flowing."

The use of the term "free-flowing" to represent the baseline conditions without dams is misleading. As the Initial TMDL notes, "EPA's evaluation does not consider or reflect free-flowing conditions upstream of the TMDL study area boundaries in Canada or Idaho."[41] A truly free-flowing condition would be reflective of the natural conditions or natural background levels, which is defined in the Washington water quality standards as "surface water quality that was present before any human-caused pollution."[42] Furthermore, the Initial TMDL acknowledges that "EPA's estimate of the … temperature conditions without the 15 dams and point sources … do not represent the 'natural' river temperatures because the impacts of numerous sources remain imbedded in the temperature predictions both within the TMDL area (e.g., climate change) and outside the TMDL area (e.g., loading from sources upstream of the TMDL boundary in Idaho and Canada)."[43] Thus, the anthropogenic factors outside of the TMDL boundary have not been entirely removed in the "free-flowing" scenario. Therefore, we suggest EPA consider the use of an alternative terminology such as "background condition" to accurately indicate that this is the condition against which the TMDL evaluates anthropogenic temperature effects.

B. EPA should resolve confusion regarding Figures 6-1 through 6-4.

Although Figures 6-1 through 6-4 are intended to demonstrate the difference between the water temperature at various locations as compared to the water quality standard, as presented the figures are misleading. The figures create the implicit suggestion that the facility listed is the cause of the exceedance, and that the reduction needed reflects changes needed at each facility. But, based on the conclusions reached elsewhere in the Initial TMDL that run-of-the-river dams have minimal effect on river temperatures, this suggestion is not correct. Rather, the purpose of the tables is to illustrate the applicable temperature standard in various segments of the river, and how the measured temperature in various locations compares to that standard. The figures do not attribute the cause of the elevated temperature, nor are they meant to allocate responsibility for reductions to various facilities. To aid in clarifying the information provided in these figures, we suggest EPA use notes below these figures that explicitly recognize that the target sites are locations where long-term temperature measurements have occurred and do not directly attribute heating to the reservoirs. This will more clearly and accurately convey the information without creating confusion.

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[41] *See* Initial TMDL at 30.
[42] *See* Wash. Admin. Code § 173-201A-020.
[43] *See* Initial TMDL at 66.

C. Clarifications are needed to properly interpret Tables 6-6 through 6-9.

Tables 6-6 through 6-9 are difficult to interpret for the average reader. While EPA has provided "notes" in Table 6-5 to assist with the interpretations of the Tables 6-6 through 6-9, the terminology in the column headers is confusing and misleading. For example, "Measured Target Exceedances" that have been calculated from existing data at the tailraces of the dams (except for Canadian Border, Hanford Reach and Snake Confluence) not only represent the heating from non-point sources, but also cumulatively represent the effects of point sources and climate change and conditions above the TMDL boundaries. While these discussions are presented elsewhere, it would be helpful to explicitly note this in Table 6-5 so that the average reader correctly interprets that "Measured Exceedance" does not equate to "dam impact".

In addition, we suggest that EPA supplement the step-by-step discussion of the calculations[44] with a flow chart or a decision tree that will enable a non-technical reader to easily understand what the load allocations in the tables actually mean.

VII. CONCLUSION

Chelan PUD respectfully requests that EPA revise Table 6-13 of the Initial TMDL to incorporate the more accurate discharge flows, temperatures, and WLAs for Chelan PUD's facilities, as set forth in Table 1, above.

In addition, Chelan PUD acknowledges points of alignment with the Initial TMDL, including that run-of-the-river dams have minimal effect on temperature in these water bodies and that the temperature criteria may not be attainable due to external factors. Given these conclusions, it is important that the final TMDL recognizes all of the tools and options available to address temperature, including a use attainability analysis to determine the highest attainable uses and development of site-specific criteria to protect the highest attainable uses.

Thank you for your consideration of these comments and proposed revisions and accommodating our extension request. Chelan PUD welcomes further discussions with the agency and looks forward to working with Ecology and other stakeholders on the implementation of the final version of the TMDL.

Sincerely,

Steve Wright
General Manager

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[44] *See* Initial TMDL at 45.

Submitted Electronically

August 17, 2020

U.S. Environmental Protection Agency, Region 10
1200 Sixth Avenue, Suite 155
Seattle, WA 98101
ColumbiaRiverTMDL@epa.gov

RE: Comments of Public Utility No. 1 of Chelan County, Public Utility District No. 1 of Douglas County, and Public Utility District No. 2 of Grant County on the Draft Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers.

Dear Sir or Madam:

Thank you for the opportunity to comment on the Environmental Protection Agency's (EPA) Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers (TMDL). The Public Utility District No. 1 of Chelan County, Washington (Chelan PUD), the Public Utility No. 1 of Douglas County, Washington (Douglas PUD), and the Public Utility District No. 2 of Grant County, Washington (Grant PUD), collectively the Mid-C PUDs, are committed to efficiently and reliably generating and delivering clean and renewable energy to the Pacific Northwest and in support of the State of Washington's Clean Energy Transformation Act. We are also committed to meeting our fish, wildlife, and water quality requirements and supporting the recovery of Endangered Species Act (ESA) listed salmon and steelhead that are part of our Federal Energy Regulatory Commission (FERC) licenses, Habitat Conservation Plans (HCPs), Settlement Agreements, 401 Water Quality Certifications and associated Biological Opinions.

We view our role as partners with the State of Washington in protecting our natural resources and contributing to our clean energy future and remain committed to meeting Washington State designated uses and environmental criteria now and into the future. The communities we serve have come to expect this level of commitment towards providing clean, renewable, low cost, and uninterrupted hydroelectric service.

The Mid-C Projects' protection and mitigation programs for salmon and steelhead are unique on the Columbia River. Our benchmark is No-Net-Impact, which goes above and beyond the ESA's "no jeopardy" standard. First, No-Net-Impact requires that each hydroelectric project meet adult and juvenile survival standards through structural improvements and operational modifications.

Importantly, and distinct from the federal system's survival standards, the Mid-C PUD's survival standards include passage through project reservoirs, where the negative effects of poor water quality, as detailed in the TMDL, are accounted for in our survival verification studies.

The unavoidable and natural mortality that occurs at our dams or in our reservoirs are mitigated by in-kind hatchery programs and the funding of habitat enhancement and restoration projects. To date, each PUD is meeting its survival standards for all species studied and our mitigation programs are fulfilling their obligations. For the Mid-C PUDs, the interaction between survival and mitigation is continually revisited and adjusted. No matter the river conditions, No-Net-Impact is our standard.

In recent years, unusually warm summers have been harmful to many of the populations in our region that we have been working to support and rebuild. According to EPA's projection of temperature trends presented in the TMDL, these warmer summers may become the norm rather than the exception.

We recognize that EPA undertook an enormously challenging task of developing thermal load allocations for a system as complex as the Columbia River. While the TMDL has presented a reasonably sound technical analysis, and stated the assumptions and limitations of the TMDL, there are specific areas of concern for the Mid-C PUDs. These include:

1. The compliance challenges associated with water temperatures entering the TMDL boundary that exceeded the State of Washington's standards.
2. A lack of clear direction in the TMDL on how the States, specifically Washington, can reconcile existing provisions in its water quality standards that conflict with assumptions and limitations in the TMDL.
3. A lack of accounting for climate change as a major heat source that will preclude the attainment of current standards despite the load allocations in the TMDL.
4. An ambiguous presentation of the results specifically for non-point sources.

Because of the stakes, and the Mid-C PUD's investments and commitments to salmon and steelhead in our region, it is imperative that the TMDL analysis assess the issues accurately and support a meaningful implementation. Our specific concerns are discussed below.

On Water Temperature in the Columbia River Entering the TMDL Boundary

The TMDL compares current conditions to a "free-flowing" scenario. We believe that the title "free-flowing" is inaccurate, leading to confusion and misunderstanding, and mischaracterizes conditions in the Columbia River. Critical to the understanding of this TMDL is that the "free-flowing" scenario, used as the baseline, still includes the large storage dams on the Columbia River in Canada. The water temperatures entering the United States are vastly impacted and shaped by these storage projects and they have a material effect on water temperature. From the TMDL:

> *"Sources outside the allocation structure of this TMDL contribute to warmer temperatures. These sources include increased air temperatures throughout the study area and upstream human activities in Idaho and Canada, resulting in Columbia and Snake River water temperatures that already exceed the numeric criteria portion of the WQS when those rivers enter the geographic area covered by this TMDL."*

Indeed, by EPA's own accounting, in August water entering Washington from Canada exceeds the State's water quality standards 99% of the time. And because the EPA's analysis does not address or require any load reduction above the TMDL boundary, the TMDL puts downstream dams in an impossible compliance environment:

> *"Even if all the allocations in this TMDL are implemented and the temperature reductions envisioned are fully realized, it is unlikely that the numeric criteria portion of the WQS will be met..."*

As indicated above, the TMDL does not provide any indication on how states should implement these allocations given the infeasibility of compliance within the TMDL boundaries and given the limited jurisdiction of the states to implement the load allocations.

On the Difficulty of Estimation of Background Conditions

The State of Washington (WAC 173-201A-260(1)(a)) recognizes that water bodies may not be able to meet water quality criteria due to the natural conditions of the water body. Under these circumstances, the natural conditions become the water quality criteria. The TMDL acknowledges this statute, but explicitly does not evaluate the State's criteria in the context of natural conditions.

> *"Although Washington and Oregon have developed numerous temperature TMDLs using the "natural condition" provisions of the States' WQS, those provisions were not used to develop this TMDL...For this TMDL, EPA has not attempted to estimate the natural conditions of the mainstems of the Columbia and lower Snake Rivers..."*

The TMDL does not provide guidance for the State of Washington on what constitutes a suitable background from an implementation perspective in-lieu of a truly natural condition which no longer applies in the current environment and is difficult or impossible to estimate accurately.

On a Warming Environment

We commend EPA for their inclusion of Appendix G on climate change impacts to the Columbia and Snake Rivers. As recognized by the TMDL, the temperature of the Columbia River is largely driven by air temperature, and the air temperature in our region is warming. According to the TMDL, climate change has increased water temperature in the Columbia River by 1.5°C since 1960 and is expected to continue to warm by 0.2 – 0.4°C per decade.

This warming trend is critical in the context of this TMDL, which establishes a total allocation of 0.1°C of warming to the 15 dams of the Columbia and Snake River hydrosystem. While climate change itself may be related to anthropogenic activity, present scientific evidence suggests that it has and will continue to result in the warming of the Columbia River basin with or without the dams, thus increasing the "free-flowing" temperature of the system. Immediately, this poses a significant compliance challenge going forward because the TMDL does not allow for compliance against an evolving "natural" condition, rather it provides a load allocation as of now.

On Improving the Clarity of the Language in the TMDL

As discussed above, the TMDL should go to greater lengths to inform readers on the nature of the "free-flowing" scenario and the implications of a baseline that includes point and non-point sources outside of the TMDL boundary. We suggest that EPA provide clarification that the "free-flowing" scenario is intended to provide a representative background temperature in the river that reconciles the heating that occurs outside of the TMDL boundaries and consider renaming the scenario to "background" to avoid confusion.

Tables 6-6 through 6-9 are very complicated and the column titles are easy to misinterpret. Even though EPA has provided a step by step discussion of how the columns in the table were derived, it is hard for the average reader of this TMDL to follow the explanations and intended application of columns from the context of compliance or implementation. EPA should consider simplifying the step-by-step discussion by including a flow chart or a decision tree to clearly illustrate when the different columns of the table apply to a specific site. Secondly, the TMDL does not provide any indication on how these tables may be used by Washington and Oregon when implementing the TMDL.

The Mid-C PUDs Contribution

As the EPA's evaluation on climate change states "Future air and water temperature warming rates will ultimately be dictated by the actual levels of greenhouse gas emissions and the evolution of the complex global energy system (Isaak et al. 2018)." As hydropower generators, the Mid-C PUDs are well positioned to support greenhouse gas emission goals in the electric sector as well as the electrification of other sectors. Our ability to follow load and provide firm capacity also makes hydropower a strategic partner with other renewable resources in achieving environmental outcomes. We believe that any TMDL should accommodate hydropower's continued contribution to the region's carbon reduction and clean energy goals. An inaccurate and overly prescriptive approach could threaten to compound the very outcomes the TMDL intends to avoid.

We appreciate this opportunity to provide input on the TMDL. As Mid-C PUDs we share a common interest in the TMDL's characterization of Columbia River water quality, state standards, and background conditions, and we stand together in our commitment to meeting our fish, wildlife, and water quality requirements while also serving as a cost-effective, clean and reliable source of energy to the communities we serve. In addition to this submission, each of our utilities have provided additional detail and analysis in separate comment letters to outline issues specific to the facilities they operate.

Thank you for your consideration.

Sincerely,

Steve Wright	Gary Ivory	Kevin Nordt
General Manager	General Manager	General Manager
Chelan PUD	Douglas PUD	Grant PUD

Commissioners:
RONALD E. SKAGEN
MOLLY SIMPSON
AARON J. VIEBROCK

General Manager:
GARY R. IVORY

Public Utility District No. 1 of Douglas County

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Via Electronic Filing - ColumbiaRiverTMDL@epa.gov August 20, 2020

Ms. Mary Lou Soscia
Columbia River Coordinator
United States Environmental Protection Agency
805 S.W. Broadway, Suite 500
Portland, OR 97205

Subject: **Wells Hydroelectric Project – FERC Project No. 2149**
Comments on Temperature TMDL for the Columbia and Lower Snake Rivers

Dear Secretary Soscia:

Public Utility District No. 1 of Douglas County, Washington (Douglas PUD), licensee for the Wells Hydroelectric Project No. 2149 (Wells Project) respectfully submits comments on the May 18, 2020 Environmental Protection Agency (EPA) issued Total Maximum Daily Load (TMDL) for temperature on the Columbia and lower Snake Rivers. Douglas PUD's Section 401 Water Quality Certification requires participation in EPA's TMDL. Importantly, Douglas PUD remains committed to meeting its Federal Energy Regulatory Commission (FERC) license obligations to conserve, protect, mitigate and enhance various aquatic resources including the protection and restoration of Endangered Species Act (ESA) listed spring Chinook, summer Steelhead and Bull Trout and the water quality that these species depend upon when interacting with the Wells Project. Douglas PUD has a long history of meeting the Washington State water quality standards. Each year, Douglas PUD spends millions of dollars and hundreds of hours working with regional stakeholders to achieve those standards. As a result of these efforts, the Wells Project has one of the highest rates of survival for adult and juvenile salmonids. We take pride in our environmental stewardship.

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 (WQS). We have thoroughly reviewed the TMDL and appreciate the opportunity to provide a series of comments on that document, which are enclosed below. Where appropriate, we have included reference and/or quotation from the specific section of the TMDL.

Comment 1

"Even if all the allocations in this TMDL are implemented and the temperature reductions envisioned are fully realized, it is unlikely that the numeric criteria portion of the WQS will be met at all times and all places (page 2)*."*

Douglas PUD agrees with this conclusion in the TMDL but we are concerned that the TMDL is being set up to fail when actually many of the dams help to maintain and even reduce water temperatures during certain seasons. The clear recognition that without the dams, the system is still out of compliance, is important particularly during the load allocation process that will be implemented by Washington State. It appears to Douglas PUD that it is impossible to meet the WQS without addressing incoming water temperatures to the study area. On the contrary, based on the data reported, the Wells Project provides a cooling effect during the latter part of the season that the TMDL covers (see comment 5).

Comment 2

"Sources outside the allocation structure of this TMDL contribute to warmer temperatures. These sources include increased air temperatures throughout the study area and upstream human activities in Idaho and Canada, resulting in Columbia and Snake River water temperatures that already exceed the numeric criteria portion of the WQS when those rivers enter the geographic area covered by this TMDL (page 2)*."*

and

"Between 2011 and 2016, Columbia River water entering the United States at the Canadian Border (RM 745) frequently exceeded Washington's applicable 7-DADM criterion of 16°C in July, August, and September. On average, water temperatures exceeded the 7-DADM by 1.8°C, and the annual maximum exceedance magnitude averaged 3.2°C (page 15)*."*

The study does not model or attempt to assign a load allocation to the largest sources of thermal input into the system, the headwater storage projects located upstream from the run-of-river dams and outside the study area. Again, Douglas PUD agrees with the findings of the study but we are concerned that by omitting these upstream heat sources, the TMDL ignores the largest sources of thermal input. This leaves the run-of-river hydro operators with no clear path to compliance. An expanded study area is needed to fully understand and properly identify ways to reach compliance with the WQS.

Comment 3

"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 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 (page 2)*."*

Douglas PUD supports EPA's suggested path forward on establishing site specific water temperature standards that will make the TMDL an outcome based load allocation provided the Clean Water Act (CWA) processes are followed and with oversight from State of Washington. Douglas PUD's commitment and record of enhancing designated uses within the state of Washington is well documented, including the implementation of the Wells Anadromous Fish Agreement and Habitat Conservation Plan (HCP), Aquatic Settlement Agreement and associated Water Quality Management Plan. Douglas PUD remains committed to meeting all of its mitigation requirements, even as climate change negatively impacts the waters within the Columbia River Basin. Importantly, the Wells Project defends against at warming climate given its renewable nature.

Comment 4

Washington's WQS appear to be 16 ^{o} C from the Canadian border to Grand Coulee Dam, 17.5 ^{o} C from the base of Grand Coulee Dam to below Priest Rapids Dam, 20 ^{o} C from Lower Granite to Ice Harbor dams and 20 ^{o} C from below Priest Rapids Dam to the Columbia River Estuary. While it is not the intent of the TMDL to discuss the merits of the current WQS, the WQS assigned to each of the four study area appear to be rather arbitrary and the TMDL hinges on these WQS. As an example, the lower Snake River section has a standard of 20^{o} C but has the same species assemblage and a very similar array of ESA listed species as the section of river from Wells to Priest Rapids where the water temperature standard is instead only 17.5^{o} C. Both of these sections of river have Chinook, Coho, Sockeye, Steelhead, Bull Trout, White Sturgeon and Pacific Lamprey and yet the WQS differ dramatically.

"*The temperature WQS are designed to protect the beneficial uses in those waters, the most sensitive of which are salmon migration and spawning* (page 1)."

The WQS should be consistent throughout those sections of the Columbia Basin that have similar species assemblages, including having similar designated uses. Why the species listed above are enhanced by allowing a 20^{o} C water quality standard in the Snake River but only 17.5 C in the Mid-Columbia cannot be defended. Please either remain consistent by increasing the WQS for the Wells to Priest Rapids section of river or reducing the standards for the lower Snake River projects.

"Although Washington and Oregon have developed numerous temperature TMDLs using the "natural condition" provisions of the States' WQS, those provisions were not used to develop his TMDL. These existing "natural condition" TMDLs attempted to estimate the instream water quality conditions that occurred prior to human development. For this TMDL, EPA has not attempted to estimate the natural conditions of the mainstems of the Columbia and lower Snake Rivers for two reasons. First, Oregon WQS do not currently include a natural condition provision. Consequently, for the lower Columbia River, where the border between Oregon and Washington divides the River, EPA developed the TMDL using the existing numeric criteria, relying on the more protective aspects of the two States' criteria to determine the total load from bank-to-bank. Secondly, there is no functional basin-wide water quality model for estimating the natural conditions of the Columbia and lower Snake Rivers. An appropriate basin-wide model would incorporate the upper portions of the watershed in Canada and Idaho and would estimate the natural flow and temperature regime that existed prior to construction of dams and irrigation diversions. For these reasons, EPA relied on the existing numeric criteria to develop this TMDL (page 11)."

While it is more conventional for TMDLs to use a natural condition baseline, Douglas PUD understands EPA's desire to instead compare temperature observations and model results to WQS using both the with and without dams scenarios. This is especially necessary in the face of climate change that has been occurring before and after the hydro-system was developed. However, the Washington WQS again seem arbitrary. For example, in Idaho the WQS are 22 C (daily maximum) and 19 C (daily average; page 19) when they are designed to protect the spawning, rearing, and migration for the same species found in the lower Snake River (20^{o} C) and upper Columbia River (17.5^{o} C).

Comment 5

The TMDL analysis of observations and modeling related to the Wells Project shows:

- During July and August, current water temperatures are lower than predicted for the free-flowing case (Tables 6-6 and 6-7).
- During September and October, water temperatures decline under current conditions from Grand Coulee to Chief Joseph to Wells (Tables 6-8 and 6-9).
- This suggests that upstream dam removal could increase the number of exceedances during July and August (and probably early September), while only decreasing exceedances in (late) September and October. However, the TMDL analysis also seems to suggest a possible beneficial effect of Chief Joseph and Wells cooling the releases from Grand Coulee, although this could also be attributed to cooling air temperatures and reduced solar radiation in the early fall.

These observations are consistent with the findings of a WQS temperature compliance study for the Wells Project completed in 2008. Likewise, it's important to consider that certain areas of the hydro system, including the Wells Project, provide either no effect or a cooling effect compared to the free flowing scenario.

Comment 6

"In the portion of the Columbia River above Priest Rapids Dam, the majority of criteria exceedances occur in the months of August and September. In the mid-Columbia, from Wells Dam to Wanapum Dam, water temperatures exceed the criterion more frequently, for a longer average duration and by a higher average magnitude. The lower mainstem Columbia, below McNary Dam, has a higher criterion (20°C) but exhibits only slightly fewer criteria exceedances (page 15).*"*

Douglas PUD finds this paragraph misleading and suggests that EPA strike the paragraph from the TMDL. This paragraph, as written, is a commentary on the WQS differences rather than reach specific influences on temperature. The Mid-Columbia River has projects that are run-of-river and have little storage capacity relative to larger run-of-river projects below them and large storage projects above them. Indeed, reach specific influences in the Wells Project show either zero influence in increasing water temperatures or a cooling effect depending on the month. See tables 6-6, 6-7, 6-8, and 6-9 in columns E (Reach Impact for Wells Dam). In fact, in later months, Wells' reach impact provides a cooling effect as much as -0.5 C in the month of October (pages 47-50). The TMDL has to be cautious when using language that infers worse conditions in reach impacts when the data from their own model suggest otherwise.

Comment 7

"The full simulation period is used for long term trend analysis, and the period 2011- 2016 is used to represent current conditions for the TMDL (page 29)*."*

Douglas PUD is concerned that the model doesn't accurately represent improved temperature conditions and improved temperature data collection at the Wells Project since 2013. Starting in 2013 Douglas PUD installed 10 new real-time thermistors throughout the Wells Project. These new devices collect highly accurate project wide water temperature data and the new date is also reflective of improvements made at the Wells Dam and Wells Hatchery intended to reduce the use of water and reduce the temperature of the water that is used. These installations and modifications were part of Douglas PUD's 401 Water Quality Certification implementation process and as part of the Wells HCP required replacement of the Wells Hatchery.

In particular, since the Wells Fish Hatchery was modernized, water temperatures in the hatchery outfall have improved dramatically and are now well below the water temperatures observed in the mainstem Columbia River adjacent to the hatchery. The large increase in ground water flow at the hatchery results in a net reduction in water temperatures immediately below Wells Dam. However, the data used by EPA, in the TMDL, labeled WELW, is not representative of current tailrace conditions. It is representative of an old, outdated spawning channel used to move water through the hatchery facility. Instead, Douglas PUD removed the old hatchery spawning channel as part of the modernization of this facility and replaced it with a new colder water conveyance structure. Since 2016, water flowing through the hatchery from July through October often provides a cold water refuge (CWR) for a number of salmonids. Wells Fish Hatchery outfall temperatures are now much colder than river temperatures during the time of year that the TMDL focuses on (July – October).

Again, Table 6-13 (page 54) lists the Wells Fish Hatchery as a minor facility. Douglas PUD would note that during the periods from July through October, approximately 35% of the water used in the hatchery is ground water with the balance being surface water. Ground water temperature in the Wells Fish Hatchery approximates 10-13 ^{o} C and is coldest during the summer months. We would expect that Wells Fish Hatchery outfall temperatures are 7-10 ^{o} C cooler than Columbia River temperatures from July to October and as such act as a CWR for salmonid species. Indeed, thousands of adult salmonids use the hatchery outfall each summer and fall as a refuge from mainstem Columbia River water temperatures.

The importance of CWR is discussed at length on page 32, but there is no acknowledgement that the Wells Fish Hatchery Facility provides this CWR to salmonids and the extent of protection is not quantified in the TMDL.

Finally, water temperature observations in tailraces were used for all Projects, except Wells, where forebay measurements were used (WEL station) as tailwater measurements at Wells Project were infrequent. As the WEL measurements are at a depth of 10 feet, it is possible that they are slightly higher (0.5-0.8 ^{o}C) during the warmer summer months due to a small seasonal stratification, increased in part by very warm flows from the Okanogan River. This could slightly overestimate the summer impact of the Wells Project based on observations and completely misses the added value of Wells Fish Hatchery providing cooler water to downstream environments.

Comment 8

Figure 6-1 (page 40) is inherently confusing. It may be helpful to change the y-axis scale. The biggest take away is that in July, at the Canadian/U.S. border, the Columbia River is 2.0 ^{o} C above the WQS,

"*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. The current water quality conditions present a significant challenge to achieving downstream water quality standards in Washington and Oregon (page 42).*"

Comment 9

It is confusing that major tributaries get automatic allocation (0.1 ^{o} C) of the 0.3 ^{o} C available. Are tributaries not part of the background that would have been part of natural conditions? Should their inputs and warming and cooling effects on each specific section of mainstem river be quantified as background processes rather than temperature adders?

Comment 10

The allocation of 0.1 ^{o} C individually for (1) point sources, (2) tributary inflows, and (3) non-point sources (dams) seems arbitrary. Having noted that point sources and tributaries each cause less than a 0.1 ^{o} C increase compared to the base case, the allocation effectively (and seemingly arbitrarily) removes point sources and tributary inflows from actions needed to meet their allocations. This leaves only non-point sources (dams) to meet an allocation to comply with WQS.

Comment 11

Table 6-13 (page 55) Data for Wells Dam Permit Number WA0991031 comes from a yet to be issued draft permit and to our knowledge has not been assigned a permit number. In addition, data provided in the TMDL that references Wells Dam point source use of water (units of million gallons a day) and temperature additions should be considered preliminary and therefore, not appropriate for use in this TMDL. Since the waste load allocation in the final TMDL is based on information in a draft National Pollutant Discharge Elimination System (NPDES) permit and there would be an opportunity to revise as appropriate during NPDES development, Douglas PUD is concerned that these data should not be used in a final TMDL.

More generally, we are concerned that the Waste Load Allocation (WLA) for "minor facilities" identified as point source polluters listed in *Tables 6-13,* either represent industry standards for column "Temp (C)", or have not been developed from physical monitoring data. Should the WLA not be a difference between ambient and discharge temperature? The use of 17.7^{o}C for Wells Fish Hatchery and 35.4^{o}C for Wells Dam seem inaccurate since these are maximum temperatures rather than deltas from ambient.

The reported temperature of 35.4^{o}C would be the temperature at one discharge location and not representative of all discharge locations at Wells Dam, nor the difference or change in water temperature from ambient (maximum delta of 14.44^{o}C). Using a change in ambient water temperature approach, for example, the additive WLA for the Wells Project operating all ten turbine units at Wells Dam is closer to 1.12E+09 kcal/day plus minor additions for new HVAC systems being installed at the Wells project and therefore conflicts with the 3.81E+09 are listed in the TMDL (*Table 6-13*). While the overestimation would allow for compliance, we feel compelled to point out that it is likely an extreme value if not an overestimation of actual WLA at the Wells Project.

In addition, during the study period, Wells Fish Hatchery is likely providing a reduction in kcal/day compared to ambient conditions due to the influence of colder ground water at the outfall. We believe the 2.42E+09 kcal/day listed in *Table 6-13* is high during most times of the year if not always. We are not certain how EPA filled out this table and are concerned a consistent approach for all of these facilities may be lacking. Again, water temperatures between July and October at Wells Fish Hatchery are likely colder, if not much colder, than Columbia River temperatures and provide a CWR for migrating salmonids.

Looking at the information presented for the Wells Project (especially in *Tables 6-6 through 6-9*), it seems that the impact of the Wells Project is very small, and in fact, an argument could be made that it may not exceed WQS during July and August (if the "natural conditions" criterion in the Washington temperature standards is considered), and further both Chief Joseph and Wells provide some cooling benefit for warm releases originating from Grand Coulee during September and October.

We look forward to working with EPA on an updated TMDL and we appreciate the opportunity to provide input and to comment during this process. If you or your staff have any questions pertinent to our comments, please feel free to contact Andrew Gingerich (509) 881-2323.

Sincerely,

Shane Bickford
Natural Resources Supervisor

FRANKLIN PUD

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July 21, 2020

Mr. Andrew Wheeler
Administrator
Environmental Protection Agency
ColumbiaRiverTMDL@epa.gov

RE: EPA Total Maximum Daily Load for Temperatures in the Columbia and Lower Snake Rivers

Dear Administrator Wheeler:

Thank you for the opportunity to comment on behalf of Public Utility District No. 1 of Franklin County (Franklin PUD) regarding the *Total Maximum Daily Load for Temperatures for the Columbia and Lower Snake Rivers ("CLSRT TMDL").*

Franklin PUD provides electrical service to over 33,000 customers located in Franklin County, Washington. Our customers depend on the clean hydro energy provided from dams located on the Columbia and Snake Rivers.

The electrical energy provided from the Columbia and Lower Snake Rivers system is the lifeblood of our economy. The farmland and food processing facilities that we provide service to truly feed the world. It is for this reason that we have a great interest and stake in this issue.

We would like to begin by expressing our support for the comments provided by Northwest RiverPartners. As a Northwest RiverPartners member, we firmly agree with their position on the CLSRT TMDL and the need for its revision.

We have concerns with the states of Washington and Oregon intent to base energy and environmental policy on the CLSRT TMDL. This outcome is problematic because, as EPA notes, "*The current water quality conditions present a significant challenge to achieving downstream water quality standards in Washington and Oregon.*"[1] This challenge arises because water temperatures entering Washington state from Canada and from Idaho often significantly exceed the respective states' water quality standards during the peak summer months. This confounding situation raises the possibility that the Federal Columbia River Power System (FCRPS) dams will be held to unattainable standards. Due to the possibility described above, the stakes are very high for the CLSRT to be extremely accurate.

Also concerning is the RBM10 model which the CLSRT TMDL relies upon. It is one-dimensional and lacks the detail and sophistication necessary to provide precise results for a river system with the complexity of the Columbia-Snake river system. Tellingly, the TMDL did not attempt to simulate the entire Columbia River Basin with its RBM10 model, but instead truncated the Columbia and Snake Rivers near the Washington state borders. This artificial limitation does not allow the model to accurately account for all of the sources of river temperature warming

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

throughout the basin, such as tributary sources and sources upstream of the boundary (i.e., Canada and Anatone, WA).

As written, the TMDL includes some dams but excludes others placing an unfair temperature standard on the downstream dams.

A 2002 study under the US Army Corps of Engineers ("USACE") compared pre-lower Snake River dam measurements from 1955-1958 to measurements taken after the lower Snake River dams were constructed. The study found no evidence that river temperatures had increased, and instead remained unchanged or slightly lower after completion of the four lower main stem dams.[2] This real-life finding runs contrary to what we are seeing in the TMDL's modeling output. In addition, 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.

If revisions are not made to the TMDL as written, the vitality of the FCRPS and the multiple purposes for the system as established by the United States Congress will needlessly be threatened .

Franklin PUD supports Northwest RiverPartners' recommendation that EPA revise its *Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers* and provide a revised 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 clean energy goals, and billions of dollars of extra costs forced on Northwest families.

Thank you again for the opportunity to comment.

Sincerely,

Scott Rhees
General Manager
Public Utility District No. 1 of Franklin County
P.O. Box 2407
1411 W. Clark St.
Pasco, WA 99302

LTR 2020-104

C: Central Files

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

Submitted via email

August 17, 2020

Mr. Andrew Wheeler
Administrator
Environmental Protection Agency
ColumbiaRiverTMDL@epa.gov

RE: EPA Total Maximum Daily Load for Temperature in the Columbia and lower Snake Rivers

Dear Administrator Wheeler,

The Public Utility District No. 2 of Grant County, Washington (Grant PUD) would like to thank you for the opportunity to comment on the Environmental Protection Agency's (EPA) Total Maximum Daily Load for Temperature in the Columbia and lower Snake Rivers (TMDL). The comments provided below are in addition to the comments Grant PUD submitted jointly with the Public Utility No.1 of Douglas County, Washington and Public Utility No. 1 of Chelan County, Washington.

The specific comments detailed below are intended to provide additional clarification and/or updated information as it relates to the Priest Rapids Hatchery and discharge flow and temperature values used in Table 6-13 of the TMDL for Wanapum and Priest Rapids Dams.

1) The Priest Rapids Hatchery is owned by Grant PUD and operated by the Washington Department of Fish and Wildlife (WDFW) whom maintains an Upland Fish Hatchery General National Pollutant Discharge Elimination System (NPDES) Permit (WAG137013) for discharges into the Columbia River downstream of Priest Rapids Dam. The Priest Rapids Hatchery permit was not included in the TMDL's list of permits in Section 6.5.2. Table 6-12, Table 6-13, or Table 6-15. Grant PUD is uncertain if the Priest Rapids Hatchery was left off the list of permitted facilities due to the timing of its operations only partially overlapping with the temporal scope of TMDL. Nevertheless, we provide the following information to EPA for consideration as you finalize the TMDL.
    a. The Priest Rapids Hatchery operates from the first week after Labor Day to late June. During September before Labor Day, July, and August there are no water withdrawals or discharges from the facility.
    b. The Priest Rapids Hatchery withdraws water from the Priest Rapids Dam forebay and on-site groundwater wells. The water from these two sources is used to create water temperatures in the hatchery that are safe and promote prescribed fish growth. The design flow for the Priest Rapids Hatchery is 102 cfs (66 million gallons per day) from Priest Rapids Dam forebay and 7,300 gallons per minute (10.5 million gallon per day) from the on-site wells for a combined design flow of 76.5 million gallons per day.
    c. All water used in the Priest Rapids Hatchery is returned to the Columbia River via an open discharge channel. The channel is approximately 2.6 km long and enters the Columbia

River 3.5 miles river kms downstream of Priest Rapids Dam. Additionally, the discharge channel enters the Columbia River approximately 11 river kms *upstream* of the Priest Rapids Dam tailrace water quality monitoring site. The State of Washington's numeric water quality criteria temperature in this reach of the Columbia River is 20°C daily maximum. Note that this water quality monitoring site includes mixing from the Priest Rapids Hatchery and was the source of the data that was used in EPA's RBM10 model.

d. Temperature monitoring in the discharge channel is not a requirement of the NPDES permit and has not been regularly conducted. However, on September 13, 2016, staff from WDFW deployed temperature monitoring devices in the discharge channel approximately 0.6 kms upstream from the confluence with the Columbia River. Data was collected until December 3, 2016. The data from that monitoring activity collected during the temporal scope of the TMDL are provided in Table 1.

Table 1 Summary of Flow and Temperature Discharge from Priest Rapids Hatchery during the Temporal Scope of the TMDL.

Month	Design Flow (million gallons per day)	Hatchery Outfall Maximum Hourly Temp °C (post-9/13/2016[1])	Priest Rapids Forebay Maximum Hourly Temp °C (post-9/13/2016[1])	Priest Rapids Tailrace Maximum Hourly Temp °C (post-9/13/2016[1])
September	76.5	19.0 (9/14)	19.2 (9/29)	19.8 (9/16)
October	76.5	18.2 (10/1)	18.4 (10/1)	18.1 (10/1)

[1]Temperature data collection in 2016 began on September 13, 2016.

2) The values (discharge flow and temperature) used in Table 6-13 of the TMDL for Wanapum and Priest Rapids Dams appear to have been taken from Grant PUD's application for NPDES permits for those facilities and, in the case of Priest Rapids Dam's temperature, from an "industry average" value. These values do not represent "the facility design flow and the highest known or estimated temperature of the facility effluent…" as described and intended by the TMDL. Below, we provide EPA with values for discharge flow and temperature that more accurately describes operations at each dam.

   a. For discharge flow, the values used by EPA represents the design flow for the cooling water intake structure only. In addition to this discharge, each dam also has sump discharge, which may capture water from locations such as gravity supply floor drains, grout gallery gutter drains, unit dewatering, and fish ladder dewatering, etc. The effluent from these sumps were included in Grant PUD's NPDES application and should be included in the TMDL wasteload analysis and allocation. Our best estimates for the potential maximum discharges, accounting for both cooling water intake and sump discharges, are provided in Table 2.

Table 2 Estimate total cooling water and sump flow from Wanapum and Priest Rapids Dams.

Facility	Cooling Water Design Flow (MGD)	Highest Average Sump Flow provided in NPDES Permit Application (MGD)[1]	Seasonal and Operational Variation above Average Sump Flow (MGD)	Total Discharge Flow (MGD)
Wanapum Dam	17.8	7.0	5.0	29.8
Priest Rapids Dam	15.8			27.8

[1]Highest average value between Wanapum and Priest Rapids Dams.

b. For temperature, the values in Grant PUD's NPDES application were recorded from single day grab samples at cooling water intake and effluent locations (note that the intake sampling location was inside the dam and not representative of incoming, or forebay, temperature). At Wanapum Dam, this sample was taken on April 23, 2019. At Priest Rapids Dam, the sample was taken on May 7, 2019. On April 23, 2019, the daily average temperature at Wanapum forebay was 7.5°C. On May 7, 2019, the daily average temperature at Priest Rapids forebay was 10.6°C. In both circumstances, the Columbia River, and therefore the intake temperatures, were relatively cold and do not represent the highest estimated temperatures of facility effluent. Project level effluent temperatures are not currently recorded at the dams, we therefore recommend the following approach to estimate maximum effluent temperatures, detailed in Table 3 and Table 4 below. First, the difference between the cooling water effluent grab sample temperature and the forebay temperature on the sampling date were used to calculate a project added temperature. Next, this project added temperature was averaged and added to the highest observed daily average forebay temperature from 2011 – 2019 at each project. The final value (column J in Table 4) is our estimated effluent temperature.

Table 3 Calculated degrees added to forebay temperature from NPDES permit application samples.

Location	NPDES Permit Effluent Application Temperature (°C)	Maximum hourly forebay temperature during sample date (°C)	Difference (°C) (B – C)	Average Difference (°C) (average of D)
A	**B**	**C**	**D**	**E**
Wanapum Dam	18.1	7.7	10.4	8.0
Priest Rapids Dam	15.5	9.9	5.6	

Table 4 The estimated maximum effluent temperature.

Location	Average Difference (°C)	Maximum Daily Average Forebay Temperature 2011-2019	Date of Maximum Daily Average Forebay Temperature 2011-2019	Assumed Maximum Effluent Temperature (G + H)
F	**G**	**H**	**I**	**J**
Wanapum Dam	8.0	22.0	9/11/2013	30.0
Priest Rapids Dam		21.2	8/15/2013	29.2

Grant PUD appreciates EPA's efforts to ensure that the information included within the Temperature TMDL is as accurate as possible. Please contact me at 509-793-1468 or rhendr1@gcpud.org, or Peter Graf at 509-888-4479 or pgraf@gcpud.org with any questions.

Sincerely,

Ross Hendrick

Ross Hendrick
Senior Manager – Environmental Affairs

Cc: Laurie Mann – EPA
Mary Lou Soscia – EPA
Ben Cope – EPA
Marcie Clement – Chelan PUD
Shane Bickford – Douglas PUD
David Bowen – Washington Department of Ecology

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July 27, 2020

Mr. Andrew Wheeler
Administrator
Environmental Protection Agency
ColumbiaRiverTMDL@epa.gov

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 Grays Harbor PUD regarding the *Total Maximum Daily Load for Temperatures for the Columbia and Lower Snake Rivers* ("CLSRT TMDL").

The Grays Harbor PUD is located on the Washington coast and provides energy and telecommunication services to over 42,000 customers. Our energy portfolio consists of over 97% emissions free energy, over 80% of which is hydroelectric generated from the Columbia and Snake River system.

We would like to begin by expressing our support for the comments provided by Northwest RiverPartners. As a Northwest RiverPartners member, we firmly agree with their position on the CLSRT TMDL and the need for its revision.

If these revisions are not made, the TMDL, as written, needlessly threatens the vitality of the Federal Columbia River Power System ("FCRPS") and the multiple purposes for the system as established by the United States Congress.

KEY POINTS OF EMPHASIS

- The states of Washington and Oregon are signaling that they intend to base energy and environmental policy on the CLSRT TMDL. This outcome is problematic because, as EPA notes, "The current water quality conditions present a significant challenge to achieving downstream water quality standards in Washington and Oregon."[1] This challenge arises because water temperatures entering Washington state from Canada and from Idaho often significantly exceed the respective states' water quality standards during the peak summer months. This confounding situation raises the possibility that the FCRPS dams will be held to unattainable standards.

- Due to the possibility described above, the stakes are very high for the CLSRT to be extremely accurate.
- The CLSRT TMDL relies upon the one-dimensional RBM10 model, which lacks the detail and sophistication necessary to provide precise results for a river system with the complexity of the Columbia-Snake river system.
- Tellingly, the TMDL did not attempt to simulate the entire Columbia River Basin with its RBM10 model, but instead truncated the Columbia and Snake rivers near the Washington state borders. This artificial limitation doesn't allow the model to accurately account 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).
- The TMDL, as written, includes significant arbitrary assumptions, such as including large storage dams in its "free flowing" state. These larger dams can release artificially cool water during the summer. This inconsistent treatment (i.e., including some dams but excluding others) places an unfair temperature standard on the downstream dams.
- A 2002 study under the US Army Corps of Engineers ("USACE") compared pre-lower Snake River dam measurements from 1955-1958 to measurements taken after the lower Snake River dams were constructed. The study found no evidence that river temperatures had increased, and instead remained unchanged or slightly lower after completion of the four lower main stem dams.[2] This real-life finding runs contrary to what we are seeing in the TMDL's modeling output.
- 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. This finding is much more consistent with the 2002 USACE finding described above.

RECOMMENDATION

Grays Harbor PUD supports Northwest RiverPartners' recommendation that EPA revise its *Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers* and provide a revised 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 main stem Columbia and Lower Snake Rivers.

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

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

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 clean energy goals, and billions of dollars of extra costs forced on Northwest families.

Thank you again for the opportunity to comment.

Best regards,

Ian Cope
Communications and Govt. Relations Director

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July 21, 2020

Mr. Andrew Wheeler
Administrator
Environmental Protection Agency
ColumbiaRiverTMDL@epa.gov

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 Lewis County PUD regarding the *Total Maximum Daily Load for Temperatures for the Columbia and Lower Snake Rivers* ("CLSRT TMDL").

Lewis County Public Utility District ("District") is a not-for-profit, consumer-owned utility that provides electric service to approximately 33,000 residential, commercial and industrial customers throughout Lewis County, in southwest Washington State. The District also owns and operates the Cowlitz Falls Hydroelectric Project, a 70 megawatt hydroelectric dam that was constructed in the early 1990s. The dam is located near the confluence of the Cowlitz and Cispus Rivers within our service territory. Ownership in a large hydro facility gives us a unique experience and insight into hydroelectric generation operations and environmental stewardship obligations.

Lewis County PUD takes our environmental stewardship responsibilities very seriously for both the dam which we operate and the renewable, carbon-free sources of power we purchase, including power sold by the Bonneville Power Administration (BPA) from hydroelectric generation facilities along the Columbia and Lower Snake Rivers. The Federal Columbia River Power System (FCRPS) is integral to the power stability for our 33,000 customers and the entire region. The District purchases approximately 95 percent of it's power from the BPA, which is about 1.5 percent of BPA's total contracted load. Impacts to the BPA's resource portfolio can result in significant cost impacts to the District's customers.

We would like to begin by expressing our support for the comments provided by Northwest RiverPartners. As a Northwest RiverPartners member, we firmly agree with their position on the CLSRT TMDL and the need for its revision.

If these revisions are not made, the TMDL, as written, needlessly threatens the vitality of the FCRPS and the multiple purposes for the system as established by the United States Congress.

KEY POINTS OF EMPHASIS

- The states of Washington and Oregon are signaling that they intend to base energy and environmental policy on the CLSRT TMDL. This outcome is problematic because, as EPA notes, "The current water quality conditions present a significant challenge to achieving downstream water quality standards in Washington and Oregon."[1] This challenge arises because water temperatures entering Washington state from Canada and from Idaho often significantly exceed the respective states' water quality standards during the peak summer months. This confounding situation raises the possibility that the FCRPS dams will be held to unattainable standards.
- Due to the possibility described above, the stakes are very high for the CLSRT to be extremely accurate.
- The CLSRT TMDL relies upon the one-dimensional RBM10 model, which lacks the detail and sophistication necessary to provide precise results for a river system with the complexity of the Columbia-Snake river system.
- Tellingly, the TMDL did not attempt to simulate the entire Columbia River Basin with its RBM10 model, but instead truncated the Columbia and Snake rivers near the Washington state borders. This artificial limitation doesn't allow the model to accurately account 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).
- The TMDL, as written, includes significant arbitrary assumptions, such as including large storage dams in its "free flowing" state. These larger dams can release artificially cool water during the summer. This inconsistent treatment (i.e., including some dams but excluding others) places an unfair temperature standard on the downstream dams.
- A 2002 study under the US Army Corps of Engineers ("USACE") compared pre-lower Snake River dam measurements from 1955-1958 to measurements taken after the lower Snake River dams were constructed. The study found no evidence that river temperatures had increased, and instead remained unchanged or slightly lower after completion of the four lower main stem dams.[2] This real-life finding runs contrary to what we are seeing in the TMDL's modeling output.
- 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. This finding is much more consistent with the 2002 USACE finding described above.

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

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

RECOMMENDATION

Lewis County PUD supports Northwest RiverPartners' recommendation that EPA revise its *Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers* and provide a revised 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 clean energy goals, and billions of dollars of extra costs forced on Northwest families. Such potentially dire consequences demand a thorough scientific review from a macro level that considers all factors that contribute to the equation.

Thank you again for the opportunity to comment.

Best regards,

Willie Painter
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PUBLIC UTILITY DISTRICT NO. 1
OF MASON COUNTY
N. 21971 Hwy. 101
Shelton, Washington 98584

BOARD OF COMMISSIONERS
MIKE SHEETZ, Commissioner
JACK JANDA, Commissioner
RON GOLD, Commissioner

July 20, 2020

Mr. Andrew Wheeler
Administrator
Environmental Protection Agency
ColumbiaRiverTMDL@epa.gov

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 Mason County PUD No. 1 regarding the *Total Maximum Daily Load for Temperatures for the Columbia and Lower Snake Rivers* ("CLSRT TMDL").

Mason PUD 1 is the very first operating PUD in Washington State. With the exception of a small, privately owned hydro project on our system, we are full subscribers of Bonneville Power Administration and our 5,300 electric customers depend on the low-cost, clean preference hydropower from BPA to keep our rates affordable and our energy virtually carbon free.

Located on the scenic Hood Canal in Washington State, we appreciate the role that water quality and temperature play in the survival of aquatic species, such as salmon and shellfish. We agree that if there are ways for industries, including the power industry, to mitigate any harm, those actions should be closely evaluated. In the case of the TMDL though, the Federal Columbia River Power System ("FCRPS") is expected to mitigate for conditions that are outside of the control of the system and are frankly, unachievable. This is an example of the undermining of value of the system that we and our fellow BPA subscribers are concerned about and monitoring closely. One of the main concerns that Mason PUD 1 has had with regard to the scrutiny of the FCRPS and Lower Snake River Dams (LSRDs) is that the critics and dam removal advocates will work to erode the value of the system by getting regulatory agencies to set impossible standards that are unachievable and not rooted in fair, objective science.

Mason PUD 1 supports the comments provided by Northwest RiverPartners. As a Northwest RiverPartners member, we wholeheartedly agree with their position on the CLSRT TMDL and the need for its revision. If these revisions are not made, the TMDL, as written, needlessly threatens the vitality of the FCRPS and the multiple purposes for the system as established by the United States Congress.

KEY POINTS OF EMPHASIS

- The states of Washington and Oregon are signaling that they intend to base energy and environmental policy on the CLSRT TMDL. This outcome is problematic because, as EPA notes, "The current water quality conditions present a significant challenge to achieving downstream

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BOARD OF COMMISSIONERS
MIKE SHEETZ, Commissioner
JACK JANDA, Commissioner
RON GOLD, Commissioner

water quality standards in Washington and Oregon."[1] This challenge arises because water temperatures entering Washington state from Canada and from Idaho often significantly exceed the respective states' water quality standards during the peak summer months. This confounding situation raises the possibility that the FCRPS dams will be held to unattainable standards.

- Due to the possibility described above, the stakes are very high for the CLSRT to be extremely accurate.
- The CLSRT TMDL relies upon the one-dimensional RBM10 model, which lacks the detail and sophistication necessary to provide precise results for a river system with the complexity of the Columbia-Snake river system.
- Tellingly, the TMDL did not attempt to simulate the entire Columbia River Basin with its RBM10 model, but instead truncated the Columbia and Snake rivers near the Washington state borders. This artificial limitation does not allow the model to accurately account 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).
- The TMDL, as written, includes significant arbitrary assumptions, such as including large storage dams in its "free flowing" state. These larger dams can release artificially cool water during the summer. This inconsistent treatment (i.e., including some dams but excluding others) places an unfair temperature standard on the downstream dams.
- A 2002 study under the US Army Corps of Engineers ("USACE") compared pre-lower Snake River dam measurements from 1955-1958 to measurements taken after the lower Snake River dams were constructed. The study found no evidence that river temperatures had increased, and instead remained unchanged or slightly lower after completion of the four lower main stem dams.[2] This real-life finding runs contrary to what we are seeing in the TMDL's modeling output.
- 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. This finding is much more consistent with the 2002 USACE finding described above.

RECOMMENDATION

Mason County PUD No. 1 supports Northwest RiverPartners' recommendation that EPA revise its *Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers* and provide a revised 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

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[1] Columbia and Lower Snake River Temperature Total Maximum Daily Load. 5/18/2020. US EPA, p 42.
[2] Water Temperatures and Passage of Adult Salmon and Steelhead in the Lower Snake River

PUBLIC UTILITY DISTRICT NO. 1
OF MASON COUNTY
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Shelton, Washington 98584

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 clean energy goals, and billions of dollars of extra costs forced on Northwest families.

Again, we do not object to mitigating water temperature to assist the survival of salmon and other species, but we firmly object to an unbalanced and arbitrary model and standard.

Thank you again for the opportunity to comment. We hope you will agree that a more balanced and objective approach is not only the most scientifically and legally defensible path, but is also the right thing to do for the Pacific Northwest.

Sincerely,

Kristin Masteller

Kristin Masteller
General Manager

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PUBLIC UTILITY DISTRICT NO. 1 OF OKANOGAN COUNTY

July 20, 2020

Mr. Andrew Wheeler
Administrator
Environmental Protection Agency
ColumbiaRiverTMDL@epa.gov

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 Public Utility District No. 1 of Okanogan County (Okanogan PUD) regarding the *Total Maximum Daily Load for Temperatures for the Columbia and Lower Snake Rivers* ("CLSRT TMDL").

Okanogan PUD is located in North Central Washington, adjoining the Canadian Border. We are a subscriber of Bonneville Power Administration and receive 10% of the output of the Wells Hydropower Project, situated on the Columbia River. Our 20,500 customers depend on the low-cost, clean preference hydropower to keep our rates affordable and our energy virtually carbon free.

Located on the Columbia River and adjoining tributaries of the Okanogan and Methow Rivers, we appreciate the role that water quality and temperature play in the survival of multiple anadromous salmon species. We agree that reasonable mitigation measures can be necessary and prudent, where impacts are known and results are achievable. However, the proposed TMDL is placing an unrealistic burden on the Federal Columbia River Power System ("FCRPS") to mitigate temperature exceedances they do not have control over. This sets an unachievable requirement, not based on science, but instead rooted in the ultimate goal of forcing dam removal.

Okanogan PUD supports the comments provided by Northwest RiverPartners. As a Northwest RiverPartners member, we wholeheartedly agree with their position on the CLSRT TMDL and the need for its revision. If these revisions are not made, the TMDL, as written, needlessly threatens the vitality of the FCRPS and the multiple purposes for the system as established by the United States Congress.

KEY POINTS OF EMPHASIS

- The states of Washington and Oregon are signaling that they intend to base energy and environmental policy on the CLSRT TMDL. This outcome is problematic because, as EPA notes, "The current water quality conditions present a significant challenge to achieving downstream water quality standards in Washington and Oregon."[1] This challenge arises because water temperatures entering Washington state from Canada and from Idaho often significantly exceed the respective states' water quality standards during the peak summer months. This confounding situation raises the possibility that the FCRPS dams will be held to unattainable standards.

- Due to the possibility described above, the stakes are very high for the CLSRT to be extremely accurate.
- The CLSRT TMDL relies upon the one-dimensional RBM10 model, which lacks the detail and sophistication necessary to provide precise results for a river system with the complexity of the Columbia-Snake river system.
- Tellingly, the TMDL did not attempt to simulate the entire Columbia River Basin with its RBM10 model, but instead truncated the Columbia and Snake rivers near the Washington state borders. This artificial limitation does not allow the model to accurately account 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).
- The TMDL, as written, includes significant arbitrary assumptions, such as including large storage dams in its "free flowing" state. These larger dams can release artificially cool water during the summer. This inconsistent treatment (i.e., including some dams but excluding others) places an unfair temperature standard on the downstream dams.
- A 2002 study under the US Army Corps of Engineers ("USACE") compared pre-lower Snake River dam measurements from 1955-1958 to measurements taken after the lower Snake River dams were constructed. The study found no evidence that river temperatures had increased, and instead remained unchanged or slightly lower after completion of the four lower main stem dams.[2] This real-life finding runs contrary to what we are seeing in the TMDL's modeling output.
- 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. This finding is much more consistent with the 2002 USACE finding described above.

RECOMMENDATION

Okanogan PUD supports Northwest RiverPartners' recommendation that EPA revise its *Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers* and provide a revised 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 clean energy goals, and billions of dollars of extra costs forced on Northwest families.

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

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

Thank you again for the opportunity to comment.

Sincerely,

Steven N. Taylor
General Manager
509-422-8485
stevet@okpud.org

Public Utility District No. 1
of Skamania County

Post Office Box 500 • Carson, WA 98610
Phone (509) 427-5126 • Fax (509) 427-8416
Toll Free (800) 922-5329

July 21, 2020

Mr. Andrew Wheeler
Administrator
Environmental Protection Agency
ColumbiaRiverTMDL@epa.gov

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 Skamania County PUD #1 regarding the *Total Maximum Daily Load for Temperatures for the Columbia and Lower Snake Rivers* ("CLSRT TMDL").

We provide electrical service for Skamania county residents and businesses.

We would like to begin by expressing our support for the comments provided by Northwest RiverPartners. As a Northwest RiverPartners member, we firmly agree with their position on the CLSRT TMDL and the need for its revision.
If these revisions are not made, the TMDL, as written, needlessly threatens the vitality of the Federal Columbia River Power System ("FCRPS") and the multiple purposes for the system as established by the United States Congress.

KEY POINTS OF EMPHASIS

- The states of Washington and Oregon are signaling that they intend to base energy and environmental policy on the CLSRT TMDL. This outcome is problematic because, as EPA notes, "The current water quality conditions present a significant challenge to achieving downstream water quality standards in Washington and Oregon."[1] This challenge arises because water temperatures entering Washington state from Canada and from Idaho often significantly exceed the respective states' water quality standards during the peak summer months. This confounding situation raises the possibility that the FCRPS dams will be held to unattainable standards.
- Due to the possibility described above, the stakes are very high for the CLSRT to be extremely accurate.
- The CLSRT TMDL relies upon the one-dimensional RBM10 model, which lacks the detail and sophistication necessary to provide precise results for a river system with the complexity of the Columbia-Snake river system.

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

- Tellingly, the TMDL did not attempt to simulate the entire Columbia River Basin with its RBM10 model, but instead truncated the Columbia and Snake rivers near the Washington state borders. This artificial limitation doesn't allow the model to accurately account 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).
- The TMDL, as written, includes significant arbitrary assumptions, such as including large storage dams in its "free flowing" state. These larger dams can release artificially cool water during the summer. This inconsistent treatment (i.e., including some dams but excluding others) places an unfair temperature standard on the downstream dams.
- A 2002 study under the US Army Corps of Engineers ("USACE") compared pre-lower Snake River dam measurements from 1955-1958 to measurements taken after the lower Snake River dams were constructed. The study found no evidence that river temperatures had increased, and instead remained unchanged or slightly lower after completion of the four lower main stem dams.[2] This real-life finding runs contrary to what we are seeing in the TMDL's modeling output.
- 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. This finding is much more consistent with the 2002 USACE finding described above.

RECOMMENDATION

Skamania County PUD #1 supports Northwest RiverPartners' recommendation that EPA revise its *Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers* and provide a revised 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 clean energy goals, and billions of dollars of extra costs forced on Northwest families.

Thank you again for the opportunity to comment.

Best regards,

Liz Green, Commissioner Liz Green

Dave McKenzie, Commissioner

Dan Boyes, Commissioner Dan Boyes

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

Chad Black
Raft River Rural Electric Co-op
PO Box 617
Malta, Idaho 83342

August 6, 2020

Mr. Andrew Wheeler
Administrator
Environmental Protection Agency
ColumbiaRiverTMDL@epa.gov

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 Raft River Electric regarding the *Total Maximum Daily Load for Temperatures for the Columbia and Lower Snake Rivers* ("CLSRT TMDL").

We are a not for profit cooperative that distributes electricity in the South Central region of Idaho, the Northwest area of Utah, and parts in Northern Nevada. We maintain and operate 2100 miles of distribution line and 300 miles of high voltage transmission line to serve just over 5000 electric meters. Our load is primarily agricultural based irrigation load, with some commercial and residential. We see peaks in the summer months of over 80 Megawatts, to lows in the winter months around 20 Megawatts.

Because of the nature of our load, it is very important that the Columbia River System can operate efficiently during short water months as our members rely heavily on the availability of reliable and economical energy, as they are providing the very food that we consume. This is why we believe it is so important that the TMDL assessment be as accurate as possible.

We would like to begin by expressing our support for the comments provided by Northwest RiverPartners and PNGC. As a PNGC member, as well as a Northwest RiverPartners member, we firmly agree with their positions on the CLSRT TMDL and the need for its revision.

If these revisions are not made, the TMDL, as written, needlessly threatens the vitality of the Federal Columbia River Power System ("FCRPS") and the multiple purposes for the system as established by the United States Congress.

KEY POINTS OF EMPHASIS

- The states of Washington and Oregon are signaling that they intend to base energy and environmental policy on the CLSRT TMDL. This outcome is problematic because, as EPA notes, "The current water quality conditions present a significant challenge to achieving downstream water quality standards in Washington and Oregon."[1] This challenge arises because water temperatures entering Washington state from Canada and from Idaho often significantly exceed the respective states' water quality standards during the peak summer months. This confounding situation raises the possibility that the FCRPS dams will be held to unattainable standards.

- Due to the possibility described above, the stakes are very high for the CLSRT to be extremely accurate.
- The CLSRT TMDL relies upon the one-dimensional RBM10 model, which lacks the detail and sophistication necessary to provide precise results for a river system with the complexity of the Columbia-Snake river system.
- Tellingly, the TMDL did not attempt to simulate the entire Columbia River Basin with its RBM10 model, but instead truncated the Columbia and Snake rivers near the Washington state borders. This artificial limitation doesn't allow the model to accurately account 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).
- The TMDL, as written, includes significant arbitrary assumptions, such as including large storage dams in its "free flowing" state. These larger dams can release artificially cool water during the summer. This inconsistent treatment (i.e., including some dams but excluding others) places an unfair temperature standard on the downstream dams.
- A 2002 study under the US Army Corps of Engineers ("USACE") compared pre-lower Snake River dam measurements from 1955-1958 to measurements taken after the lower Snake River dams were constructed. The study found no evidence that river temperatures had increased, and instead remained unchanged or slightly lower after completion of the four lower main stem dams.[2] This real-life finding runs contrary to what we are seeing in the TMDL's modeling output.
- 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. This finding is much more consistent with the 2002 USACE finding described above.

RECOMMENDATION

Raft River Electric supports Northwest RiverPartners' recommendation that EPA revise its *Total Maximum Daily Load for Temperature in the Columbia and Lower Snake Rivers* and provide a revised 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.

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

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

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 clean energy goals, and billions of dollars of extra costs forced on Northwest families.

Thank you again for the opportunity to comment.

Best regards,

Chad Black

General Manager
Raft River Electric Co-op

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Seattle City Light

July 21, 2020

Mr. Chris Hladick
U.S. EPA Region 10 Administrator
1200 Sixth Avenue, Suite 155
Seattle, WA 98101-3188

Re: Seattle City Light Comments on TMDL for Temperature in the Columbia and Lower Snake Rivers

Dear Mr. Hladick:

Seattle City Light (City Light) is a municipal electric utility and a department of the City of Seattle that serves nearly 1 million residents in the City of Seattle and seven franchise jurisdictions bordering Seattle. We are the second largest Bonneville Power Administration (BPA) customer and, hence, the reliability, cost, and environmental sustainability of the federal hydropower system are vitally important to our customers and stakeholders. We are equally committed to operating on principles that support the recovery of threatened and endangered salmon and steelhead, cognizant of the impacts of hydroelectric operations on the water quality conditions upon which these species depend. To this end, elevated temperatures in the Columbia and Snake Rivers have been recognized as a key limiting factor to the recovery of salmonid populations in these systems for decades, and we commend the Environmental Protection Agency (EPA) for publishing the Total Maximum Daily Load (TMDL), which we hope serves its purpose of coordinating temperature reductions where possible in the Columbia and Snake River basins. While the publication of the TMDL is very welcome, multiple other regulatory actions affecting hydropower operations and salmonid recovery in the Columbia and Snake River watersheds are at play at present, including the recently released Columbia River Systems Operations (CRSO) Draft Environmental Impact Statement (EIS), EPA-issued National Pollutant Discharge Elimination (NPDES) permits for the federal hydropower facilities that constitute the CRSO, and draft section 401 water quality certifications for these same NPDES permits recently issued by the Washington State Department of Ecology. The overlapping implications for compliance by operators attempting to meet these requirements is challenging. In this light, we offer a few observations for consideration.

We understand the TMDL sets temperature load limits to consider the sum of individual waste load allocations for point sources, load allocations for non-point sources and natural background. The TMDL also incorporates a margin of safety to restrict point and non-point source allocations resulting in a load limit of 0.3 degrees centigrade increase above water quality criterion within the boundary of the TMDL—the Canadian border to the Pacific Ocean, excluding Idaho. We note that the TMDL also acknowledges that, "it is unlikely that the numeric criteria portion of the Water Quality Standards will be met at all times and all places. Sources outside the allocation structure of the TMDL contribute to warmer temperatures," and that failure to meet criteria through load allocation is likely.

At the same time, EPA's recently released draft NPDES permits for the federal CRSO dams assert heretofore unapplied provisions of section 316(b) of the Clean Water Act to hydropower facilities, requiring the application of the Best Technology Available (BTA) for entrainment and impingement screening at all cooling water intakes of hydropower facilities, and to monitor temperature in all cooling water outfalls. In both cases, it appears at present that these requirements are being proposed across the board, without an apparent screening of the risks of the intakes to cause impingement or entrainment, or the cooling water intake structure(s) to actually heat the water. For example, the Draft NPDES permit for the Dalles Lock and Dam (WA0026701) indicates that 27 cooling water intakes (for the 27 cooling water outfalls) must have intake screens and/or other technologies installed (if they are not already), regardless of the intake flows and whether or not there is any evidence of impingement/entrainment with the existing technology. Such an application does not appear to be a risk-based application of regulation, but appears largely procedural and hence, while potentially costing an excessive amount, may have equivocal fish benefits. Further complicating matters is the assertion in Ecology's section 401 water quality certification requirements that failure to meet TMDL allocations would lead to the denial of the 401-water quality certification for the facility in question, requiring reapplication by the operator. Given that in many locations incoming water will simply be too warm to meet standards (e.g., as it typically enters Washington from both Canada and Idaho during summer and early fall), the value of the TMDL process to lead to the necessary and needed changes is in question in the absence of an even broader watershed approach.

Notwithstanding the above concerns, City Light supports prudent and appropriate monitoring to meet the needs of these federal and state permits, particularly when it is tightly tied to increasing our understanding of the impacts of factors such as temperature, entrainment and impingement that can have adverse effects on the recovery of Endangered Species Act-listed salmonids. We are concerned, however, that there are multiple redundant requirements in the monitoring provisions being proposed that add little value. We encourage the EPA to work closely with its State and Tribal partners to reconcile monitoring provisions that appear to be overreaching, potentially increasing compliance costs significantly without necessarily benefitting the species. For example, Ecology asserts that they must conduct an independent review of EPA's determination of BTA, and that permittees must prepare additional annual reporting (e.g., Ecology's proposed annual cooling water intake structures report; operation and maintenance manual) that will address elements already required by EPA's provisions (e.g., EPA's requirement for a Quality Assurance Plan for all monitoring to be conducted, and development of a best management practices plan).

City Light greatly appreciates the opportunity to comment on EPA's draft TMDL. While we have concerns regarding scope and redundancy of overlapping regulatory jurisdictions and the regulatory actions in play at present, the TMDL is long overdue and is welcome. Costs of implementation can be greatly magnified by the overlapping requirements of regulatory agencies involved in the current actions in the Columbia Basin, and/or by requirements that are not likely to lead to measurable change in fish recovery. As a matter of policy, City Light supports regulatory efficiency and hence recommends the EPA work with its sister State and Tribal agencies addressing water quality concerns such that actions required by permittees are founded on the consideration of inherent risks at each intake and outfall proposed for monitoring, and are not applied unnecessarily where actions that could be applied would not yield tangible benefit to fisheries resources in the Columbia basin. If you have any questions or comments regarding our letter, feel free to reach me at Tom.DeBoer@seattle.gov, or via phone at (206) 572-0519.

Sincerely,

Tom DeBoer

Tom DeBoer (Jul 21, 2020 15:59 PDT)

Tom DeBoer
Chief Environmental Officer
Seattle City Light

Oregon

Kate Brown, Governor

Department of Environmental Quality
Agency Headquarters
700 NE Multnomah Street, Suite 600
Portland, OR 97232
(503) 229-5696
FAX (503) 229-6124
TTY 711

August 20, 2020

Sent via electronic email to ColumbiaRiverTMDL@epa.gov

Mr. Chris Hladick, Regional Administrator
U.S. Environmental Protection Agency, Region 10
1200 6th Avenue, Suite 900
M/S ECL-122
Seattle, WA 98101

Dear Administrator Hladick:

The Oregon Department of Environmental Quality (DEQ) appreciates the opportunity to provide comments on the Total Maximum Daily Load (TMDL) for Temperature in the Columbia and Lower Snake Rivers issued by EPA on May 18, 2020.

The Columbia and Lower Snake Rivers Temperature TMDL, requires a reduction in thermal pollution to ensure temperature water quality standards are met. These standards are set to protect a range of beneficial uses, including salmonids and other aquatic life. DEQ will prepare a Water Quality Management Plan as described under Oregon Administrative Rule (OAR) 340-042-0040(8).

While the attached comments provide detailed feedback, I want to highlight several important aspects EPA must address in a revised TMDL. First, EPA must revise the TMDL to assign allocations that fully achieve the numeric criteria for the Oregon temperature water quality standard. EPA recently cited the inability to fully achieve the numeric criteria as the reason for its disapproval of Oregon DEQ's Willamette Basin Mercury TMDL. EPA's current TMDL for temperature in the Columbia and Lower Snake fails to show how applicable standards will be met. Further, it is unlawful for EPA to try and skirt its responsibility by suggesting that Washington and Oregon change their federally-approved water quality standards by conducting a use attainability analysis to change applicable designated uses. EPA is effectively taking the position that threatened and endangered salmon and steelhead populations in the Columbia Basin should be allowed to go extinct.

Federal and non-federal dams are a significant contributor to temperature pollution in the Columbia and Lower Snake. EPA's TMDL must determine how the operation of the dams and the pools that they create affect stream temperatures and identify how operational changes must be used to meet allocations made to each facility.

Finally, EPA must revise the TMDL to include wasteload allocations (WLAs) for National Pollutant Discharge Elimination System permitted sources. Under 40 CFR 122.44(d)(1)(i) and (d)(1)(vii)(B), without a WLA, point sources may not be allowed to discharge the TMDL allocated pollutant, in this case heat. EPA-approved Oregon TMDLs (Hood River Temperature TMDL and Upper Klamath and Lost Subbasins Temperature TMDL) provide WLAs for sources that are considered de minimis and provide a template for how such de minimis discharges are to be treated within the TMDL.

Thank you for your attention to these important shortcomings in EPA's temperature TMDL for the Columbia and Lower Snake Rivers.

Sincerely,

Richard Whitman
Director

Attachment

cc: Dan Opalski, Director, Water Quality Division, Region 10, Environmental Protection Agency
Vincent McGowan, Water Quality Program Manager, Washington Department of Ecology
Jason Miner, Natural Resources Policy Manager, Oregon Governor's Office
Ed Bowles, Fish Division Administrator, Oregon Department of Fish and Wildlife
Justin Green, Water Quality Administrator

State of Oregon Department of Environmental Quality

Comments on Columbia and Lower Snake Rivers Temperature Total Maximum Daily Load

General

Nomenclature: Use of term heat load

Heat is an energy flux term. As such, DEQ uses the terms thermal load, excess thermal loads, etc., rather than heat loads, etc. DEQ suggests EPA provide an explanation, possibly in a footnote, on how terms are defined in thermodynamics vs. common usage terms used in this TMDL.

Thermal load calculation

When calculating thermal (heat) loads, EPA multiplies temperature in units of degrees Celsius by river flow rate and a conversion factor rather than expressing temperature (T) in units Kelvin. Use of T in °C in the equation implies that ice at 0°C has zero thermal load, which is not the case (if ice at 0°C is placed in contact with ice at -20oC, heat will flow from 0°C ice to -20°C ice). Therefore, total thermal load should technically be calculated using Kelvin. It would be helpful if EPA provides a brief explanation and justification for their use of Celsius.

Corrections for TMDL tables

Table 1. Corrections for TMDL tables

TMDL Table	Comment
6-4 Mainstem Columbia and lower Snake River dams	Add a row of information for Ice Harbor Dam.
6-12 WLAs for "Major facility" NPDES permitted facilities on the Columbia River	The maximum effluent temperature for Hood River OR STP should be changed to 27.0°C and the associated WLA changed accordingly.
6-15 NPDES permitted facilities not receiving WLAs	A note needs to be added for Pacific Coast Seafoods Company LLC stating that it shares an outfall with Warrenton STP.
6-21 Temperature targets for 12 CWR in the lower Columbia River	The Tanner Creek temperature criterion is 18°C.

Heat Source Evaluation

Sections 1.0 Introduction and 1.1 Total Maximum Daily Loads and Clean Water Act

The introduction lists source categories of heat loading that EPA evaluated. Although EPA did evaluate increasing air temperatures and other factors associated with climate change, EPA did not evaluate solar radiation and air temperature that influence water temperature as part of "background," which is identified on page 2 as part of the load allocation (LA). EPA needs to explain or correct this apparent disconnect between its analysis and load allocation.

Section 1.1 Total Maximum Daily Loads and Clean Water Act

On page 2, the TMDL states:

> Even if all the allocations in this TMDL are implemented and the temperature reductions envisioned are fully realized, it is unlikely that the numeric criteria portion of the WQS will be met at all times and all places. Sources outside the allocation structure of this TMDL contribute to warmer temperatures. These sources include increased air temperatures throughout the study area and upstream human activities in Idaho and Canada, resulting in Columbia and Snake River water temperatures that already exceed the numeric criteria portion of the WQS when those rivers enter the geographic area covered by this TMDL. Although the TMDL cannot ensure that the applicable criteria will be met at all times and places, this TMDL restricts the identified point and nonpoint sources to the increases that can be allocated under Washington and Oregon WQS (0.3°C above WQC), as discussed below, consistent with those existing WQS.

1. The TMDL does not document or explain what information EPA is relying on or evaluating to conclude that activities in Idaho and Canada are influencing the water temperature of the Columbia River that form the Washington and Oregon border. EPA should document its analysis that leads to this conclusion.
2. EPA should consider giving an allocation to climate conditions as a source of heat affecting water temperatures. DEQ believes it is important for the TMDL to recognize the role of past and current climate conditions that influence the river temperature and to account for them in the allocations. There are many local and global actions being taken with the objective of reducing impacts from climate, and it is appropriate for the TMDL to reinforce the need for these actions through an allocation.

Attainment of Water Quality Criteria and Protecting Beneficial Uses

Section 2.0 Water Quality Standards

There is evidence that dam operations and processes during certain times of the year are a thermal barrier to the upstream migration of adult salmonids, resulting in adverse effects on beneficial uses. This issue should be addressed in the TMDL and addressed during development of the Water Quality Management Plans for implementing the TMDL in Idaho, Oregon, and Washington.

Section 1.1 Total Maximum Daily Loads and Clean Water Act

EPA suggests, on page 2, that the state could conduct a use attainability analysis and change the designated use. EPA's statement implies that the agency is ready to conclude that salmon and steelhead migration through the Columbia and lower Snake should no longer be protected under federal law. This astounding position detracts from what Oregon believes is an appropriate approach to the TMDL: addressing the anthropogenic sources that are adding heat to the system and that can be altered by allocating the 0.3°C human use allowance. Strong action to implement a TMDL will result in overdue actions needed to address major temperature impacts to this system. Conducting a UAA and revising the biologically based numeric criteria would not result in beneficial environmental outcomes, nor will it alter the any significant conclusion about action needed to significantly reduce temperature impacts in the basin.

Section 2.2 Oregon

On page 9, EPA describes Oregon's narrative criteria including reference to the seasonal thermal pattern in the Columbia River, which must reflect the natural seasonal thermal pattern. The TMDL does not address this narrative criterion. EPA should evaluate its modeling, and describe and address any differences in the seasonal thermal pattern when comparing current conditions with:

1. A scenario without the dams, and
2. Attainment of the biologically based numeric water quality criteria

Protecting Cold Water Criteria in Spring

Section 3.1 Columbia and Lower Snake Temperature Data and Water Quality Exceedances

EPA's TMDL identifies July through September as the critical period with the most exceedances of the temperature water quality criteria. The temperature TMDL must address all parts of the temperature water quality standard, and not only the base numeric criteria. One important part of the temperature water quality standard is the Protecting Cold Water (PCW) criteria, which limits anthropogenic warming to no more than 0.3ºC when water temperatures are below the biologically based numeric criteria. Of specific concern is that the TMDL address the PCW criteria during the period of spring juvenile salmonid migration. Snake River spring/summer Chinook salmon and Snake River summer steelhead are Endangered Species Act listed evolutionarily significant units (ESUs) of salmonids that are experiencing significant population declines. These ESUs migrate down the lower Snake River and the Columbia River in the spring. The TMDL must address the PCW criteria, not only during July through September, but also during the spring.

Monitoring Locations, Target Sites and Current Conditions

Sections 3.0 Current Conditions and 6.1.1 Target Sites

EPA used dam tailrace locations instead of forebay locations, with exception of Wells Dam, for evaluating current conditions and as target sites for modeling TMDL target temperatures. Use of well-mixed tailrace locations for these purposes is appropriate, considering references in the OARs to well-mixed sampling locations. However, the TMDL does not evaluate, and address as appropriate, forebay temperatures relative to current conditions in the tailrace and attainment of the biologically based numeric water quality criteria at target sites. Juvenile and adult salmonids spend a large portion of their migration in the forebay. As a result, it is important to understand changes in forebay temperatures and differences contrasted with tailrace temperatures.

According to Table 3-1 Data Access in Real Time (DART) data locations, on page 14, there are 140 river miles between the most downstream monitoring site, located at Warrendale, and the mouth of the Columbia. Aside from the 154-mile stretch between the Canadian border and the nearest downstream monitoring site, all other distances between DART locations are nearly half the 140-mile distance. Supplemental temperature data, from a monitoring location between Warrendale and the mouth of the Columbia, must be used to better inform current conditions and the modeling performed for the target site at RM 42 described on page 35. Monitoring data within this 140-mile distance must be used to validate EPA's reliance on modeling to estimate the cumulative impacts of upstream heat loads.

Section 3.1 Columbia and Lower Snake Temperature Data and Water Quality Exceedances

EPA must clarify the following statement on page 14: "The results for each year were then used to calculate a single average value for annual and monthly (July – October) average mean and maximum temperatures." Is "monthly (July – October) average mean temperatures" the same as "monthly (July – October) average temperatures"? It is unclear why EPA uses both terms average and mean. In addition, EPA must explain what exactly is meant by "maximum temperatures" Is this the maximum temperature for each month, an average of daily maximum temperatures, or some other statistic?

For Table 3-2, EPA must define what is meant by average maximum temperature and monthly average maximum temperatures. In addition, EPA must explain how it is that very little warming occurs between McNary Dam and Bonneville Dam, a distance of 150 miles. According to Table 3.2, Current Conditions, there is essentially no change in mean annual or mean monthly water temperatures. The maximum temperatures for September and October increase only 0.2 and 0.3°C and the annual maximum and monthly maximum temperatures for July and August increase less than 1°C.

Cold Water Refuge

Section 5.0 Cold Water Refuge

DEQ acknowledges EPA's thorough work on the Columbia River Cold Water Refuges Plan and the contribution of this document for addressing Oregon's Cold Water Refugia narrative criteria. The TMDL should include a description of the geographic extent of the CWR.

Modeling Effect of Dams

Section 6.5.1 Dams

On page 45, the TMDL states:

> EPA used the RBM10 temperature model to estimate the dams' impacts on river temperature by comparing daily average river temperatures with and without the presence of dams. The target temperatures are daily maxima. Since the diel variation is typically greater in a free-flowing river than when dams are present, the impact of the dams on the daily average temperature is greater than the impact on the daily maximum temperature. The daily average temperature is therefore a more conservative indicator of dam impact. This component of the analysis is considered as a margin of safety (Section 6.6).

The effect of reservoirs on dampening diel temperature fluctuations might not only reduce daily maximum temperatures and increase daily minimum temperatures immediately downstream from dams, but might also increase daily maximum and daily average temperatures at certain locations further downstream. Reservoirs often reduce diel temperature fluctuations. Therefore, they can appear to "cool" the river because daily maximum tailrace temperatures are reduced. But daily minimum tailrace temperatures are also increased, which can result in greater average and daily maximum temperatures further downstream. As water that leaves the reservoir early in the morning flows downstream, it warms to daily maximum temperatures that are greater than temperatures would be in the absence of a reservoir. Therefore, simply eliminating diel fluctuations can result in warmer daily maximum temperatures up to a distance of a half day's time-of-travel downstream.

It is difficult to follow Steps 1-5 shown on page 45 describing the process used to estimate each dam's temperature impacts. Whenever referring to a column, it would be helpful to specify the column letter and make sure phrases in text exactly match titles in tables. For example, is "cumulative dam impact" the same as "RBM10 Cumulative Impact?" The description should also define terms such as "excess dam impact" and "cumulative excess dam impact."

Wasteload Allocations

Design low flow conditions

Generally, when developing wasteload allocations for point sources, model runs are performed at a design low river flow condition (7Q10, 30Q5, etc.). Modeling performed by EPA was performed utilizing data over many years, so would capture design low flow years, and river flow rates less than design low flows. Will evaluating the impacts of point sources at 90th percentile levels be of a similar conservative nature as using a design low river flow condition?

Total thermal load allocations vs. Excess thermal load allocations

The approach used by EPA to derived wasteload allocations is inconsistent with the approach used by ODEQ to develop thermal wasteload allocations. In Oregon, thermal wasteload allocations are specified as "excess thermal loads," as follows:

$ETL = (\Delta T)(Q_R + Q_E)C_F$

Where:

ETL = Excess Thermal Load (kcal/day)

ΔT = Allocated allowable river temperature increase due to a point source, ^oC

Q_R = River flow rate upstream of discharge (cfs or cms)

Q_E = Effluent flow rate (cfs or cms)

C_F = Conversion Factor (86.4×10^6 if flow as cms, 2,446,665 if flow as cfs)

Note that ETL is independent of river temperature. River temperature factors in when determining if thermal wasteload allocations will be met for a given effluent temperature and flow combinations, as follows:

ETL for a given effluent T and Q combination = $Q_E(T_E-T_C)C_F$

Where:

T_E = Effluent temperature, ^oC

T_C = Applicable temperature criterion, ^oC

Therefore, based on ODEQ's approach effluent with a temperature equal to the applicable criterion will have an ETL of zero, whereas EPA's method would show a positive load.

Section 6.5.2 NPDES Permitted Point Sources

On pages 52 and 53, this TMDL includes examples of industrial general permits that are considered de minimis with regard to temperature impacts to the Columbia and Lower Snake Rivers. These include Confined Animal Feeding Operations (CAFOs), in-stream placer mining, pesticide discharges, fruit packers, seafood processing, net pen aquaculture, and fish hatchery permits. As stated in the TMDL, EPA did not assign a wasteload allocation for these facilities because the type of industry, permit requirements, and/or available data indicate the temperature impacts from these sources are de minimis. In the future, if it is determined that these facilities are a heat load source, EPA states that the permittees will work with the permitting authorities to determine if the reserve allocation or additional heat load within the reach is available.

Using EPA's rationale for the list included in the TMDL, the following general permits should also be included as de minimus in EPA's list: 500J boiler blowdown, 1700A washwater, 400J log ponds, and 1500A petroleum hydrocarbon cleanup permits. Further, the 1400A and 1400B general permits for fruit packing are both Water Pollution Control Facility permits, which, because they do not discharge to surface waters, are not subject to the TMDL and should not be included.

While DEQ agrees the temperature impacts from these types of industry are not significant. DEQ is concerned that without a wasteload allocation a permitted facility would not be able to discharge any heat. EPA should provide a WLA for facilities in the Columbia River that are authorized to discharge under the 100J, 200J, 400J, 500J, 900J, 1500A, and 1700A general permits.

Facilities covered under these general permits are not expected to discharge materials likely to significantly contribute to heat. Therefore, **WLAs for these facilities in the Columbia River currently permitted <u>or permitted in the future</u> under by 100J, 200J, 400J, 500J, 900J, 1500A, and 1700A should be assigned a wasteload allocation within a reach.** EPA should assign a separate "bubble" wasteload allocation to each reach in the Columbia River for all general permit sources. A bubble wasteload allocation would be set aside in each reach for the applicable general permits. Tabulating and tracking the permittees and associated thermal loads can occur to ensure assigned wasteload allocations would not exceed the bubble allocation. Once exceeded, reserve capacity would need to be applied for and allocated to additional permittees covered under a general permit. In Table 2, DEQ lists general permits and information in support of a wasteload allocation in a reach for these sources.

Table 2. Supporting information for a wasteload allocation in a reach

General Permit Number/Facility Name	Number of Discharges/ Permit Coverage Number	Supporting Information for Wasteload Allocation in a Reach	
200J	2	Filter backwash permit	DEQ evaluated temperature in the development of the permit. DEQ established a minimum dilution requirement of 30:1 and determined that meeting this dilution requirement will not cause a measureable increase in stream temperature. No measureable increase equals 0.3°C at the edge of the mixing zone. This general permit is available at: https://www.oregon.gov/deq/FilterPermitsDocs/200jpermit.pdf
Oregon Parks and Recreation Department	ORG387007	Filter backwash permit; No flow information	
City of Dalles	ORG387005	Filter backwash permit; No flow information	
900J- General Permit	4	Seafood processing	A source covered under a 900J seafood processing permit is not expected to cause or contribute to an exceedance of a temperature standard because seafood processing is generally done using chilled water without a process that allows for thermal loading. It is possible that some thermal loading could come from two facilities, DaYang and Bornstein, which could have a minimal amount of thermal loading at peak production. The proposed 900J renewal permit (expected to be effective October 2020) has a proposed limit for 7-day average of daily maximums of 20 °C. The draft general permit is available at: https://www.oregon.gov/deq/FilterPermitsDocs/900jpermit.pdf
Pacific Coast Seafoods Company LLC	ORG520001	Seafood processing general permit; No flow information	
Astoria Pacific Seafoods LLC	ORG520007	Seafood processing general permit; No flow information	
Fishhawk Fisheries, Incorporated	ORG520011	Seafood processing general permit; No flow information	
Bornstein Seafoods, Incorporated	ORG520014	Seafood processing general permit; No flow information	
100J - General Permit	1	Non-contact cooling water permit	A discharge must not exceed 0.5 mgd (0.8 cfs) and requires dilution for temperature in the receiving stream. The maximum discharge temperature is 100°F but dilution must be adjusted for receiving stream temperatures (see formula in 500J). Discharges to the Columbia River from sources that discharge the maximum
Flint Group Packaging Inks North America LLC	ORG250003	Cooling water permit; No flow information	

General Permit Number/Facility Name	Number of Discharges/ Permit Coverage Number	Supporting Information for Wasteload Allocation in a Reach	
			allowed 0.5 mgd are not likely to affect the river's temperature. This general permit is available at: https://www.oregon.gov/deq/FilterPermitsDocs/100jpermit.pdf
500J - General Permit	0	Boiler blowdown	Boiler blowdown must not exceed 0.057 mgd (0.09 cfs) and must meet dilution for temperature in the receiving stream. A maximum temperature is 100°F but dilution must be adjusted for receiving stream temperatures. In this permit's development, DEQ included a dilution limit during periods of discharge, the receiving stream flow shall be at least four (4) times that of the discharge for each degree Fahrenheit the temperature of the discharge is above that of the receiving stream. The following example illustrates the use of this formula. Example: If a discharge is 0.05 mgd at 100 degrees F and the receiving stream temperature is 60 degrees F, the receiving stream flow must be at least 8 mgd (12.4 cfs). (100 - 60) x (4) x (0.05) = 8 mgd. A discharge to the Columbia River will not result in a measureable change in stream temperature. The Department proposed a temperature limit of 100°F to protect against localized impact from a discharge. This general permit is available at: https://www.oregon.gov/deq/FilterPermitsDocs/500jpermit.pdf
300J – General Permit	Three sources listed in Table 6-13	Fish Hatchery	The temperature of the discharge from most fish hatcheries is essentially the same, or very slightly greater, than the temperature of the intake water, thus a de minimis thermal load increase is attributed to the hatchery activity. The permit contains an effluent limit of 77°F (25°C), a temperature that would only be approached when the river (intake) temperature is at this value. This general permit is available at: https://www.oregon.gov/deq/FilterPermitsDocs/300jpermit.pdf

General Permit Number/Facility Name	Number of Discharges/ Permit Coverage Number	Supporting Information for Wasteload Allocation in a Reach	
1700 A	Stationary and non-stationary	Washwater	This permit regulates washing of vehicles, equipment and structures from fixed and mobile washing operations. Conditions that are protective of temperature and DO are in the permit. Individual washwater discharges are not expected to cause a measurable increase in stream temperatures. This general permit is available at: https://www.oregon.gov/deq/FilterPermitsDocs/1700apermit.pdf
400J	0	Log Ponds	Permit conditions satisfy the requirement to comply with the temperature standard. A typical discharge will occur November through April. A discharge can occur during a precipitation event, at any time a discharge requires a minimum dilution of 50:1 and a discharge does not include process wastewater.
1500A	0	Petroleum Hydrocarbon Cleanup	In development of this permit, temperature is not listed a pollutant of concern. A minimum dilution of 10:1 is required. Flow and temperature are not expected to contribute to a thermal load increase.

DEQ agrees temperature impacts from sources covered under the 700PM, 2300A, and CAFO general permits are de minimis and it is appropriate to not assign a wasteload allocation. The general permits 700PM and 2300A cover mobile operations. Operations that may occur in the Columbia River with 700PM and 2300A general permit coverage are not expected to influence heat. CAFO general permit 01-2016 does not authorize a discharge except in an extreme storm event where discharge will be comprised of stormwater. As mentioned above, the 1400A and 1400B general permits for fruit packing are do not allow a discharge to surface waters and should not be included. In the future, if it is determined that these facilities are a heat load source, the permittees can work with the permitting authorities to determine if the reserve allocation or additional heat load within the reach is available. In Table 3, DEQ lists general permits and information in support of not assigning a wasteload allocation.

Table 3. Supporting information for insignificant discharge

General Permit Number/ Facility Name	Number of Discharges/ Permit Coverage Number	Supporting Information for Insignificant Discharge	
700-PM	Not a stationary source	In-stream placer mining	During its development, the 700PM permit was evaluated with regards to potential impacts on dissolved oxygen and temperature. Conditions that are protective of temperature and DO are in the permit. To ensure dissolved oxygen is not a problem for vulnerable life stages of anadromous fish, motorized suction dredging is only allowed during in-water work periods established by Oregon Department of Fish and Wildlife. DEQ did not find that motorized suction dredging adversely affects stream temperature. The 700PM permit includes a condition to prevent activities from creating obstructions that could cause ponding and a localized temperature increase. The permit includes best management practices to protect riparian areas that provide shade. BMPs also provide protection from erosion that could otherwise contribute to stream channel profile changes that may increase temperature. This general permit is available at https://www.oregon.gov/deq/FilterPermitsDocs/700pmPermit.pdf
1400A and B		Fruit Packer (food processing)	1400A and 1400B are WPCF general permits that do not allow a discharge to surface water.
2300-A	Not a stationary source	Pesticide discharge	Operators with permit coverage under the 2300A do not discharge materials that influence temperature. There is no thermal loading from the permitted activity. This general permit is available at https://www.oregon.gov/deq/FilterPermitsDocs/2300aPermit.pdf
01-2016	30 NPDES	CAFOs	Because the CAFO NPDES General Permit does not allow a discharge to a surface water except in significant storm event (25-Year/24-Hour event) this activity will not contribute to thermal loading under normal conditions. This general permit is available at https://www.oregon.gov/oda/shared/Documents/Publications/NaturalResources/NPDESGeneralPermit.pdf

WLAs should be assigned to Oregon Fish Hatcheries on the Columbia River covered by a 300J fish hatchery general permit. In the future, a fish hatchery that seeks new coverage under a 300J general permit should work with EPA and permitting authorities to determine if the reserve allocation or additional heat load within the reach is available. Table 4 lists the hatcheries.

Table 4. Oregon fish hatcheries that should be included in the TMDL

Facility Name	Permit Number	Location (RM)	Flow (MGD)	Temp (C)	WLA (kcal/day)
Oregon Fish and Wildlife	ORG137011	275	7.1	17.5	4.71E+08
Oregon Fish and Wildlife	ORG137017	275	18.1	16.6	1.13E+09
Oregon Fish and Wildlife	ORG130001	143	32.0	15.5	1.87E+09

Warrenton STP and Oregon Cherry Growers (Riverside Facility) also need to be added to the list of permittees with calculated WLAs in TMDL Table 6-13. Information for assessing their WLAs are shown in Table 5.

Table 5. Information for including Warrenton STP and Oregon Cherry Growers in TMDL Table 6-13 WLAs for "Minor facility" NPDES permitted facilities located on the Columbia River Facility Name Permit

Facility	EPA Number	Value	Parameter (units)
Warrenton STP	OR0020877	1.0	Maximum monthly dry weather design flow (MGD)
		1.5	Maximum monthly wet weather design flow (MGD)
		24.7	Max daily temperature (deg C) June 2017
Oregon Cherry Growers (Riverside Plant)	OR0000116	3.24	Max daily flow (MGD) design from most recent fact sheet
		2.74	Maximum monthly average flow (MGD) design from most recent fact sheet
		24.0	Max daily temperature (deg C) August 2019

Stormwater

Section 6.5.3 NPDES Permitted Stormwater

Results of the 2020 census may show that additional municipalities, which discharge stormwater to the Columbia River, require MS4 permits because population is the primary factor in determining if a municipality requires an MS4 permit. In addition, DEQ anticipates renewing the construction, industrial and municipal stormwater general permits on a regular basis. EPA did not assign a WLA to stormwater sources because their temperature impacts are "minimal and intermittent." On page 60, EPA states:

If additional data indicate that any of the various sources of stormwater are a significant source of thermal loading, then the States or EPA may access a portion of the reserve capacity or available heat load within the reach to allow for continued discharge from stormwater facilities.

DEQ would like clarification on how EPA defines "significant" for purposes of needing to request a portion of the reserve capacity. DEQ does not anticipate any MS4, construction or industrial stormwater permit registrant would be a significant source of thermal loading. Please state that in the TMDL documents so there is clarity regarding future MS4's, construction and industrial stormwater permit registrants.

Reserve Allocations

Section 6.5.4 Reserve Allocations

DEQ will work with Washington Department of Ecology to create the framework for policy decisions involving assigning reserve allocations for future use. EPA should affirm that the states are the appropriate decision-making bodies and, due to the fact that the TMDL model resides with EPA, that EPA will support the evaluation of whether to grant reserve capacity by running the model or conducting other appropriate analyses. In addition, due to the multi-state nature of these evaluations and decisions, Oregon believes it would be appropriate for EPA to track and assign the reserve based on the decisions of the relevant state.

Section 6.5.4 Reserve Allocations & 6.6 Margin of Safety

Sections 6.5.4 Reserve Allocations and 6.6 Margin of Safety state that the reserve allowance is considered part of the implicit margin of safety until the reserve is allocated for future uses. This approach conflates two very distinct elements of a TMDL, and to be consistent with the federal requirements specifying that the margin of safety account for uncertainty in predicting how well pollutant reductions will result in meeting water quality standards. Conservative assumptions used in the TMDL analysis or in developing a TMDL target contribute to the implicit margin of safety. The reserve allocation by its very nature and definition should be solely reserved for future use and not double counted toward a margin of safety that would diminish as the reserve allocation is assigned for future uses.

Tributaries

Section 6.5.5 Tributaries

The first paragraph of this section includes a finding attributable to Fuller et al. 2018: "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." An excerpt from Fuller et al. 2018, states:

> Across the study region, our models predicted mean August riparian shade restoration stream temperatures (under the present climate scenario) to be on average 0.5°C (± 0.39SD) cooler than current vegetation shade steam temperatures. Streams that were predicted to cool the most between current and restored riparian vegetation scenarios were generally smaller streams with bank-full widths of 5m or less. Additionally, the mainstem Columbia River tributaries are predicted to reach the mainstem river on average (flow-weighted) by 0.4°C (± 0.24SD) cooler than they are currently under the

same restoration conditions (current versus restored riparian shade for the present climate).

EPA should clarify whether the impact of restoring riparian vegetative shade on tributary temperatures during the summer is 0.4ºC or 0.5ºC and clarify whether the reference to "average temperature increase of 0.5°C" is a flow-weighted average.

In the second paragraph under Section 6.5.5, on page 61, EPA states:

> EPA was able to use the RBM10 model to estimate the effect of temperature changes at the mouths of the tributaries on the temperature of the mainstem Columbia and Snake rivers. EPA used the model to evaluate the relationship between tributary and mainstem temperatures; through trial-and-error, model results indicated that a uniform tributary reduction of 0.5°C below current temperatures, at the confluence with the mainstem, results [in] a maximum cumulative temperature change in the mainstem approximately equal to the 0.1°C temperature allocation.

The "uniform tributary reduction of 0.5°C" is a greater reduction than the amount suggested to be attainable under best case scenarios by Appendix F: "the mainstem Columbia River tributaries are predicted to reach the mainstem river 29 on average (flow-weighted) by 0.4°C (± 0.24SD) cooler than they are currently under the same 30 restoration conditions (current versus restored riparian shade for the present climate)."

Also, the second paragraph under Section 6.5.5 references model results in Table 6-10 and 6-11 whereas the model results in Table 6-18 and 6-19 should be referenced instead.

For DEQ to conduct an assessment of whether or not DEQ's existing tributary allocations are sufficient to meet the TMDL's 0.1ºC allowance for the tributaries, EPA should add a summary table to the TMDL which shows expected Restored Temperature Differences for tributaries that are provided Load Allocations.

Appendix E: Tributary Assessment Methods and Results

A note in Table 1 states, "Positive value indicates Tributary Colder than the Mainstem Columbia River at the confluence." It may be more intuitive if positive values indicate that tributary temperatures are warmer than Columbia River temperatures.

Implementation by dam operators

7.0 Reasonable Assurance

EPA must acknowledge and address in the TMDL the many limitations dam operators are subject to in meeting their TMDL allocations. These include obligations in operating the Columbia River System (CRS) for a variety of Congressionally-authorized purposes including but not limited to water quality, fish and wildlife conservation, power system management, irrigation / water supply and navigation. In addition to the requirement to meet obligations under the Clean Water Act, including allocations under this TMDL, the operators must also meet Endangered Species Act (ESA) requirements in dam operations. For example, the 2019 NOAA National Marine Fisheries Service Columbia River System Biological Opinion (Biological Opinion) includes operational measures for minimizing risks to ESA listed salmonids. These measures include minimum pool levels for constraining water releases for navigation at the lower Snake River dams and irrigation at the John Day Dam on the Columbia River. The Biological Opinion specifies John Day Dam's minimum irrigation pool for April 10 through September 30. This restriction may impact potential flow augmentation options for temperature mitigation. DEQ expects that minimum operating pool, minimum irrigation pool and normal operating elevation range will be addressed in the Water Quality Management Plans implementing the TMDL.

Climate Change

EPA provides important information on the effect of climate change on Columbia and Snake River water temperatures. EPA's Columbia and Lower Snake Rivers Temperature TMDL identified a strong link between air temperature and Columbia and Snake River water temperature. They also showed increases in air temperature and water temperature since the 1960's. The TMDL discusses climate change but does not include allocations for reductions in air temperatures or greenhouse gases (GHG) that are known to affect global air temperatures. EPA should include allocations for these reductions as has been done for other TMDLs, including mercury TMDLs.

In the TMDL and Appendix G, EPA showed regional Columbia and Snake River water temperature increases since the 1960's. On page 28 of the TMDL, EPA states, "A growing body of research has produced and is continuing to produce evidence that changes to regional climate are contributing to an increase of stream temperatures in the Columbia and Snake Rivers. In addition to the RBM10 modeling assessment, EPA reviewed and synthesized available information and data on climate and projected future trends (Appendix G)." EPA's Appendix G of the TMDL provides the analysis and link between water temperature, air temperature, and climate change for the Columbia and Snake Rivers. EPA has shown an increase in Columbia and Snake River water temperatures of 1.5C +/- 0.5C since 1960 (page 30 TMDL).

In DEQ's temperature TMDLs for Oregon, DEQ typically allocates shade to nonpoint sources while also allocating channel morphology and flows for meeting the temperature criteria. Point sources are also given wasteload allocations to minimize warming from NPDES permitted sources. However, air temperature has a significant effect on water temperature, which EPA acknowledges in the Columbia and Snake River temperature TMDL:

Although temperature TMDLs typically identify loss of riparian shade as a nonpoint source of heat, loss of shade is not a significant source on the mainstem Columbia and Snake rivers. The width of these large rivers results in the surfaces of the rivers being directly exposed to full solar radiation during daylight hours. The presence or absence of trees on the banks does not create any measurable instream temperature effects. In contrast, shade restoration in tributary watersheds can improve tributary temperatures.

Therefore, control of other sources of heat, through inclusion of appropriate load allocations including air temperature, is crucial for meeting temperature water quality standards in the Columbia and Snake Rivers.

Appendix G, page 11, Table 2-3 is titled, Comparison of baseline and current air and water temperatures (1915-1959; 1997-2006) (based on Mantua et al., 2010). However, the table only contains water temperatures for those time periods and the change per decade, but not the air temperatures. EPA should include the corresponding columns for air temperatures, specifically, air temperatures for 1915-1959, 1997-2006 mean air temperatures and change per decade for air temperature for the locations and months in Table 2-3.

For the Columbia and Snake River regions, EPA should allocate air temperature reductions to levels that occurred in 1915-1959 that would then relate to water temperature reductions. EPA should also allocate GHG reductions for meeting the allocated air temperature reductions. The air temperature and GHG reductions could be calculated from the difference between 1915-1959 and 1997-2006 air temperatures and GHG levels.

There is precedence for allocating to air sources in TMDLs with implementation occurring at the local, national, and international level. In mercury TMDLs around the U.S., allocations (reductions of mercury) to air sources (both regional and global sources of mercury) have been assigned in numerous mercury TMDLs (including DEQ's 2019 Willamette Basin Mercury TMDL and EPA's 2019 Willamette Basin Mercury TMDL) and have referenced regional, national and global efforts as the bases for air mercury reductions. A similar conceptual model relating reduction of GHG air temperatures and then water temperatures would be consistent with the mercury TMDL conceptual models. Actions in the Columbia Basin could contribute a portion to the overall global effort needed to reduce GHG emissions to reduce air temperatures.

EPA's TMDL does not meet Oregon's temperature WQS unless allocations are made to background sources, including air temperature and GHG.

The federal regulations (40 C.F.R. 130.7(c)(1)) require that TMDLs, "shall be established at levels necessary to attain and maintain the applicable narrative and numerical WQS 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. Determinations of TMDLs shall take into account critical conditions for stream flow, loading, and water quality parameters."

On page 2 of the TMDL, EPA states that with allocations implemented it is unlikely that the numeric criteria portion of the WQS will be met at all times and all places. While EPA addressed major sources of in-river heat, it failed to allocate reductions to one of the most important sources of heat and temperature exceedances in the Columbia River, air temperatures and their rise due to climate change. Without allocations to GHG and air temperatures, it is unlikely that the TMDL is consistent with Section 303(d) of the Clean Water Act (CWA), and EPA's implementing regulations at 40 CFR Part 130, and that the Columbia River temperature TMDL is not established at a level necessary to attain and maintain the applicable water quality standards. EPA must allocate reductions of air temperature and GHG in the TMDL. Because of EPA's role in setting national environmental policy and as the primary science advisor to the U.S. government when negotiating international treaties and their implementation, EPA should be identified as having responsibility for identifying climate change strategies and the implementation of those strategies.

Oregon
Kate Brown, Governor

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August 20, 2020

Chris Hladick, Regional Administrator
U.S. Environmental Protection Agency, Region 10
Park Place Building
1200 6th Avenue
Seattle, WA 98101

Re: TMDL for Temperature in the Columbia and Lower Snake Rivers

Dear Regional Administrator Hladick:

The Oregon Department of Fish and Wildlife (ODFW) has reviewed the Total Maximum Daily Load (TMDL) Analysis for Temperature in the Columbia and Lower Snake Rivers prepared by the U.S. Environmental Protection Agency (EPA) and submits the following recommendations.

Context

In 2015, Columbia Basin salmon experienced high-water temperatures that delayed adult migration and ultimately caused record high mortality among sockeye and summer Chinook salmon. Climate change projections show similar events can be expected with increasing frequency in the future, and the 2015 event prompted renewed interest in "the long-recognized and largely unaddressed problem of high water temperatures ... in the Columbia River Basin."[1] While 2015 was particularly harmful, temperatures in mainstem reaches routinely exceed water quality standards for significant portions of the adult passage season.

ODFW understands that the purpose of the TMDL, in part, is to assess the sources of lower Columbia and Snake River pollutants as they relate to water quality standards, allocate loads, and restore the ability of salmon and steelhead to migrate unimpeded through the Columbia and lower Snake rivers.

As the Ninth Circuit recently explained, Columbia and Snake River salmon,

"depend on cold water temperatures for migration and spawning on the Columbia and Snake Rivers. Water exceeding 68° F is particularly dangerous … Above this temperature, they have difficulty migrating upstream, and they instead remain downstream where they are more likely to die of disease and spawn with far less frequency. The … dams and more than 100 point-source discharges into the two rivers are a primary cause of rising water temperatures, which in recent years have consistently exceeded State water quality standards of 68° for much of the summertime salmon and steelhead runs."[2]

Concerns and Recommendations

The EPA seems to be suggesting that the states of Washington and Oregon change their applicable

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[1] The Fish Passage Center, *Requested data summaries and actions regarding sockeye adult fish passage and water temperature issues in the Columbia and Snake Rivers*, p. 1 (2015).
[2] *Columbia Riverkeeper v. Wheeler*, 944 F.3d 1204, 1206 (9th Cir. 2019) (ordering EPA to issue the TMDL).

designated uses for the lower Columbia and Snake rivers to address the existing disconnect between summer water quality (temperature) exceedances >68° F and state water quality standards based on designated uses for salmon and steelhead rearing and migration habitats not to exceed 68° F. ODFW recommends the EPA remove these inappropriate suggestions. The lower Columbia and Snake rivers support both salmon and steelhead stocks, currently listed under the Endangered Species Act (ESA), which provide important regional commercial and recreational fisheries benefits as well as significant cultural importance to the citizens and Native American tribes of the Pacific Northwest. Rather, the EPA should focus on solution based outcomes for addressing excessive water quality pollutant loads, including achieving state water temperate standards which support the continued use of these rivers by salmon and steelhead as part of the final TMDL study document, consistent with EPA's responsibilities under the Clean Water Act.

The Draft TMDL study document describes using observed temperatures from various hydrosystem project forebay and tailwater monitoring locations to assess current (2011-2016) compliance with water quality standards for the study reaches. Migratory fish, including anadromous salmon and steelhead must migrate via hydrosystem project fish ladders to complete their lifecycles and reproduce. Water temperatures in fish ladders have been found to typically exceed water temperatures in associated tailwater areas where waters are well mixed. The majority of fish ladder water, other than at Lower Granite and Little Goose Dams, is drawn from near the surface water of the forebay area which can be the warmest water temperature strata in a project forebay when reservoirs stratify. Temperature discontinuities between tailraces, fish ladders, and reservoir forebay areas can and do disrupt adult fish migration. ODFW recommends EPA assess water temperatures in hydrosystem fish ladders as well as tailrace and forebay monitoring locations to complete the final TMDL study document and compare those temperatures against state water quality standards set for salmon and steelhead which rear and migrate the lower Columbia and Snake rivers prior to setting load allocations.

The effects of climate change are analyzed in Section 4.3 of the draft TMDL study materials. However, EPA's climate change analysis appears to be focused on observed water temperature increases between 1960 to the present. From ODFW's perspective, it is unclear how this analysis relates to the estimates of water temperature increases assigned to climate change in Table 4.1, increases of 1.0-2.0° C (1.8 to 3.6° F). ODFW recommends EPA clearly explain why this period of record was chosen and how it relates to (i.e. predicts) likely future climate change impacts in the final TMDL document.

Proposed water temperature allocations are described in Section 6.5 of the draft TMDL study materials. Proposed allocations appear to be somewhat arbitrarily allocated equally (0.1°C) among three Source Groups: Dams (nonpoint source); NPDES regulated discharge locations (point source); and inflow from major tributaries. ODFW recommends the EPA more thoroughly explain the rationale between these allocations in the final TMDL document. In addition, ODFW finds the lack of a proposed allocation for future climate change impacts (water temperature increases) troubling. Future climate change impacts to water temperature are both predictable and are the single most significant likely source of increasing summer water temperatures in the lower Columbia and Snake rivers. Setting load allocations without accounting for future climate change impacts in those allocations will set in motion regulatory and non-regulatory actions, likely to fail to achieve durable pollutant outcomes for ESA-listed salmon and steelhead and other state designated uses for these reaches. ODFW recommends EPA fully consider likely water temperature pollutant loads from future climate change and expand allocation Source Groups to include future climate change as Source Group in the final TMDL document.

The EPA eloquently describes actions underway to finalize the draft Columbia River Cold Water Refuges Plan in Section 6.5.6. However, it is unclear to ODFW how this effort relates to the remainder of draft

TMDL study materials. Nowhere else in the document is this information regarding cold water refuges used to help set load allocations or otherwise inform the document conclusions or outcomes. ODFW recommends EPA clarify the role of cold water refuges in TMDL process as part of the final TMDL document.

The development, configuration, and operation of the hydrosystem have negatively impacted salmon migration and survival in numerous ways. These well-documented impacts include protracted and impeded migrations resulting in increased or extended exposure to diminished water quality, including high water temperatures. Upon returning to freshwater, adult salmon that encounter high water temperatures often experience migration delays. Adult salmon forced to stop or slow their migration, and languish for days or weeks in warm water, begin dying from stress and disease.[3] Heat-stressed salmon are also more likely to succumb to predators or fallback after passage. Further, exposure to sub-lethal temperature stress contributes to diminished reproductive success.

The draft TMDL study material's analysis of water temperature in the lower Columbia and Snake rivers definitively shows that the lower four Snake River dams, and lower Columbia River dams, are the main causes of anthropogenic temperature problems. Reduced water travel time and increased surface area with exposure to solar radiation are primary contributors to high reservoir temperatures. As the draft TMDL study materials explain, "The 15 dams within the TMDL area have a cumulative warming effect during the summer and early fall." Specifically, the TMDL results show that the lower Snake River dams consistently raise the temperature of the lower Snake between 0.7 and 3.2 degrees C from July to October—often causing or contributing to violations of the applicable water quality standard. This is of particular concern for ESA-listed salmon and steelhead as these exceedances are an impairment of designated critical habitat in this reach. The draft TMDL study materials also suggest that the dams prevent the lower Snake from cooling periodically throughout the summer months in a manner that would facilitate fish migration even during otherwise hot years. These important and definitive scientific findings should help guide efforts to restore Columbia River basin Salmon and steelhead populations. Overall, the draft TMDL study materials show that temperatures in a free-flowing lower Snake River would be much more supportive of successful salmon and steelhead rearing and migration.

The draft TMDL study materials indicate that the Snake River upstream of the Clearwater confluence sometimes exceeds the 20° C water quality criterion. While true, such statements have resulted in confusion and misinformation; leading to claims by some that the lower Snake dams are being held responsible for water quality problems caused elsewhere.[4] Such claims are misleading and disingenuous. The TMDL's data clearly show that water entering the lower Snake (e.g. at the Clearwater confluence) is cooler than the water leaving the lower Snake which is too hot for salmon and steelhead —and that the four lower Snake dams are the only significant anthropogenic cause of heat pollution in this reach. To avoid further confusion, ODFW recommends that the final TMDL document should clearly explain that the lower Snake River dams (not upstream conditions) are primarily responsible for water quality standard violations in the lower Snake River. Without these four dams, the lower Snake River would likely remain cool enough for salmon migration, even in very warm years like 2015.

As ODFW understands the process, part of the TMDL includes the development of an implementation plan when developed pollutant criteria are not being met. On page 72, the EPA suggests that this task should fall to the affected states "...to work within their authorities to implement activities to reduce nonpoint source heat loading." While some measures could potentially be implemented at the state level,

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[3] National Marine Fisheries Service, *2015 Adult Sockeye Salmon Passage Report*, pp. 20–22 (2016).
[4] *E.g.*, Kurt Miller, *Tri-City Herald Guest Opinion: Are Northwest dams being set up to fail?* (June 22, 2020).

it is unclear to ODFW how uncoordinated, state-developed responses could address one of the main contributors to nonpoint source pollution causing lack of compliance - thermal loads in large reservoirs managed by the US Army Corps of Engineers and Bureau of Reclamation. Furthermore, addressing another major contributor - climate change - would be better addressed in a regional, coordinated fashion. Given that multiple jurisdictions are involved and would require coordination to *effectively* reduce nonpoint source heat loading, ODFW requests clarification from EPA regarding their suggestion that EPA cannot assist in the development of an implementation plan.

In Conclusion, ODFW appreciates the EPA's Region 10 staff efforts to develop these draft TMDL study materials and sincerely hopes this can result in a significant step forward to address current water quality problems as well as plan for a more functional river for ESA listed salmon and steelhead into the future given the backdrop of climate change. Please consider ODFW's above recommendations to revise the draft TMDL study materials to more clearly identify the causes of, and solutions to, anthropogenic temperature exceedances impairing salmon migration and survival. Although ODFW's mission is primarily focused on conservation and utilization of fish, wildlife, and the habitats they depend on, we are supportive of regional collaborations to address water quality issues in the lower Columbia and Snake rivers which affect all users' needs including fish. ODFW is committed to partnering with the EPA and other regional entities to work toward achieving solution based and durable outcomes to meet state water quality standards in these reaches.

Thank you for this opportunity to provide our recommendations. As you proceed to amend and finalize the TMDL for the lower Columbia and Snake rivers, please work with Art Martin at 971-673-6061 and art.c.martin@state.or.us to coordinate the Oregon Department of Fish and Wildlife's participation in these efforts.

Sincerely,

Curtis E. Melcher

Curtis E. Melcher
Director

c: Richard Whitman, Director, Oregon Department of Environmental Quality
Jason Miner, Natural Resources Policy Advisor, Governor's Office

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

1410 North Hilton, Boise, ID 83706 • (208) 373-0502

Brad Little, Governor
John H. Tippetts, Director

August 13, 2020

Mary Lou Soscia
Columbia River Coordinator
EPA Oregon Operations Office
805 SW Broadway, Suite 500
Portland, OR 97205

RE: Request for Comment: TMDL for Temperature in the Columbia and Lower Snake Rivers

Dear Ms. Soscia:

On May 18, 2020, the U.S. Environmental Protection Agency (EPA) opened a public review and comment period of the Total Maximum Daily Load (TMDL) for Temperature on the Columbia and Lower Snake River. The Idaho Department of Environmental Quality (IDEQ) appreciates the opportunity to provide input on this TMDL and commends EPA's efforts to complete this TMDL.

After reviewing the TMDL, it is apparent that the Columbia and Lower Snake River temperature TMDL could have significant ramifications for waterbodies upstream of the TMDL's geographic extent on the Snake River. IDEQ reads this temperature TMDL as implying a potential for temperature reductions in upstream waters and requests EPA provide clarification on the vision for accomplishing this. Given the complexity of the Snake River's hydrologic system, variable land uses, high priority and interstate waters, IDEQ believes EPA should form and lead a working group to include IDEQ and others to address upstream temperature reductions that may be necessary to reasonably assure the Columbia and Lower Snake River Temperature TMDL meets its objectives.

Idaho is generally concerned with implications for how this TMDL may affect regulatory decisions for stakeholders in Idaho. We request that EPA provide language to confirm that this TMDL does not establish load capacity, load allocations, or wasteload allocations outside of the geographic extent of the Columbia River and Lower Snake River Temperature TMDL. Furthermore, EPA should add additional language to clarify that Columbia River and Lower Snake River Temperature TMDL does not provide legal authority to alter water rights or mandate releases from manmade impoundments.

IDEQ's comments and questions related to specific sections of the TMDL are below.

1. **TMDL Attainability and Use Attainability Analysis**

While the CWA and Federal Regulations have provisions that would allow states to remove or revise uses through UAAs, the development of UAAs and revised uses and criteria for both waters within the TMDL boundaries and upstream waters is not likely a practical or viable tool, as the designated uses for these waters are existing uses and could not be removed or revised to less sensitive uses. IDEQ suggests EPA provide more language describing how it envisions UAAs serving as practical, implementable solution.

2. Geographic Extent of TMDL

In section 1.2 Total Maximum Daily Load Geographic Scope and Water Quality Impairments (page 2), it states "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." However, in Section 3 (page 13), the TMDL document compares current temperature conditions at location in Idaho, such as the Snake River near Anatone and Clearwater River, that are well outside of the "geographical scope" of the Columbia River and Lower Snake River temperature TMDL. Additionally, Section 6.3 (page 39) presents estimates of load capacity and load reduction for a location outside of the geographical scope of the TMDL, the Snake River near Anatone.

IDEQ understands it is common for TMDLs to develop allocations at the mouth of tributaries to TMDL segments and for the upstream geographical boundaries of TMDL endpoints, but it is rare to develop estimates of load capacity and required reductions at a location that is 29 miles upstream of RM 139, the upstream boundary of this TMDL. IDEQ supports using RM 139 as the upstream boundary for this TMDL. Consistent with that boundary, IDEQ requests EPA remove the estimate of load capacity and temperature reduction for the Snake River near Anatone and replace it with an estimate of load capacity and load reduction at the geographical end point on the Columbia River Temperature TMDL on the Snake River (i.e. the confluence of the Clearwater and Snake River along the Idaho border at RM 139).

3. Cooling From the Clearwater River

Section 3.4 of Appendix D (page34) discusses the cooling effect of discharges from Dworshak Dam. These discharges are described as "a significant cooling effect to the lower Snake River." However, Section 1.1 of the TMDL document (page2) states "[s]ources outside the allocation structure of this TMDL contribute to warmer temperatures" and "water temperatures that already exceed the numeric criteria portion of the WQS when those rivers enter the geographic area covered by this TMDL." It is inconsistent to acknowledge that waters from the State of Idaho have a cooling effect that contributes to attainment of temperature standards downstream of the Snake-Clearwater confluence, while suggesting that Idaho waters may also lead to non-attainment of the TMDL. IDEQ requests that EPA amend the TMDL to show the net temperature effect of the Clearwater River and the Snake River at the upstream geographic boundary of the TMDL (i.e. the confluence of the Clearwater and Snake Rivers along the Idaho border at RM 139).

4. De Minimis Impacts

In section 6.5.5 Tributaries (page 63); the TMDL references "a number of small tributaries that have de minimis impacts to the mainstem temperature…." Please elaborate or provide appendix references to the de minimis analyses and threshold values that were used to determine "de minimis impacts."

IDEQ looks forward to EPA's responses and continued collaboration for TMDL development. Please contact Jason Pappani at 208-373-0515 or Jason.Pappani@deq.idaho.gov of IDEQ's Surface Water staff to discuss any component of this letter.

Sincerely,

Mary Anne Nelson

Mary Anne Nelson, PhD

Surface and Wastewater Division Administrator

MAN:GF:lf

c: Jess Byrne, Acting DEQ Director
Mark Cecchini-Beaver, Deputy Attorney General
Jason Pappani, Surface Water Bureau Chief
John Cardwell, Lewiston Regional Office Administrator
Sujata Connell, Lewiston Surface Water Quality Manager
Graham Freeman, Water Quality Analyst
Lisa Kusnierz, EPA R10

UPPER SNAKE RIVER TRIBES FOUNDATION, INC.

413 W. Idaho Street, Suite 101, Boise, Idaho 83702

(208) 331-7880

July 21, 2020

U.S. Environmental Protection Agency Region 10
ATTN: Daniel D. Opalski, Director
1200 Sixth Avenue, Suite 155
Seattle, WA 98101-3188

RE: Columbia and Lower Snake Rivers Temperature Total Maximum Daily Load (TMDL)

The Upper Snake River Tribes (USRT) Foundation is composed of four federally recognized Indian tribes of the Upper Snake River region in Idaho, Nevada, and Oregon: the Burns Paiute Tribe, Fort McDermitt Paiute-Shoshone Tribe, Shoshone-Bannock Tribes of the Fort Hall Reservation, and Shoshone-Paiute Tribes of the Duck Valley Reservation. The four tribes have common vested interests to protect rights reserved through the United States Constitution, federal treaties, federal unratified treaties (e.g., Fort Boise Treaty of 1864, Bruneau Treaty of 1866, and Malheur Treaty of 1864), executive orders, inherent rights, and aboriginal title to the land, which has never been extinguished by USRT member tribes. USRT works to ensure the protection, enhancement, and preservation of the tribes' rights, resources, cultural properties, and practices and that those rights remain secured. These include but are not limited to hunting, fishing, gathering, subsistence uses, and religious and ceremonial activities.

After reviewing the Columbia and Lower Snake Rivers Temperature Total Maximum Daily Load (hereafter referred to as the "TMDL") issued by U.S. Environmental Protection Agency Region 10 (hereafter referred to as "EPA") , USRT has notable concerns regarding states' use of conducting a Use Attainability Analysis (hereafter referred to as "UAA") , presentation of temperature averages, and National Pollutant Discharge Elimination System (NPDES) point source permitted facilities' wasteload allocation (WLA) effects on the Columbia River.

The purpose of a TMDL is to help implement state water quality standards based on the relationship between pollution sources and in-stream water quality conditions.[1] "The TMDL establishes the allowable

[1] *Guidance for Water Quality-based Decisions: The TMDL Process,* The United States Environmental Protection Agency Office of Water 1 (April 1991) [hereinafter *Guidance*].

loadings or other quantifiable parameters for a waterbody and thereby provides the basis for states to establish water quality-based controls. These controls should provide the pollution reduction necessary for a waterbody to meet water quality standards."[2] The Columbia and Lower Snake River Temperature TMDL in question "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 to its confluence with the Columbia River."[3] This river system is vital to Columbia and Snake River salmon and steelhead, which are at risk of extinction due to fish-killing hot water within this river system.[4] The importance of these fish to USRT's tribes cannot be diminished.

> Historically, the Bannock, Paiute, and Shoshone peoples harvested salmon and trout throughout the Columbia River Basin for subsistence. Annual salmon and steelhead runs in what are now [Idaho], Nevada, [Oregon], and Washington provided harvest opportunities throughout the year. Access to anadromous fish for subsistence and ceremonial purposes has been eliminated from much of the Upper Snake River Basin following the construction of dams (for hydroelectric, flood control, and irrigation purposes) along the Columbia and Snake Rivers. Once a mainstay of the tribal diet, anadromous fish have been absent from waters within, or near, tribal reservations for nearly a century, effectively preventing three generations of tribal members from practicing their cultural practices and traditions.[5]

Based on the purpose and function of a TMDL, it is imperative that the water quality criteria identified in a TMDL be implemented by each state, in this case Oregon and Washington, in order to benefit all affected parties and help restore salmon and steelhead populations within the Columbia River Basin.

In the TMDL, EPA mentions the option of states conducting a UAA that "demonstrates that attaining the use is not feasible because of one of the six factors listed in 40 C[.]F[.]R[. §] 131.10(g)[6]" because of the "inability to achieve applicable water quality criteria at all times and all places." Although this option is permitted via 40 C.F.R. § 131.10(g), this option should *always* be used as a last resort for states, and never an immediate viable option to meet applicable water quality criteria presented in a TMDL. The restoration

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[2] *Id.*
[3] *Total Maximum Daily Load (TMDL) for Temperature in the Columbia and Lower Snake Rivers*, United States Environmental Protection Agency Region 10 1 (May 18, 2020) [hereinafter *Total Maximum Daily Load*].
[4] Lynda V. Mapes, *Washington state aims to regulate water temperature at federal dam, wading into controversy*, Seattle Times, Last Updated May 28, 2020, in Environmental, *available at* https://www.seattletimes.com/seattle-news/environment/washington-state-aims-to-regulate-water-temperature-at-federal-dams-wading-into-controversy/.
[5] *Hells Canyon Complex Fisheries Resource Management Plan*, Upper Snake River Tribes Foundation 4 (April 27, 2018).
[6] These six factors are as follows: (1) Naturally occurring pollutant concentrations prevent the attainment of the use; or (2) Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or (3) Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or (4) Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or (5) Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or (6) Controls more stringent than those required by sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact. 40 C.F.R. § 131.10(g) (August 21, 2015).

of salmon and steelhead populations, and those who rely on these fish, desperately depends on states making necessary decisions to improve water quality criteria and lower the water temperature of the Columbia Basin River system. If states choose not to do so by conducting a UAA that EPA then approves, the future of salmon and steelhead is bleak, if not nonexistent.

In order to provide the most accurate data for establishing water quality criteria, it is crucial that EPA use data from a worst-case scenario instead of averaging data collected over a time period. In the TMDL, EPA took the average of temperature conditions from calendar years 2011 – 2016 covering the months of July – October.[7] Although this data set revealed that on average, water temperatures exceeded the 7-day average daily maximum (7-DADM) by 1.8°C, and the annual maximum exceedance magnitude averaged 3.2°C.[8], EPA should have used data representing a "worst-case scenario," such as the data from 2015, the hottest year on record for the Northwest dating back to 1895.[9] Pursuant to EPA's publication *Guidance for Water Quality-based Decisions: The TMDL Process*, "When developing a TMDL, design conditions are those critical conditions that must be specified in order to determine attainment of water quality standards. In specifying conditions in the waterbody, an attempt is made to use a reasonable 'worst case' condition."[10] Thus, although the average temperature data used by EPA does show that the river system is, indeed, too hot, data from 2015 follows the EPA's "worst-case" scenario TMDL guidance, and would provide more efficient data for establishing water quality criteria for the Columbia and Lower Snake Rivers.

The last concern of USRT is regarding NPDES point source permitted facilities' WLA effects on the Columbia River. In calculating WLAs for major and minor NPDES permitted facilities on the Columbia River, EPA "used the best available data, but in some cases, temperature data from facilities were limited."[11] However, EPA concludes that "[c]ollectively, if all the sources discharge this load on average, the goal of the TMDL for point sources will be achieved."[12] Upon looking at the list of major and minor facilities, the discharge temperature for some of these facilities is exceedingly hot – some as high as 40°-45°C (104°-113°F).[13] Although tribal governments were told by EPA during an EPA Coordination Webinar that irrigation withdrawals, nonpoint source heating, NPDES point sources and tributaries' temperature impacts "pale in comparison" to the temperature impacts of climate change and dams along the system[14], it is still concerning that exceedingly hot water is being discharged into the same river system that heat sensitive salmon and steelhead are navigating. USRT recommends that EPA thoroughly research the effects of these NPDES permitted facilities' discharges on the river system, taking into consideration the future predictions of climate change, and using worst-case scenario data to calculate WLAs.

The restoration of salmon and steelhead populations is of utmost importance to the tribes. "The ecological, cultural, and social impacts related to the loss of anadromous fisheries…to members of the [tribes] cannot be understated. From time immemorial the peoples of the Snake River Basin [and Columbia River Basin]

[7] *Total Maximum Daily Load*, *supra* note 3, at 13-14.
[8] *Id.*, at 15.
[9] Chris Dolce, *Summer 2015 Was Hottest on Record for Northwest*, The Weather Channel (September 9, 2015, 12:00 AM EDT) https://weather.com/news/climate/news/record-hot-summer-northwest-wet-midwest.
[10] *Guidance*, *supra* note 1, at 47.
[11] *Total Maximum Daily Load*, *supra* note 3, at 53.
[12] *Id.*
[13] Nippon Dynawave Packaging Corporation, Permit No. WA0000124, Temp. 45.0°C.; KB Alloys/AMG Al North Amer., Permit No. WA0002976, Temp 40.0°C. *Id.*, at 54, 55.
[14] *EPA Coordination Webinar with Columbia River Basin Tribal Governments on Columbia/Lower Snake Mainstem Temperature TMDL* (June 4, 2020).

used anadromous fish resources for subsistence and in their traditional cultural practices."[15] USRT requests that EPA consider the proposals in this comment letter to better protect current salmon and steelhead populations, and further aid salmon and steelhead recovery throughout the Columbia and Lower Snake Rivers.

If comments or questions arise in reviewing this letter, please contact Scott Hauser, USRT Executive Director, by phone ((208) 331-7880) or email (scott.hauser@usrtf.org) at your convenience.

Sincerely,

s:/ Scott Hauser

Scott Hauser
USRT Executive Director

[15] *Hells Canyon Complex Fisheries Management Resource Plan*, *supra* note 5, at 3.

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, NORTHWESTERN DIVISION
PO BOX 2870
PORTLAND, OR 97208-2870

July 21, 2020

SUBJECT: Total Maximum Daily Load (TMDL) for Temperature in the Columbia and Lower Snake Rivers

Mr. Dan Opalski
United States Environmental Protection Agency
Region 10 Office
1200 Sixth Avenue, Suite 155
Seattle, WA 98101-3188

Dear Mr. Opalski,

The U.S. Army Corps of Engineers (Corps) reviewed the May 18, 2020, Total Maximum Daily Load (TMDL) for Temperature in the Columbia and Lower Snake Rivers. The Corps' combined comments are provided below. The Corps appreciates the cooperation and dialogue that has occurred with you and your staff not only under this process, but the Columbia River System Operations Environmental Impact Statement (CRSO EIS) process as well; and, we look forward to continued collaboration as we work to understand the opportunities and constraints that exist in the system in relation to water temperature and compliance with the Clean Water Act.

The TMDL documents the wasteload allocations for point sources, the load allocations for non-point sources and natural background, and a margin of safety, to identify the maximum amount of pollutant (i.e. water temperature allocation) that the Columbia-Snake River system can receive and still meet applicable Water Quality Standards (WQS). The TMDL accurately states that "*even if all the allocations in the TMDL are implemented and temperature reductions are fully realized, it is unlikely that the numeric criteria portion of the WQS will be met at all times and all places.*" This is due to a myriad of factors that are discussed throughout the TMDL and outlined in this letter.

Sources outside the allocation structure of this TMDL (e.g. climate change, upstream human activities in Idaho and Canada, tributary loading) contribute to warmer temperatures in the mainstem Columbia and Snake Rivers, making it impossible to meet the numeric and narrative water temperature criteria throughout the TMDL study area, and particularly in the lower rivers during certain times of year. The Corps should only be expected to address temperature effects associated with operation and maintenance of the dams, not potential exceedances caused by other sources (e.g., water coming into the TMDL study area from Canada and Idaho or tributary sources).

The Corps agrees with EPA's determination that the existence of the dams, as operated for Congressionally-authorized project purposes, contribute to a shift in the natural water temperature regime in the Columbia and Snake Rivers and creates cooler than natural conditions in the spring and early summer and slightly warmer conditions during the fall and winter months. The Corps, however, also recognizes that historical water temperatures in the lower Columbia River, before major development of dams, frequently exceeded the current numerical standard of 20°C during the summer months (O'Connor 2019, in draft). Given this, the Corps supports EPA's suggestion that the States of Oregon and Washington make changes to their applicable designated uses, as part of a use attainability analysis. Other complicating factors, such as climate change, may also contribute to water temperature exceedances and should be captured in the use attainability analysis as well.

There is limited opportunity to change bulk river water temperatures through operational or structural technologies at run-of-river dams; however, passageways within the structures such as fish bypass channels and fish ladders can be influenced by project operations when the river is thermally stratified. For example, the development of cooling pumps and sprayers in adult fish ladders at Lower Granite and Little Goose dams on the lower Snake River have been constructed and the feasibility of such structures at other dams were analyzed under the CRSO EIS and on-going evaluations continue. Where some level of stratification does occur (e.g. Lower Granite forebay), passing water through the lowest outlets at the dams (e.g., turbines) may provide some temperature benefits, as opposed to spilling warmer water near the top of the reservoirs over the dams. Tools developed during preparation of the EIS may also provide additional insight on determining feasibility of upstream project operational changes, such as Dworshak Dam temperature operations, as well as exploring other possible modifications or operations.

The Corps supports the approach that the Waste Load Allocation (WLA) should allow for the continuation of current outfall operations with regard to temperature. The WLAs should reflect the current maximum daily load based on design flow and maximum discharge temperature. Due to the complexity of the number of outfalls, different types of outfalls and different designs, determining the current maximum daily load for nine projects straddling two states is challenging. The Corps is concerned that a WLA that does not represent the maximum daily load could cause a limitation in the

NPDES permit. The Corps requests a forum to jointly review the design flow of outfalls for each project and maximum likely temperature, which could lead to revisions of the WLA. We would also like to discuss specific instances where the TMDL might have been in error. For instance, it is unclear what data were used to generate Tables 6-13 and 6-14. We were unable to recreate the WLAs using the data submitted to EPA via our initial NPDES permits. As an example, it appears that Bonneville Powerhouse 1 discharges were omitted and the McNary flow rate was underestimated. The TMDL reports a flow at Bonneville Dam (OR), of 0.86 millions of gallons per day (MGD) whereas our calculation is 22.11 MGD. Likewise, McNary (OR) is reported as 15.9 MGD whereas our calculation is 36.9 MGD. In addition, water temperature at this location vastly differs from what we submitted to EPA (23.6°C is reported, but 27.4°C was what was submitted in our initial NPDES permits). Furthermore, the data used for the WLAs for point source outfalls may not reflect true conditions since the data used to calculate the WLAs was from an extremely limited data set (from a single day of sampling, collected only on equipment in operation that day). If data collected during initial sampling is found to be inconsistent and effect the WLA's, the Corps requests that there be a provision to make adjustments to the permit based on more complete information.

In addition to the above comments, the Corps offers specific technical comments and suggested edits to the TMDL as follows:

a. Clarify definition of free-flowing which is used throughout the document to explain that projects are influenced by tributary loading, upstream dams and the operation of those dams. Text included in Section 4.2 (page 30) describes this adequately, but this nuanced differentiation is not carried into tables. Consider relabeling as “Scenario X” to limit misleading readers. In Table 6-22, add footnote to the Canadian Border, Anatone and Clearwater Confl. indicating that these points are impacted by tributary loading, upstream dam storage regulation and should not be considered "free-flowing" conditions. Additionally, please fix the reference to “no dam” in the steps listed on page 45, Step 2 for consistency.

b. The “allocation exceedance” and “reduction needed” for Bonneville Dam (Table 6-9 and Figure 6-4, respectively) are incorrectly calculated. The 13°C WQS water temperature criteria applies to the second half of the month of October, rather than the entire month. This calculation should be corrected for all tables and figures in the TMDL.

c. The EPA's use of water temperature metrics is inconsistent, and often times, confusing throughout the TMDL. The Corps suggests EPA use the daily or seven day average daily maximum water temperature metric throughout the TMDL, which is consistent with Oregon and Washington's water temperature criteria portion of the WQS.

d. The method used to calculate the "allocation exceedances" is biased due to the inconsistent use of daily average and daily maximum temperatures (as documented on page 45, paragraph 2). The data used for the calculation is prior to the development of the allocation for dams and therefore, it is not appropriate to term it an "exceedance" because the allocation did not exist at that time of the data collection. Furthermore, the "allocation exceedance" is not a required element of the TMDL. The Corps is concerned that this calculation could have unintended consequences during implementation and non-TMDL related activities. Please either accurately recalculate the "allocation exceedance" using the daily maximum temperature and rename, or, remove from Tables 6-6 through 6-9 and update the text accordingly.

e. Ice Harbor Dam is missing from Table 6-4. Please correct.

f. Tables 6-6 through 6-9 are hard to follow and should be edited. The "RBM10 Cumulative Impact" is important source assessment information. We suggest simplifying these tables into one table with each row containing a river location and each column a month. The "RBM10 Cumulative Impact" would be the result and should be highlighted if there is a "Measured Target Exceedance". This would resolve the biased calculation using daily average and daily maximum but still provide useful information. If these tables remain, the Corps suggests including all data that are used to quantify allocation exceedances (e.g. observed data) in the table so that it is easier to understand the math applied to each river reach.

g. The Corps is incorrectly referred to as a "federal power agency" on page 72. Please revise. The Corps should be referred to as a Federal Agency.

h. Please consider distributing the human use allowance based on current distribution of thermal impact of source categories receiving an allocation rather than an even but arbitrary split.

i. Please consider including unidentified, local nonpoint sources of heat within the allocation to the Major Tributary category.

j. Page 10, Section 2.3, paragraph 3. The daily maximum water temperature standard for the Snake River is 20 °C, not 19 °C.

k. Page 13, Tables 3-2 through 3-7 of main text as well as multiple tables in Appendix B. River temperature data were only retrieved from the DART database. Consequently, there are several cells that are highlighted in red due to missing data. In several cases, the missing data is available from the Corps and U.S. Geological Survey databases.

l. Tables 3-2 through 3-7. The Dworshak Dam tailrace monitoring station (DWQI) is located on the North Fork Clearwater River at river mile 0.5, not the Clearwater River at river mile 55.

m. Tables 3-3 through 3-7 as well as Figures 21 and 22 in Appendix B. The Washington 20 °C daily maximum (DM) is shown for the Clearwater Station at river mile 37 and the Dworshak Dam tailrace station. Both of these stations are in Idaho, and the Washington standard does not apply. Please change to the Idaho standard.

n. Page 31, Section 5.0 and page 64, Section 6.5.6. Cold water refugia are also present on the lower Snake River near the Lyons Ferry Hatchery, and the Clearwater River provides cold-water refuge for salmonids that migrate up the middle Snake River.

o. Page 36, Table 6-1. Ice Harbor Dam is located at river mile 9, not 6.

p. Page 53, paragraph 1, "Equation 6-1 in Section 6.3" is referenced. This equation appears to be missing from the document.

q. Page 62. Tables 6-18 and 6-19 are not referenced in text.

r. Page 70, Table 6-22 and elsewhere. The Clearwater confluence is at approximately river mile 139, not 138.

s. Section 6.5.2. Table 3.5 in Appendix D indicates that the Clearwater Paper Company discharges 44.7 millions of gallons per day (MGD) at 33 °C into the Snake River at river mile 139.3. Since this is the largest single point thermal discharge into the lower Snake River, and occurs in the State of Washington, it should be identified in this section.

t. Appendix B, Page 4, Table of Contents. Dworshak Dam tailrace is on the North Fork Clearwater River, not the Clearwater River. Lower Monumental is spelled incorrectly.

u. Table B-1, page 56. Data gap identified for PAQW 2015 and 2016 should be the same as stated for 2014.

Thank you for the opportunity to review the May 18, 2020, TMDL for Temperature in the Columbia and lower Snake Rivers. Consistent with the productive engagement that the Columbia River System action agencies have had to date with the EPA, we look forward to discussing our review in greater detail in the near future.

Sincerely,

Frances E Coffey

Frances E. Coffey, SES
Director, Programs

From: Archuleta, Joy E -FS
To: ColumbiaRiverTMDL
Subject: TMDL for Temperature in the Columbia and Lower Snake Rivers
Date: Monday, July 20, 2020 9:42:37 AM
Attachments: image001.png
image002.png
image003.png

Thank you for the opportunity to review the TMDL for Temperature in the Columbia and Lower Snake Rivers. We look forward to continuing to work collaboratively and proactively with EPA and state agencies on improving water quality in Columbia and Lower Snake Rivers.

Here are some specific items noted during our review:

> Pg 3 – The document is reference the Washington Department of Ecology (Ecology) 2012 CWA section 3030(d) list. The current water quality assessment for the state of Washington was approved by EPA on July 22, 2016.
>
> P. 27, Table 3-9. Hood, Sandy, Kalama and the Deschutes have identical estimated mean temperatures. Is this correct given the differences in flow paths/lengths, surrounding climate, etc?
>
> P. 64, RVLW 6-21. The third column shows a footnote of "18", but do not see the definition of the page.

If you have any questions, please contact me.
Sincerely,
Joy Archuleta

Joy Archuleta
R6 Water Quality and Water Rights

Forest Service
Forest Service, Pacific Northwest Region

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UPPER SNAKE RIVER TRIBES FOUNDATION, INC.

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July 21, 2020

U.S. Environmental Protection Agency Region 10
ATTN: Daniel D. Opalski, Director
1200 Sixth Avenue, Suite 155
Seattle, WA 98101-3188

RE: Columbia and Lower Snake Rivers Temperature Total Maximum Daily Load (TMDL)

The Upper Snake River Tribes (USRT) Foundation is composed of four federally recognized Indian tribes of the Upper Snake River region in Idaho, Nevada, and Oregon: the Burns Paiute Tribe, Fort McDermitt Paiute-Shoshone Tribe, Shoshone-Bannock Tribes of the Fort Hall Reservation, and Shoshone-Paiute Tribes of the Duck Valley Reservation. The four tribes have common vested interests to protect rights reserved through the United States Constitution, federal treaties, federal unratified treaties (e.g., Fort Boise Treaty of 1864, Bruneau Treaty of 1866, and Malheur Treaty of 1864), executive orders, inherent rights, and aboriginal title to the land, which has never been extinguished by USRT member tribes. USRT works to ensure the protection, enhancement, and preservation of the tribes' rights, resources, cultural properties, and practices and that those rights remain secured. These include but are not limited to hunting, fishing, gathering, subsistence uses, and religious and ceremonial activities.

After reviewing the Columbia and Lower Snake Rivers Temperature Total Maximum Daily Load (hereafter referred to as the "TMDL") issued by U.S. Environmental Protection Agency Region 10 (hereafter referred to as "EPA") , USRT has notable concerns regarding states' use of conducting a Use Attainability Analysis (hereafter referred to as "UAA") , presentation of temperature averages, and National Pollutant Discharge Elimination System (NPDES) point source permitted facilities' wasteload allocation (WLA) effects on the Columbia River.

The purpose of a TMDL is to help implement state water quality standards based on the relationship between pollution sources and in-stream water quality conditions.[1] "The TMDL establishes the allowable

[1] *Guidance for Water Quality-based Decisions: The TMDL Process*, The United States Environmental Protection Agency Office of Water 1 (April 1991) [hereinafter *Guidance*].

loadings or other quantifiable parameters for a waterbody and thereby provides the basis for states to establish water quality-based controls. These controls should provide the pollution reduction necessary for a waterbody to meet water quality standards."[2] The Columbia and Lower Snake River Temperature TMDL in question "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 to its confluence with the Columbia River."[3] This river system is vital to Columbia and Snake River salmon and steelhead, which are at risk of extinction due to fish-killing hot water within this river system.[4] The importance of these fish to USRT's tribes cannot be diminished.

> Historically, the Bannock, Paiute, and Shoshone peoples harvested salmon and trout throughout the Columbia River Basin for subsistence. Annual salmon and steelhead runs in what are now [Idaho], Nevada, [Oregon], and Washington provided harvest opportunities throughout the year. Access to anadromous fish for subsistence and ceremonial purposes has been eliminated from much of the Upper Snake River Basin following the construction of dams (for hydroelectric, flood control, and irrigation purposes) along the Columbia and Snake Rivers. Once a mainstay of the tribal diet, anadromous fish have been absent from waters within, or near, tribal reservations for nearly a century, effectively preventing three generations of tribal members from practicing their cultural practices and traditions.[5]

Based on the purpose and function of a TMDL, it is imperative that the water quality criteria identified in a TMDL be implemented by each state, in this case Oregon and Washington, in order to benefit all affected parties and help restore salmon and steelhead populations within the Columbia River Basin.

In the TMDL, EPA mentions the option of states conducting a UAA that "demonstrates that attaining the use is not feasible because of one of the six factors listed in 40 C[.]F[.]R[. §] 131.10(g)[6]" because of the "inability to achieve applicable water quality criteria at all times and all places." Although this option is permitted via 40 C.F.R. § 131.10(g), this option should *always* be used as a last resort for states, and never an immediate viable option to meet applicable water quality criteria presented in a TMDL. The restoration

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[2] *Id.*
[3] *Total Maximum Daily Load (TMDL) for Temperature in the Columbia and Lower Snake Rivers*, United States Environmental Protection Agency Region 10 1 (May 18, 2020) [hereinafter *Total Maximum Daily Load*].
[4] Lynda V. Mapes, *Washington state aims to regulate water temperature at federal dam, wading into controversy*, Seattle Times, Last Updated May 28, 2020, in Environmental, *available at* https://www.seattletimes.com/seattle-news/environment/washington-state-aims-to-regulate-water-temperature-at-federal-dams-wading-into-controversy/.
[5] *Hells Canyon Complex Fisheries Resource Management Plan*, Upper Snake River Tribes Foundation 4 (April 27, 2018).
[6] These six factors are as follows: (1) Naturally occurring pollutant concentrations prevent the attainment of the use; or (2) Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or (3) Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or (4) Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or (5) Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or (6) Controls more stringent than those required by sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact. 40 C.F.R. § 131.10(g) (August 21, 2015).

of salmon and steelhead populations, and those who rely on these fish, desperately depends on states making necessary decisions to improve water quality criteria and lower the water temperature of the Columbia Basin River system. If states choose not to do so by conducting a UAA that EPA then approves, the future of salmon and steelhead is bleak, if not nonexistent.

In order to provide the most accurate data for establishing water quality criteria, it is crucial that EPA use data from a worst-case scenario instead of averaging data collected over a time period. In the TMDL, EPA took the average of temperature conditions from calendar years 2011 – 2016 covering the months of July – October.[7] Although this data set revealed that on average, water temperatures exceeded the 7-day average daily maximum (7-DADM) by 1.8°C, and the annual maximum exceedance magnitude averaged 3.2°C.[8], EPA should have used data representing a "worst-case scenario," such as the data from 2015, the hottest year on record for the Northwest dating back to 1895.[9] Pursuant to EPA's publication *Guidance for Water Quality-based Decisions: The TMDL Process*, "When developing a TMDL, design conditions are those critical conditions that must be specified in order to determine attainment of water quality standards. In specifying conditions in the waterbody, an attempt is made to use a reasonable 'worst case' condition."[10] Thus, although the average temperature data used by EPA does show that the river system is, indeed, too hot, data from 2015 follows the EPA's "worst-case" scenario TMDL guidance, and would provide more efficient data for establishing water quality criteria for the Columbia and Lower Snake Rivers.

The last concern of USRT is regarding NPDES point source permitted facilities' WLA effects on the Columbia River. In calculating WLAs for major and minor NPDES permitted facilities on the Columbia River, EPA "used the best available data, but in some cases, temperature data from facilities were limited."[11] However, EPA concludes that "[c]ollectively, if all the sources discharge this load on average, the goal of the TMDL for point sources will be achieved."[12] Upon looking at the list of major and minor facilities, the discharge temperature for some of these facilities is exceedingly hot – some as high as 40°-45°C (104°-113°F).[13] Although tribal governments were told by EPA during an EPA Coordination Webinar that irrigation withdrawals, nonpoint source heating, NPDES point sources and tributaries' temperature impacts "pale in comparison" to the temperature impacts of climate change and dams along the system[14], it is still concerning that exceedingly hot water is being discharged into the same river system that heat sensitive salmon and steelhead are navigating. USRT recommends that EPA thoroughly research the effects of these NPDES permitted facilities' discharges on the river system, taking into consideration the future predictions of climate change, and using worst-case scenario data to calculate WLAs.

The restoration of salmon and steelhead populations is of utmost importance to the tribes. "The ecological, cultural, and social impacts related to the loss of anadromous fisheries…to members of the [tribes] cannot be understated. From time immemorial the peoples of the Snake River Basin [and Columbia River Basin]

[7] *Total Maximum Daily Load*, *supra* note 3, at 13-14.
[8] *Id.*, at 15.
[9] Chris Dolce, *Summer 2015 Was Hottest on Record for Northwest*, The Weather Channel (September 9, 2015, 12:00 AM EDT) https://weather.com/news/climate/news/record-hot-summer-northwest-wet-midwest.
[10] *Guidance*, *supra* note 1, at 47.
[11] *Total Maximum Daily Load*, *supra* note 3, at 53.
[12] *Id.*
[13] Nippon Dynawave Packaging Corporation, Permit No. WA0000124, Temp. 45.0°C.; KB Alloys/AMG Al North Amer., Permit No. WA0002976, Temp 40.0°C. *Id.*, at 54, 55.
[14] *EPA Coordination Webinar with Columbia River Basin Tribal Governments on Columbia/Lower Snake Mainstem Temperature TMDL* (June 4, 2020).

used anadromous fish resources for subsistence and in their traditional cultural practices."[15] USRT requests that EPA consider the proposals in this comment letter to better protect current salmon and steelhead populations, and further aid salmon and steelhead recovery throughout the Columbia and Lower Snake Rivers.

If comments or questions arise in reviewing this letter, please contact Scott Hauser, USRT Executive Director, by phone ((208) 331-7880) or email (scott.hauser@usrtf.org) at your convenience.

Sincerely,

s:/ *Scott Hauser*

Scott Hauser
USRT Executive Director

[15] *Hells Canyon Complex Fisheries Management Resource Plan*, *supra* note 5, at 3.

Washington Association of Sewer & Water Districts
EDUCATE ▪ ADVOCATE ▪ COLLABORATE

July 16, 2020

Ms. Mary Lou Soscia
EPA Oregon Operations Office
805 SW Broadway, Suite 500
Portland, OR 97205

RE: Public Comment on May 18, 2020 EPA "TMDL for Temperature in the Columbia and Lower Snake Rivers"

Dear Ms. Soscia:

The Washington Association of Sewer and Water Districts (WASWD) represents the 180 public sewer and water districts in Washington state, serving about 20% of our state's population—ranging from the state's largest population centers, to the smallest rural communities. These districts provide essential public health services of sewer and drinking water. Clean water is a major concern to both our membership and the customers they serve.

We are writing in support of comments on the TMDL for temperature in the Columbia and Lower Snake Rivers submitted to you by the Discovery Clean Water Alliance and the City of Vancouver, WA. The Alliance and City performed a thorough analysis of the proposed TMDL and have made excellent points concerning the application and clarification of specific parts of the TMDL.

Of particular concern to our members is whether or not point sources should even be included in this TMDL since their contributions to temperature increase are miniscule compared to dams and climate change, as reflected in Table 4.1 in the TMDL document. With 126 facilities affected, the burden of revising permits, administration and providing oversight on the part of permitting agencies would be substantial. Permittees would need to perform analyses for optimization, develop compliance strategies, revise plans, and possibly develop and implement capital projects, for what appears to be little environmental benefit compared to other discharges and impacts. For these reasons, point sources should be removed from this TMDL.

Another concern of our members is the need for precise and consistent definitions to ensure the pathway to compliance is clear. It must be clear whether measurements are reported as daily or monthly averages to avoid confusion and potential regulatory or legal implications regarding compliance. Clarification and consistent application of river mile designations and well-defined river reaches is also needed to ensure proper access to reserve allocations by point source dischargers.

This TMDL also needs to recognize and coordinate with approved growth needs. Our members participate in and must comply with a number of planning processes. Some of these state, local, and federally delegated processes have the potential to conflict with the allocations established by the proposed TMDL. Planning that establishes future growth projections is already in place across the state and needs to be considered in establishing reserve allocations.

Our members support establishing a robust water quality trading program. This TMDL seems ideal for a water quality trading program as Washington and Oregon currently have guidance regarding trading and could begin implementation as part of a compliance strategy that could lead to better environmental outcomes. It would be helpful if EPA would establish this in the TMDL.

Finally, public entities are always concerned with costs, and our members are no different. We encourage EPA and the States to recognize the fiscal realities of the current times and develop innovative compliance strategies that maximize environmental outcomes for modest financial investments.

Thank you for the opportunity to comment on this TMDL.

Judi Gladstone

Judi Gladstone
Executive Director

Washington Association of
Sewer & Water Districts

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600 • Olympia, WA 98504-7600 • 360-407-6000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

August 19, 2020

Chris Hladick, Regional Administrator
U.S. Environmental Protection Agency, Region 10
Park Place Building
1200 6th Avenue
Seattle, WA 98101

Re:	TMDL for Temperature in the Columbia and Lower Snake River

Dear Regional Administrator Hladick:

The Washington Department of Ecology (Ecology) appreciates the opportunity to provide comment on EPA's Total Maximum Daily Load (TMDL) for Temperature in the Columbia and Lower Snake Rivers. The Columbia and Snake Rivers serve as prime freshwater habitat for salmon and other aquatic species and salmon rely on these rivers for spawning, rearing, and migrating. Protecting and restoring salmon is a priority for Washington and is a critical component of recovering endangered orca whales. We must address the temperature issues on the Columbia and Snake Rivers in order to provide cool, clean waters for salmon.

The Columbia and Snake Rivers provide a critical migration corridor that connects salmon spawning streams throughout the basin with the Pacific Ocean. We have been working in these river basins for decades, and while improvements have been made, significant work remains. Temperature standards are regularly exceeded and can reach lethal temperatures for salmon.

We do not agree with EPA's recommendation to weaken our water quality standards, and are asking for the statement to be removed from the TMDL. It is imperative that we not give up protecting Columbia and Snake Rivers for our salmon and orca before we have even started to address the key sources of temperature pollution. The TMDL study identifies climate change and dams as the biggest contributors to temperature pollution in the Columbia and Snake Rivers and highlights the importance for action. However, instead of outlining a pathway to addressing these sources and focusing on what we can do to lower temperatures and protect salmon, EPA suggests that we simply lower our standards. We believe that suggestion is unwarranted and unhelpful.

Addressing temperature is complex, but if we all work together towards the same goals, we will see progress in the Columbia and Snake Rivers. We should focus on implementing actions that can reduce temperatures and help us meet our water quality standards.

Since dams are identified as a key source of temperature pollution in the TMDL, focusing on how to better control this source is critical to successfully reducing temperature in the Columbia and Snake Rivers. We have issued 401 certifications to Washington nonfederal dam operators with Federal Energy Regulatory Commission (FERC) licenses and they have been working to implement those 401 certifications through actions to address their temperature impacts for the last 12 years. In order to address our water quality standards, including temperature, we need to address all impacts associated with dams and hydropower operations. We need to build resiliency in our rivers to prepare for the ongoing impacts of climate change.

On May 7, 2020, we took the important first step of issuing 401 certifications to the eight federal dams on the Columbia and Snake Rivers. Our 401 certification authority for the federal dams is a key piece in ensuring the federal dams are meeting the water quality standards. Unfortunately, instead of stepping up to the challenge, the Army Corps has challenged our authority to protect state waters in an appeal to the Pollution Control Hearings Board. The decision to appeal means that a federal agency isn't willing to do its part to address temperature pollution and instead believes that all other Washington sources should bear the burden of heat contribution from the federal dams. We struggle to see a path forward to implementation of the TMDL without 401 certifications as a regulatory tool to address the federal dams.

This TMDL identifies climate change as a dominant contributor to temperature to the Columbia and Snake Rivers, but EPA does not include a plan for addressing climate change impacts in the TMDL. It is clear that EPA recognizes the significance of climate change as a source of temperature pollution, and it is therefore incumbent upon EPA to develop measures to address it. Instead, the TMDL fails to detail a single action the federal government can take to address climate change. This is unacceptable.

We are also disappointed that this TMDL identifies Idaho and Canada as sources of temperature to the Columbia and Snake Rivers without any guidance on how to address them. EPA and the federal government have a key continuing role to play in reducing temperature pollution from the operation of federal dams, Idaho, and climate change. We struggle to understand how the TMDL provides reasonable assurance that water quality standards will be met when multiple temperature sources are identified with no identified actions to address them. EPA should include more clarity and guidance on how to implement temperature reductions in this TMDL and explicitly explain how they will continue their role in helping Washington meet our temperature water quality standards. Doing so will advance the very important work of implementing the TMDL and ensuring that we effectively address temperature pollution in the Columbia and Lower Snake Rivers.

Attached are our comments on the TMDL. We have divided the comments into two sections: our general comments on the TMDL, and specific details identified as errors within the TMDL.

If you have questions or would like to discuss further, please contact Kelly Ferron at kelly.ferron@ecy.wa.gov or (360) 764-3583 (work cell).

Sincerely,

Vincent McGowan, P.E.
Water Quality Program Manager

Enclosure: Comments on the TMDL

cc: Dan Opalski Director, Water Quality Division, Region 10, EPA
Richard Whitman, Director, Oregon Department of Environmental Quality
Kelly Ferron, Water Quality Specialist, Ecology

Washington State Department of Ecology's Comment on EPA's TMDL for Temperature in Columbia and Lower Snake Rivers

We appreciate the opportunity to provide comment on EPA's Total Maximum Daily Load (TMDL) for Temperature in the Columbia and Lower Snake Rivers. However, we would have preferred to have worked collaboratively with EPA and Oregon from start to finish on the development of this tremendously important TMDL. We hope that this is not a model for developing TMDLs moving forward.

We had limited time to review the TMDL and our comments are focused on what we believe are the key issues and concerns with the TMDL. The first section of this document includes general comments and the second section includes corrections for tables and figures in the TMDL.

General Comments

Water Quality Standards Attainment

In Section 1.1, EPA suggests a use attainability analysis due to the potential inability to meet temperature water quality standards, stating "*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.*"

We are disappointed that EPA is telling the states to weaken their water quality standards as part of the temperature TMDL. Ecology does not intend to do a use attainability analysis (UAA) at this time. We must first focus on implementing actions that can improve water quality. The goal of a UAA is to determine what designated use is attainable. Without the process of reviewing and implementing improvement measures to achieve TMDL goals in the Snake and Columbia rivers, the level of use attainment that can be gained will not be fully understood. By suggesting a UAA now, EPA is prematurely suggesting that we weaken the current level of protection which is designated for salmon rearing and migration. Protecting and restoring salmon is a priority for Washington and for these rivers, and adaptive management through the TMDL process must be our first priority rather than rushing to weaken the standards.

We want EPA to modify language of Section 1.1 to clarify that after implementation actions are taken to address temperature pollution, a UAA is a tool to be considered if temperature water quality standards are not met. We also request that EPA articulate the basis and process of a UAA, given that this regulatory action would require EPA review and approval along with formal ESA consultation.

Standards Interpretation

We want EPA to explain in greater detail which water quality standards are relied upon to allow the 0.3°C allowance in figures 6-2 through 6-4. How are the allowances in the bar graphs related or not related to the aggregate allocations in Table 6.3? It seems from these figures that each dam is provided an allowance based on the 'measureable change' condition referenced in WA Standards described in Section 2.1. If the 0.3°C allowance is already applied to account for error based on the measureable change language, from where is the 0.3°C aggregate allocation in Table 6.3 derived?

Temperature sources

Appendix D, Section 4.0 states: "This RBM10 model assessment considered temperature impacts to the Columbia and Snake Rivers from point sources, tributaries, dams, climate change, and an agricultural water withdrawal. The assessment results indicate that climate change and dam impacts are the dominant sources impacting river temperatures, with impacts that are an order-of-magnitude higher than point sources, agricultural withdrawals (Banks Lake project), and tributaries."

This TMDL study identifies climate change and dams as the biggest contributors to temperature pollution in the Columbia and Snake Rivers. This study highlights the importance for implementation of actions to address temperature impacts from dams and to take action on climate change because both are causing impacts to the Columbia and Snake Rivers. While we appreciate that this TMDL highlights these temperature sources and recognizes the need to *collectively* take steps to address both of these contributors, we are disappointed that EPA has not articulated what can be done to address these significant sources of heat.

When the TMDL's silence on actions to address climate change and dams is combined with the recommendation that we change the water quality standards to make them "more achievable" it appears EPA is trying to skirt its responsibility under the federal Clean Water Act. The purpose of a TMDL is to describe a plan for restoring impaired waters.

The TMDL should include more specific recommendations for how the federal dams and climate impacts can be addressed.

Reasonable Assurance

The EPA repreatedly states in this TMDL that temperature water quality standards cannot be met in all places at all times. But meeting water quality standards is a critical element of an approvable TMDL.

When the EPA establishes or approves a TMDL that allocates pollutant loads to both point and nonpoint sources, it determines whether there is reasonable assurance that the load allocations (LAs) will be achieved and water quality standards (WQS) will be attained. EPA does that to be sure that the wasteload allocations (WLAs) and load allocations (LAs) established in the TMDL are not based on overly generous assumptions regarding the amount of nonpoint source pollutant reductions that will occur.

This is necessary because the WLAs for point sources are determined, in part, on the basis of the expected contributions to be made by nonpoint sources to the total pollutant reductions necessary to achieve WQS. If the reductions embodied in LAs are not fully achieved because of a failure to fully implement needed nonpoint source pollution controls, or that the reduction potential of possible BMPs or actions was overestimated, the collective reductions from all sources will not result in attainment of WQS. As a result, EPA must demonstrate whether a TMDL provides reasonable assurance that nonpoint source controls will achieve expected load reductions.

When EPA Region 10 evaluates our TMDLs for reasonable assurances, they consider the following questions: "One practical way to evaluate reasonable assurance is to consider whether it addresses these questions: 1) Do practices capable of reducing specified pollutant load exist? 2) Does the TMDL describe a plan or process to implement such practices?"

If this TMDL consistently states that water quality standards cannot be met, how can EPA show the necessary reasonable assurances required by the Clean Water Act?

In particular, we are concerned that reasonable assurances are lacking for the following elements of the TMDL:

Climate change

This TMDL names climate change as a dominant source of temperature pollution to the Columbia and Lower Snake Rivers and demonstrates, yet again, the impact climate change is having on Washington's valuable natural resources. The TMDL identified a strong link between air temperature and Columbia River water temperature and showed increases in air temperature and water temperature since the 1960's. By naming climate change as one of the biggest two sources of temperature pollution, it is important that EPA include information on what the federal government can do to address it. But the current TMDL is completely silent on the actions that the federal government can take to address climate change.

Washington is committed to addressing climate change and is taking measurable actions. EPA should take a larger role in identifying concrete measures to address climate change in regards to this TMDL. This TMDL should put heightened scrutiny on other actions that can be taken to address the impacts of climate change on warming air temperature that subsequently increase river temperatures.

Load allocations for federal dams

This TMDL identifies dams as one of the biggest impacts to increased temperatures in the Columbia and Snake Rivers. However, the TMDL does not include actions that the federal dams can take to meet their load allocations, nor is there any certainty that any actions will be implemented. We would like the EPA to clarify what actions can be taken by federal dams to reduce their temperature impact.

Specifically, we would like EPA to include in this TMDL how they envision federal dams meet their load allocations. 401 certification serve as a crucial administrative tool for requiring temperature reductions. To address temperature impacts from dams, Ecology issued 401 certifications to federal dams to address temperature pollution on May 7, 2020. The Army Corps of Engineers has appealed these certifications. This appeal demonstrates that federal dams do not think they need to meet Washington Water Quality Standards or the federal Clean Water Act. Without 401 certification authority, how can there be reasonable assurance that the LA assigned to dams will be implemented?

We thought that there was a clear implementation pathway for federal dams, but the tool we were relying on to protect state water quality is unfortunately being litigated. Although we are confident in our legal case, if the Army Corps does prevail, what tools are available to Ecology to regulate and address federal dam temperature impacts? The TMDL should be revised to explain how there is reasonable assurance that the reductions necessary to meet the LA assigned to the federal dams will be achieved.

Dams

EPA assigned a 0.1°C temperature allocation collectively for all dams on the Columbia and Lower Snake Rivers. This collective allocation means that Ecology's implementation plan will need to determine how to divide this 0.1°C load allocation amongst the dams. We ask that the EPA outline options for how this division of the allocation could be accomplished. In an earlier presentation about this TMDL, the EPA shared temperature allocations given to individual dams. We understand that dams and their temperature impacts are interconnected, and we request EPA acknowledge this by including potential allocation divisions. We request that EPA include this information in the TMDL as it will be beneficial information for Ecology as we develop our implementation plan.

The Lower Snake River dams provide a certain challenge for temperature reductions. Again, this TMDL fails to identify specific actions that can address temperature pollution from these dams. The identification of specific actions would be helpful as we plan to implement this TMDL and determine what temperature reductions dams in the Snake River can achieve in an established timeline. Again, there needs to be reasonable assurances that all dams will achieve the assigned LA.

Achieving Load allocations (LAs)

We ask that EPA explain in the TMDL how the load allocations assigned in this TMDL are achievable. This explanation should answer these questions: 1) Do practices capable of reducing specified pollutant load exist? 2) Does the TMDL describe a plan or process to implement such practices? There is no description in the TMDL of practices that are capable of reducing the pollutant load necessary to achieve the LA. We would like EPA to identify what practices exist to reduce temperature pollution and describe potential implementation actions that could meet the LAs assigned to the dams and the tributaries.

Idaho

Multiple times in this TMDL, EPA identifies Idaho's upstream influence on temperatures in the Snake River (6.4 Boundary Conditions). We would like more clarity on how EPA will use their role in Idaho's regulatory program to work with Idaho to address downstream standards in Washington. In particular, we request clarity and answers to the below questions:

- What is EPA doing to make sure Idaho's regulatory programs, such as TMDLs or NPDES permits, are designed to meet downstream water quality standards?
- Can EPA articulate potential changes that could occur in Idaho to prevent upstream temperature impacts that impact our downstream water quality?
- Can EPA explain the influence of the Dworkshak dam on this TMDL in more detail? The TMDL does not clearly communicate the assumptions EPA used for the Dworshak dam influence on downstream temperature. We would appreciate the TMDL providing clear background information on how the Dworkshak dam operates and the important role that dam operation plays in addressing temperature impacts.
- Can EPA ensure that the Dworshak will stay operating at current conditions? What should be done in this TMDL if Dworshak operations changes?

Canada

It is our understanding that the Grand Coulee generally acts as a reset on temperature conditions, in regards to Canada's temperature impacts on the Columbia below Grand Coulee. This would mean that Canada's temperature impacts are largely confined from the Canadian border to Lake Roosevelt.

If our understanding is correct, we ask that EPA make this more explicit in the TMDL to demonstrate that Canadian temperature impacts do not have a significant effect below the Grand Coulee dam. If we are misunderstanding this element of the TMDL, we ask that EPA discuss in the TMDL the actions the federal government can take to address temperature impacts from sources outside of our border.

Water withdrawals

Water withdrawal at Grand Coulee Dam for the Banks Lake Project constitutes about 10% of the River. The TMDL estimates that this withdrawal for the Banks Lakes Project has a 0.1°C impact in July and August (Appendix D, Section 3.9.2). This is a significant impact when compared to the 0.3°C total temperature allocation in the TMDL. We note that the Banks Lake Project impact is not explicitly referenced in the main part of the TMDL and appears to be an unaccounted source in the TMDL allocations.

Temperature averages, assessment periods, and locations

The RBM10 water temperature model applied in this TMDL cannot estimate water temperatures for a specific portion of the water column (i.e. is not applied when water column temperatures vary with depth). Instead, it estimates an overall average water column temperature. For this reason, only hydroelectric facility tailrace locations (downstream discharge) were used as model assessment points. Tailrace outflow tends to be highly mixed and uniform in temperature. However, the model output and assessment locations have the combined effect of depressing the actual level of temperature impact while posing a constraint to its application to Washington's water temperature criteria. This is because:

- Washington's water temperature criteria is based on an assessment of daily maximum temperatures not averages.
- Washington's temperature criteria is based on either a daily or a seven-day assessment period. This TMDL applied a monthly time scale for its temperature assessment.

Use of the tailrace as an assessment point ignores heating occurring in the upper water column of the forebay of each hydroelectric facility. The tailrace discharge reflects water temperatures from a portion of the water column far below the forebay surface and is largely buffered from the hydroelectric facility's real heating effect which tends to be observed most prominently in the forebay's upper water column.

Using tailraces as compliance points may underestimate exceedances or completely miss hotter areas of the river system. The TMDL does not discuss forebay temperatures relative to current conditions in the tailrace and meeting water quality criteria at the target sites. Forebays are important areas for juvenile and adult salmonids, as they spend a large portion of their stream migration there. So, it is important to understand changes in forebay temperatures and differences contrasted with tailrace temperatures.

Temperature comparisons – given travel time differences

Given that hundreds of miles of the Columbia River are covered by this TMDL, an assessment of travel times should be provided in the analysis. The analysis applied a metric to determine the effect of each hydroelectric facility's effect on water temperature referred to as the cumulative impact (CI). It is based on the difference between monthly average tailrace temperatures with the dams in place (current condition) in comparison to the temperatures predicted given their removal. While most of the facilities operate as run-of -river (upstream storage is minimized), the reality is that during the critical period of July-October, the river volume has increased (wider and deeper) with reduced overall velocities now compared to a pre-dam condition. This results in increasing travel times. By assuming similar travel times, even given the monthly assessment period applied in the TMDL, the error of travel times increases the further the assessment point is located from the upper boundary used in the model. With increasing separation, water representing the river with dams in place in the current scenario and without dams in place are subjected to differing meteorological and hydraulic heating and cooling effects. This impacts the intent of the exercise which was to solely examine the influence of the dams on water temperatures.

In addition, a cumulative impact metric was used to determine the periods and levels of temperature reductions required to achieve the relevant criteria. Given this importance, the level of analysis error resulting from scenario travel time differences should be examined and the TMDL should provide a justification to the analysis approach taken.

Temperature Metrics

Average versus maximum temperatures

The TMDL evaluated the level of temperature impact associated with each of the Columbia River facilities based on two metrics: the temperature exceedance (TE) and the cumulative impact (CI).

A rule was applied to these metrics: if the target exceedance level is greater in magnitude than the cumulative impact range, then the level of temperature reduction required is the cumulative impact temperature differential minus 0.1^{o}C. The underlying assumption is that the exceedance is greater than what the dams can be reasonably considered responsible for. Therefore the reference, in terms of impact, becomes the cumulative impact differential.

If the target exceedance is less than the cumulative impact differential, then 0.1^{o}C is subtracted from the target exceedance level. The underlying assumption here is that the target exceedance is entirely attributed to the dams.

This approach requires that the two metrics share some commonality – a common frame of reference. That link would assumed to be the maximum (from observed data) and the estimated model average temperatures, which are assumed to be equivalent in the TMDL. However, there is a disparity between these two temperature estimates. A comparison of the predicted monthly average temperatures (model predicted– current condition scenario) to the observed monthly maximums for July and August, indicates a median difference of 1.3^{o}C and 0.9^{o}C, respectively. Differences were largest at Rock Island (~1.7^{o}C) and lowest at Priest Rapids (~0.5^{o}C).

The study did compare daily maximums to daily average temperatures and found only around a 0.2^{o}C difference at the John Day dam tailrace based on 2016 data throughout the year with no discernable seasonal influences affecting this difference. However, based on the monthly maximums calculated from 2011-2016 hourly data in comparison to the model predicted average temperatures, the difference is 1.9^{o}C and 0.9^{o}C for July and August, respectively.

Under prediction of temperature reduction required to achieve criteria

It appears like the TMDL allocation approach was to provide only 0.1^{o}C to the hydroelectric facilities of the assumed 0.3^{o}C increase allowed by the criteria. Based on how the temperature exceedance metric (TE) is calculated it appears like an "allocation" of 0.3ºC was already assigned. The TE is the observed maximum temperature (for a particular assessment location) above the combined appropriate criteria and an additional 0.3ºC. If this is correct, subtracting a portion of that "allocation" or 0.1ºC from the TE just further increases that "allocation" effectively by another 0.1ºC. The net result is the allocation of 0.3ºC to each facility and the estimated temperature reduction required to achieve the criteria falling short of that target. We request that EPA clarify their allocation approach and ensure that all allocations fit within the 0.3ºC increase allowed by the criteria.

Load allocations and flow levels

The heat loads estimated in the TMDL for each hydroelectric facility are based on 2011-2016 monthly average flow levels (Appendix I). This approach assumes that there will be little change to flow in the future. In reality, based on recent history of flow management for the Columbia River, addressing temperature issues will likely require an increase in summer and fall period flows. Increasing flow could result in an exceedance in the load allocation. Increasing system-wide (at Grand Coulee) critical period flows may have a much greater effect on the calculated heat load (the magnitude of flow is considerably greater than the 0.3ºC maximum temperature increase allowed) and is, therefore, a controlling factor. From this perspective, the incentive to achieving the load allocation could be to reduce system flows, which is counter to positive fisheries enhancement measures. We request that EPA examine the potential impact of different flow level management decisions.

Waste load allocations (WLAs)

Although we do not foresee large changes to our NPDES permits, it would be helpful to understand the assumptions behind the WLAs in this TMDL. Can EPA provide further guidance on how to interpret WLAs? Typically, TMDLs have text that explain this and we need to understand the assumptions for WLAs to know how to best interpret them.

Table 6-15 and General Permittees

The list of general permittees and general permit types that are de minimis needs clarification (Table 6-15; and page 52, last paragraph).

In particular, it is not clear if the list of de minimis permittees is narrow (a subset of the particular permittees in Table 6-15 whose data is available); broad (permittees covered under the general permits listed in the last paragraph on page 52 as well as other general permits); or something in between.

Facilities who discharge to the Columbia River with coverage under Washington's Sand and Gravel General Permit are missing from the list of facilities considered on page 52 and are not assigned WLAs. In regards to discharges for these permits, we would like to know:

- Will the states have to use reserves allocated for point source loads to accommodate those covered by the sand and gravel general permit that were not considered in EPA's modeling, or would they (or could they) also be considered de minimis as many of the other general permit dischargers were?
- If considered part of the reserves or de minimis (in either case), what guidance do we provide to those permittees in regards to their discharge?

It would be useful also to clarify that stormwater permittees are deminimus, as they appear to be from language on pages 58 and 60 of the TMDL (page 60: "*Because the estimated temperature impacts from these sources are minimal and intermittent, EPA has not assigned a WLA to stormwater sources in this TMDL*".)

It would be useful to clarify if new permittees might also be considered de minimis – for example, new fish rearing facilities and possibly other facilities covered under individual or general permits.

Finally, it would be useful to clarify if agencies must assign a thermal loading limit to facilities with an assigned WLA, whose effluent temperature is below aquatic life temperature criteria.

Reserve allocations

In section 6.5.4, the TMDL is not clear as to which river reaches are associated with the reserve allocations. We understand these reserve allocation reaches are the reaches between points (locations) identified in Tables 3-2 through 3-7, but clarification would be helpful.

We would like EPA to reassess the reserve allocations in this TMDL. These allocations should reconcile how nonpoint temperature reduction actions at dams will impact WLAs assigned via NPDES permits. Implementation actions at dams could increase point source temperature loads and this has not been factored into the waste load allocation given to the dams. We want assurance that the reserve allocation is sufficient to deal with these types of implementation actions in the future.

In terms of reserve management, we will work with Oregon DEQ to manage the reserve allocation in this TMDL. Since the TMDL model resides with EPA, we would require EPA's assistance in tracking and assigning the reserve. Additionally, Ecology suggests that EPA develop procedures for obtaining reserve capacity and identify that you will do this in the TMDL.

TMDL Corrections

Section text corrections

2.3 *“The Washington water quality standard for the Snake River is 19°C daily maximum.”*

- Correction: The Washington water quality standard for the Snake River is 20°C daily maximum.

Table and Figure corrections

Section 2

Figure 3-5

- Figure 3-5 should have the tributary points scaled based on proportional flow contribution. In the current figure, each point is given an equal weight, which is not as informative.

Table 3-9

Temperature disparity in the Lewis River between Table 3-9 (12.5°C) and Table 5-1 (16.6°C)

Table 6-1 TMDL target temperatures

- Why is June not included in this table?

Table 6-12 WLAs for “Major facility” NPDES permitted facilities on the Columbia River

Facility Name	Corrected daily maximum flow	Corrected daily maximum temperature	New WLA
Agrium-Kennewick	23.4 MGD	30.8º C	2.72E +09
Agrium-Finley	18.9 MGD	27.2º C	1.94E +09
Packing Corporation of America	37.5 MGD *37.5 MGD is the value that is used in their mixing zone study and was based on flow data during the three years prior to the study being performed.		

These values are from monthly discharge monitoring data reported in PARIS for the last five years, from May 2015 – April 2020.

Table 6-13 WLAs for “Minor facility” NPDES permitted facilities on the Columbia River

Agrium Bowles Road	WA0003671	322.6	15.0	30.8	1.74E+09
Agrium Game Farm Road	WA0003727	321.0	14.1	27.2	1.45E+09

- Change Grand Coulee WWTP to City of Grand Coulee WWTP
- Change City of Coulee Dam to City of Coulee Dam WWTP
- Change Interior, Reclamation to Grand Coulee Dam WWTP
- The two Agrium facilities listed in the minor table have the same permit numbers as two in the major table. Also, the river miles, flows, and temperatures are not consistent. It would be best to remove the Agrium facilities from the minor table and only have the Agrium facilities in the major table.
- Goldendale is listed at a “minor facility” NPDES permitted facilities on the Columbia River. However, the City of Goldendale discharges from a facility on the Little Klickitat River.
- TrueGuard (AKA All Weather Wood Treating) WA0040029 is missing in the TMDL Table 6-12), but probably needs to be added since the TMDL includes Exterior Wood (WA0040711), a similar facility in the same Washougal Industrial Park location. Both these facilities are individual permits for Stormwater only and neither is known to discharge any heat load, as there is no process wastewater discharge.
- Consider declaring Asotin diminimus or providing a WLA. Our records suggest a design flow of 0.164 MDG, and a maximum temperature discharge of 25°C. The thermal load appears to be about 1/3 of 1% of the reserve allocation in a single reach. We understand there are reserves associated with multiple river reaches.

Table 6-20

- Entiat River is listed as not having a TMDL but it is a 4B Temperature Project site.
- This table shows the Yakima River having a Water Quality Criteria of 17.5ºC when it is noted as 21ºC in WAC 173-201(a) table 602. This should be corrected.

Working together to serve and improve the small grains industry of Washington

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August 20, 2020

Mr. Andrew Wheeler
Administrator
Environmental Protection Agency
ColumbiaRiverTMDL@epa.gov

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 Washington Association of Wheat Growers (WAWG) and Washington Grain Commission (WGC) regarding the Total Maximum Daily Load for Temperature (TMDL) for the Columbia and Lower Snake Rivers.

WAWG and WGC represent thousands of farmers across Eastern Washington and farm landowners throughout the region. With a mission that includes working for solutions to problems of the farm and rural community, maintaining a balance between the economy and the environment is critical to Pacific Northwest life and culture. The security of the carbon-free federal hydropower supply sourced from the Columbia-Snake River System should be enhanced. TMDL efforts should not be used to dismantle the hydro system.

Our membership base largely resides, and industry partners are based, in rural communities. Communities that depend on power generated by river dams. If the dams on the lower Snake River, for example, were replaced by a combination of other energy sources, rates could increase as much as 19% as referenced in a recent Environmental Impact Statement. The role of dams to produce affordable, reliable, clean, and renewable energy cannot be easily dismissed or replaced.

Regional wheat producers rely on a complex system of rivers, rail, and highways to transport our product. Of the nearly 153 million bushels of wheat produced in Washington, about 60% of it is transported via the Columbia-Snake River System. Barging is proven to be the most efficient and least carbon-intensive mode of cargo transportation available to us. As such, the wheat industry maintains our strong opposition to any attempt to breach the lower Snake River dams and considers such a possible disruption to the river system to be an extreme—and unnecessary—measure. Dam breaching would have devastating and long-lasting impacts on our industry and many Northwest communities that rely on the clean power, irrigation supply, and navigable waters made possible by the federal system of locks and dams. Breaching would not only negatively affect agriculture, but also manufacturing, transportation, trade, and tourism businesses.

For decades, the benefits of the Columbia-Snake River System have contributed to thriving communities in the Pacific Northwest. The system's hydroelectric dams and locks provide us with clean affordable energy for our homes and businesses; irrigation water for agriculture; and navigable waterways in order to transport inputs and move our commodities to the rest of the world. We encourage the EPA to reissue a revised draft Columbia and Lower Snake River Temperature TMDL, and that stakeholders are provided with the opportunity to provide comments before the draft is finalized.

Sincerely,

Ryan Poe
WAWG President

Gary Bailey
WGC Chairman

To: US EPA

Date: 08-19-20

RE: Comments For EPA EIS for the Columbia and Snake River TMDL's

These comments are from the Yakima County Farm Bureau (YCFB). YCFB is a grass roots organization with 3100 members consisting of farmers and ranchers with operations both large and small as well as other folks with interest in agriculture affairs in Yakima and Klickitat Counties.

The YCFB as a matter of principle is in favor of Hydroelectric power and totally opposed to breaching any Columbia River or Snake River dams. The YCFB believes that these dams should remain in operation for their entire physical life span and that they are much more valuable intact than breached, for a multitude of reasons. (Please refer to our second attachment)

The YCFB believes that the facts show that breaching the Lower Snake River Dams would negatively impact efforts to reduce the region's carbon foot print. If the region is going to be able to withstand a loss of fossil fuel based electrical generation due to artificial restraints on carbon emissions while at the same time move towards electric mobile transportation, then we simply can't afford to lose ANY renewable energy sources, much less one that provides abundant clean power such as Hydropower. Breaching dams at this stage would create a catastrophic loss of power to our grid just when all the renewables become more critical.

The life cycle of salmon varies between species but the bulk of them spend a much greater portion of their life span in the ocean than in fresh water. As the concern for environmental conditions intensifies, it is wise to consider that what happens to the salmon in the ocean proportional to the time they spend there as very impactful. As atmospheric carbon dioxide levels have come under scrutiny for influencing ocean conditions with regards to how salmon prosper in the ocean, the argument in favor of retaining all renewable, non-carbon based

electric power generation becomes much stronger. Similarly, the trend towards electric mobile transportation is also strengthening. That electricity to power our future cars, trucks and trains must also be accounted for. Our power grid and its renewable portion of it the generating capacity will be more in demand than ever to accommodate CO2 emission reductions. All at a time when the generating base is about to be drastically diminished because of the amount of electricity created by carbon based sources in the first place.

Currently, our power from Hydroelectric sources accounts for slightly less than 50% of the total generated. Wind accounts for about 9% with Solar at about 1%. Coal and other carbon based capacities account for the balance at about 40%.

It is imperative to fully consider the potential reductions to our electric generation base as a whole in the discussions of breaching any hydro power producing dams: The argument that breaching the Lower Snake River Dams only reduces our capacity by a mere 5% may appear acceptable but not when one realizes that an additional 40% of the production, that of the carbon base generation is already on the "chopping block"! The risk to our power security is not a mere 5% as in the discussion about breaching the Lower Snake River Dams nor is it just the 40% lost due to our carbon based power contribution being eliminated, rather it is a combination amounting to a staggering and untenable 45% percent loss of electric production.

With regards to the water temperature of the Snake and Columbia River the YCFB believes that though these rivers have warmer water than optimum at times during the summer that it is not out of line with what the temperature would be in natural free flowing conditions. Further, the YCFB believes that for extended periods of time the impounded water condition fosters lower overall water temperatures and thus causes a delaying effect to a seasonal temperature spike that would occur sooner under natural free flowing conditions.

The YCFB notes that the Washington State Department of Ecology has chosen or is proposing water temperature targets that are *lower* than the actual temperature of water from either river as it enters Washington State. Thus, the arbitrary limit is unrealistic and impossible to attain. The YCFB believes that Washington and Oregon must create reasonable limits for temperatures and recognize the vital resource both economically and environmentally that our hydroelectric dams provide the citizens of the region.

There is great debate as to what water temperatures were prior to the construction of the Columbia River System (CRS). There is less conjecture as to what the Snake River's water temperatures were prior to the construction of the Lower Snake River Dams. Those temperature records are revealing and illustrate that low summer flows of a natural stream that winds through a naturally hot dry region will greatly increase its temperature.

The YCFB is fully aware that impounded waters will stratify with respect to temperature with colder water deeper in the water body and warmer water at the surface. The EPA has correctly found that the impounding of water on the CRS delay the temperature rise compared to a natural running reach because the high air temperature found in the region during summer can't reach the deeper water behind each dam.

With the impoundment of water behind the dams and the stratification of colder water at the lower depths of the water column the opportunity to create Cold Water Refuges (CWR) exists. A CWR is a structure where pumps move water from lower (colder) regions of the water body behind our reservoirs upward to certain areas at the surface of the body or in other instances utilize the colder water on fish ladders for the salmon to provide a sanctuary and resting place for them during less than favorable warm season water temperatures in the River System.

Another mitigation tool that is gaining traction is the Salmon Cannon. The combination of the Cannon and a CWR to entice the upward migrating fish to these lifting devices may prove very useful.

The YCFB believes that our once successful salmon hatchery programs must be revitalized to bolster the fishery as well. The South Resident Orcas (Orcas) population increase and fall parallels the rise and fall of the hatchery fish and the State of Washington and other interests would do well to heed that fact. It has become popular on the I-5 corridor to divert attention away from the Puget Sound where so many real threats exist for the Orcas and chose to demonize the four Lower Snake River Dams, particularly when in 2016, the NOAA Fisheries under the Obama Administration assigned the threat to these marine mammals from these dams as low.

Improved regulation of the harvest of Salmon must also be "on the table". For far too long, the United States has allowed foreign interests unregulated access to our coastal areas to the detriment of the Salmon and other fish. Beyond that, our own commercial and sport fishing interests have to reduce harvests to allow

a sustainable fishery. The YCFB believes that an endangered species should not be in a "can" much less "on sale" on a grocery store shelf while Billions of dollars are invested towards mitigation of salmon habitat as well as also ensuring the highest possible fish passage survival rates at our hydroelectric dams.

The YCFB believes that the depredation of salmon must also be addressed before their populations can be stabilized. Predator reduction is simply the only recourse. The control of Cormorants has provided some success, but that needs to be pursued more aggressively and our society must make a choice with respect to the other major salmon predators: To deal with species such as Terns, Seals and Sea Lions or continue to lose vast quantities of salmon and fail to substantially increase fish runs.

The spilling of water from the dams has been used extensively and is expected to be utilized to a greater degree to control water temperature and salmon survival. The YCFB believes that there is a limit to the amount that can be spilled and help fish. That is because excessive spillage is very detrimental to fish due to dissolved gases created by the action. The water that is spilled also is not available to generate power either and that is a loss for renewable energy.

The breaching of dams is a poor tool to save various fish species when many other options exist that have been or are already about to be implemented to improve their survival without damaging our electric generation capacity, transportation system and regional economy. With the planned reductions in CO_2 emissions simultaneously reducing our supply of electricity and placing added burdens on the grid by electrifying our transportation, to consider dam breaching is not simply bordering upon insanity, it is insane.

Mark Herke

President, Yakima County Farm Bureau

YAKIMA COUNTY FARM BUREAU

Addendum To YCFB Comments On EPA EIS For The Columbia and Snake River TMDL's

The YCFB believes that our region and nation must maintain a robust electrical generation capability. Western societies are becoming less dependent on fossil fuels due to the desire to reduce our carbon foot print and nuclear energy has been sidelined due to perceived safety concerns. This leaves hydropower, solar and wind generation as our exclusive electrical generating base in the near future.

While there have been advancements in solar and wind generating technologies the YCFB believes that by the very nature of the natural resources they draw upon they are not "trust worthy" as a stand-alone energy source. In the case of solar, it can only generate power 50% of the time (at most) based on it needing sunlight. But the Sun is not available to its full extent due to cloud cover, thus it is available even less than half the time. Wind is available on its own schedule, not one when the power is needed the most.

During the region's winters, a condition often occurs where long stretches of low temperature, stagnant air and solid cloud cover and/or fog which often lasts for weeks. The power needs are at their annual peaks due to heating and lighting needs during these periods. The net result is that when we have the most need for power, wind and solar is producing little or no electricity.

Due to the variable and intermittent nature of wind and solar, to operate effectively, they require a "large battery" to help the grid through resource shortages (periods of no wind or sun). Manufactured battery technology such as Lithium Ion has been advancing but there are still considerable hurdles with respect to creating ones large enough for a wind or solar farm. These new batteries require a considerable investment to manufacture and are largely built overseas due to environmental regulations in the United States and are expensive enough that they are currently used only up to the size required to power compact automobiles for short distances. When these batteries expire they present both an environmental challenge and are expensive to safely

dispose of. Replacement batteries would be required as the older ones fail, also at great expense. Traditional batteries containing lead which are less expensive would surely be a non-starter in the current legal environment.

Hydropower dams are always able to generate power as they depend on (reliable) water and actually enhance both solar and wind production because of their ability to fill the "gaps" of production from these facilities. They work hand-in-hand with the power grid which ties all these production facilities together thus creating the "perfect battery". Finally, the public does not have to build these facilities because they are already in operation.

Beyond the intermittent nature of solar and wind power generation, the overall cost of wind and solar equipment and operation is much higher. Our region would suffer from an overwhelming power rate shock if we began breaching any dams due the increased cost of the replacement solar and wind compared to retaining the existing hydropower facilities.

While the Preferred Alternative of retaining the Lower Snake River dams and spilling more water for fish carries an estimated rate hike of 2.5%, the breaching alternative cost rises to about a 50% hike. The YCFB is opposed to any rate hike, the cost of breaching would be disastrous to agriculture, particularly with respect to irrigation rates.

According to Washington State University, 1.8 million acres are irrigated in the State with 80% being irrigated by sprinkler, 5% by drip and 15% by surface methods. Irrigation is a very power dependent activity. Ground water (even more power intensive) accounts for 25% of with drawl leaving 75% by surface water sources. We must assume that with few exceptions 85% (80% by sprinkler plus 5% by drip) of the irrigated land or 1.53 million acres require power. Virtually all of that power in this region is by electricity. Of the other 300,000 acres irrigated by surface methods, a significant portion of that also requires power to deliver it. The Columbia Basin Project being a prime example.

The fact is that irrigation power bills amount to a substantial impact to farms and ranches in Washington State. The YCFB believes that a substantial increase in electric rates would negatively impact agriculture and a rate increase of up to 50% as suggested in the CRSO EIS due to breaching would CRIPPLE our industry as well as many other supporting businesses and activities that agriculture is sustained by.

When the Lower Snake River Dams were constructed, tens of thousands of acres of additional land became irrigated and losing that agricultural production caused by breaching would be unacceptable. The YCFB believes that the promises offered to make the farm families "whole" due to a loss of their irrigation are hollow. Even if their loss were to be fully compensated, simple money does not reimburse for the loss of one's way of life. Also, the true cost of compensation would be staggering.

Interestingly, there are environmental consequences related to wind and solar production, some are known and some are surfacing over time. An example is the issue of birds being killed by wind turbines. Some of these species are in fact endangered or listed. The first generation of wind turbines were scrapped after generating power for a number of years because of their lethal nature to Bald Eagles and other birds. Imagine the cost of that reversal, first to develop the technology, implement it and then scuttle it? The current generation of turbines are claimed to have improved blades but the controversy continues and birds continue to die.

Another issue with wind and solar farms is over the view scape. These installations typically occupy considerable amounts of real estate that are valued by many individuals for their scenic value. There have been instances of serious opposition and road blocks in the form of local zoning regulations adopted with the intent of barring new wind or solar projects.

As a matter of economics, wind turbines can only be sited where the wind is fairly constant and there is enough speed to pay back the investment. As a matter of fact, they have already been built on the best locations and only upon less desirable sites later as the economics may or may not work out. There is a point of no return, where it simply does not pay to build on subsequently less favorable sites. Another requirement is that a substantive power line <u>must</u> be close enough to afford to connect a potential wind farm to the grid. So the net result is that wind turbines (and solar farms in the case of no close grid or little sunshine) just will not work everywhere.

Further, wind turbines have a short life span compared to hydropower installations and that adds to the cost of power generation with them. We do not know what the lifespan of solar farm components are yet but due to the materials used to construct the generating panels, it certainly could not rival the lifespans of dams which are measured in centuries.

There is an argument that our region does not need more power or even as much generation capacity as it presently has. The YCFB strongly disagrees with that assertion. It is obvious that there will be continued long term economic growth in Washington and neighboring States which will demand more electricity. The recent leveling off in electrical demand has been created largely through conservation but one can only conserve to a point. Soon our regional load will increase due to economic growth however, the current total generating capability of wind and solar is far from substantial enough to satisfy our present needs. If Dams are allowed to be breached, emergency petroleum, natural gas or coal based power would have to bridge the gap and that would substantially add to carbon emissions.

In the quest to reduce CO2 emissions, our electric demand will increase due to a requirement to move towards mobile electric transportation. While autos have led the way, both heavy and light rail transportation and city buses have a history of utilizing electricity and there are companies testing the feasibility of producing large and small electric freight and utility trucks. The move to electrify personal and freight transportation will certainly produce an increased load on power generation and ignoring the impact is foolish and dangerous.

Another reason the YCFB believes our LSRD must be retained is because they are fitted with locks. This allows millions of bushels and tons of agricultural commodities and other freight to be transported by barge rather than truck or rail. Simply put, barging saves money and reduces carbon emissions. A single barge replaces many rail cars and countless trucks on our roads and rail lines in a more fuel and labor efficient manner, thus subjecting our roads and rail lines to much less wear and tear. Most important, fewer trains and trucks on our roads directly enhance public safety.

<u>After all, when was the last time that a car collided with a barge?</u>

The dams of the Columbia and Snake Rivers also provide life and property saving flood mitigation. The floods of 1861 and 1894 occurred prior to the construction of any dams on the Columbia River and claimed many lives in 1861. The latter (1894) affected Portland Oregon and caused great damage. The water level reached 33.5 feet higher than low flow (a record) and many buildings had their ground floors entirely submerged across a 250 square block area. It was referred to as the "dirty flood" because raw sewage was routinely dumped into the river in that time and great numbers of flood killed livestock and then dead fish, further compounding the specter of serious water borne disease.

The Van Port flood in 1948 also caused great loss and killed at least 15 people (but estimates ran as high as 50 lost). Only two major dams had been built by the time of the 1948 flood. Another serious flood also occurred in 1996 but the most unpredictable damages and danger to public safety was caused by flooding from the Willamette River. The Portland area has been fitted with other property and life-saving structures (levies etc.) in the intervening years but the role that the major dams on the Columbia River System serve in saving lives and property cannot be minimized.

It should be noted that when the Columbia floods in the Portland area, those events are not historically short lived but have last from several days into weeks.

<u>The gain to migratory fish due to breaching is much less certain.</u> There is a serious issue about what the effect of sudden, large releases of silt and mud built up behind the dams will have upon the river below each dam breached. Any purported gains could take years if not decades to come to fruition and instead breaching may well set back salmon and other migratory fish in the meantime.

Furthermore, the debate about dam breaching has been occurring for many years. During that time there has been much improvement with regard to the technology to mitigate the fish issues around dams. Study of the other elements of the migratory fish environment has also been advancing. It is finally being recognized that issues such as predation and over fishing (both domestically and internationally) are very important factors. The YCFB believes that addressing those two issues would far outweigh losses due to dam passage.

Another issue that has surfaced recently is that of a declining population of the Southern Resident Orcas. Advocates for breaching the LRSD blame a reduced salmon population due to losses because of them. The facts and history are illustrative because the Orca population is the same as it was before large scale fish hatchery operations began. The Orca count was about 66 individuals in the area of concern. Millions of salmon were reared and released from hatcheries for many years and the Orca's numbers increased to over 100. The hatcheries were closed or scaled back considerably and the Orcas now number ……….. 78.

The YCFB believes that the Orca's rise in numbers and then their subsequent decline is significantly correlated to the rise and fall of artificial releases of hatchery reared fish. As the releases of hatchery salmon have declined, the Orcas finding fewer reared fish had to turn to the wild salmon which then also

declined because of the added pressure from the Orcas. If we need more Orcas, then it is obvious that we need to resume rearing and releasing more hatchery fish to feed them.

Though there is disagreement within the environmental community about the genetic quality of hatchery fish, the YCFB believes that they are genetically one in the same as wild salmon, the difference being how they are reared. One study, from the Hood River, claims that first cross fish from eggs and sperm from wild salmon are only 87% as genetically fit as the wild parents. No one else has such a finding. YCFB agrees with the principle Native Nations on this issue. They are big proponents of hatchery fish, and they operate a number of rearing operations in the region and are also at the forefront on research on how to better breed and rear them with great success.

Understanding where the Southern Resident Orcas reside is also important since they range within the Puget Sound and the Salish Sea for more than half of the year. The EPA has been closely monitoring pollution levels in the Sound and adjoining Salish Sea for decades and they have been finding alarming levels of PCB's and PBDE's in the marine life there.

The primary animals the agency is monitoring are the Pacific Herring and the Harbor Seal. Less often, the agency has retrieved samples from Orcas and one individual, a "transient" (mammal eating) Orca was found to have alarmingly high levels of these harmful pollutants. The resident (Salmon eating) Orcas tested are also showing heightened levels of a number of pollutants including PCB's and PBDE's. Shockingly, scientists in Canada are finding high estrogen levels in male salmon to an extent where some are producing eggs and female proteins. The estrogen is being dumped by humans into waste treatment systems. Scientists are finding similar trends in the Puget Sound. Cocaine is also among the numerous chemicals detected in salmon.

The EPA banned PCB's in the 1980's and PBDE's by 2003. Continued monitoring has shown that PCB levels are declining and PBDE concentrations are leveling off. Unfortunately these pollutants are very persistent in the environment and have been shown to bio-accumulate with marine animals higher in the food chain such as with Orcas. It is to be noted that PCB's and PBDE's have been implicated with interfering with many critical life functions in animals. We also find it interesting that the highest levels of these onerous pollutants with in the Sound, on an order of magnitude (a few hundred units vs. nearly 4000) has been found *right in the vicinity of Olympia*. The YCFB believes that transposing a

Puget Sound pollution issue into an advocacy to breach the Lower Snake River Dams <u>is scapegoating, at best</u>.

Though a great amount of effort has been directed to fish passage around the Columbia River dams, the YCFB finds it very odd that relatively little has been accomplished with respect to passage around the many blockages of tributaries that empty into the Puget Sound. This is peculiar since this is the home space for the Orcas and if salmon, the prime food source for the resident Orcas, are not allowed to spawn in those tributaries, we ask the question: Is it any surprise that they (Orcas) are hungry?

Further, Orcas while in the Sound are also threatened by humans conducting water travel by a multitude of surface and sub-surface ships and craft. These activities include commercial shipping, recreation and military. A point of fact is that even the commercial tour boats used to view the Orcas have been implicated in injuring them. The Orcas are said to be injured not only by the hull of the ships/boats but also by propeller strikes.

A related controversy exists over the use of sonar by ships and other water craft. Orcas hunt, navigate and communicate with their own sonar and it is claimed that all these sonars working in a relatively confined space such as the Puget Sound is detrimental to the Orcas. One can count on Orca tour boats using a form of sonar when even the most basic outfitted fisherman in the Puget Sound is using the technology (fish finders). The sonar caused confusion could even add to the Orca/boat collisions.

During the winter and spring, the South Resident Orcas range from Monterey Bay on the south to coastal South East Alaska on the north. NOAA has done some remarkable research utilizing satellite tracker tags on salmon and made several important discoveries.

Interestingly, Columbia and Snake River salmon as a group do not all range in the same area when out in the ocean. They have found that salmon from the upper reaches of the Columbia River and the Snake River travel farther out into the Pacific Ocean before they begin traveling along the coast. <u>This is incredibly significant because Orcas range more closely to the shore.</u>

Salmon from the lower Columbia tributaries such as those originating from rivers such as the Cowlitz and Deschutes among others travel closer to the shore precisely where the Orcas are during the winter and spring. The Snake River Salmon are farther from land than the Orcas looking for salmon. Breaching the LSRD expecting to get more salmon from the Snake River to feed the Orcas is foolish when in fact the Orcas rely upon salmon that arise from the lower tributaries of the Columbia and not those from the upper Columbia and Snake Rivers.

All of the Columbia and Snake River Salmon have relatively high return rates thanks to tremendous efforts and expense to improve habitat and passage in the entire basin. It is interesting that while these salmon have been increasingly successful it is found that runs in areas where NO dams exist are way down even in British Columbia and Alaska. Scientists studying this phenomenon are puzzled as to the reason but again there has been a great amount of land mark research and the likely problem stems from conditions in the Ocean. Predators are a suspected factor in reducing salmon populations.

<u>One researcher recently commented that they are having a difficult time finding other factors that could be impacting the salmon because his satellite tagged fish are getting eaten so quickly.</u>

The North Resident Orcas have been growing in numbers (about 200) to the extent that they are flourishing. One theory is that the South Resident Orcas are being out "performed" by their "neighbors" (the North Resident). Orcas are known to favor salmon greater than 25 inches long. The research points to a possible answer in that the increasing numbers of North Resident Orcas are harvesting the bigger fish before they can leave the Alaskan waters and travel south back to Washington State tributaries and thus denying the South Resident Orcas a chance to feed on them.

The status of the South Resident Orcas and what needs to be accomplished to support a desired population of them is a complicated matter, the four Lower Snake River Dams are the least of their problems and focusing on the false hope that breaching affords will only allow their population to further decline since the real problems are being ignored.

Our hydroelectric dams generate reliable power economically and provide water for irrigation as well as serving in flood mitigation. Further, our dams form an important transportation system along with great recreational opportunities. Trading this "sure bet" system that is the envy of the world for two less reliable generating systems that have serious short comings is nonsensical. The supposed environmental gains related to breaching are dubious. The argument that dam breaching would save the Southern Resident Orcas is fallacious when the facts speak otherwise. New technology is already boosting fish survival around the dams with the promise of more innovations in the future without breaching.

Mark Herke

President, Yakima County Farm Bureau

From: (b) (6) [redacted]
To: ColumbiaRiverTMDL
Subject: Make changes to save salmon and orcas
Date: Friday, August 21, 2020 2:48:25 AM

<u>EPA received 1014 copies of this comment</u>

EPA Columbia and Lower Snake Rivers,

I am writing to ask for your leadership to reduce water temperatures in the Snake and Columbia River to protect and restore endangered salmon, the Southern Resident orcas, and the communities who depend on them.

Specifically, I request the you consider the following points:

The Lower Snake and Columbia rivers are too hot for endangered salmon and steelhead. The Total Maximum Daily Load (TMDL) study recently released by EPA clearly shows that the dams are the main cause of increased water temperatures.

Large, shallow reservoirs created by the dams, coupled with intensifying climate change—threatens the Columbia and Snake rivers' already imperiled salmon and steelhead.

The science is clear—restoring the Lower Snake River is our very best opportunity to restore imperiled salmon and orca populations. I urge you to work with the people and policymakers in the Northwest to develop a comprehensive package of measures that restores the Lower Snake River and its salmon, helps feed starving Southern Resident orca, and invests in clean energy that protects the health of our communities and our river.

Northwest people and leaders must work together to craft a bold and effective plan that achieves these goals as quickly as possible. Without effective leadership, we risk losing these iconic species and the special benefits they bring to our region.

Thank you again for your careful consideration of this request.

(b) (6) [redacted]

ColumbiaRiverTMDL

From: (b) (6)
Sent: Friday, July 24, 2020 12:07 PM
To: ColumbiaRiverTMDL
Subject: [WARNING: DMARC validation failed] I demand action on the dam hot water

EPA received 708 copies of this comment letter

Dear US EPA,

I am writing to ask for your leadership to reduce water temperatures in the Snake and Columbia River to protect and restore endangered salmon, the Southern Resident orcas, and the communities who depend on them.

Specifically, I request that you consider the following points:

-The Lower Snake and Columbia rivers are too hot for endangered salmon and steelhead. The Total Maximum Daily Load (TMDL) study recently released by EPA clearly shows that the dams are the main cause of increased water temperatures.

-Large, shallow reservoirs created by the dams—coupled with intensifying climate change—threaten the Columbia and Snake rivers' already-imperiled salmon and steelhead.

-The science is clear—restoring the Lower Snake River is our very best opportunity to restore imperiled salmon and orca populations.

-I urge you to work with the people and policymakers in the Northwest to develop a comprehensive package of measures that restores the Lower Snake River and its salmon, helps feed starving Southern Resident orca, and invests in clean energy that protects the health of our communities and our river.

-Northwest people and leaders must work together to craft a bold and effective plan that achieves these goals as quickly as possible. Without effective leadership, we risk losing these iconic species and the special benefits they bring to our region. Thank you again for your careful consideration of this request.

Sincerely,
(b) (6)

ColumbiaRiverTMDL

From: (b) (6) (b) (6)
Sent: Tuesday, August 11, 2020 10:40 AM
To: ColumbiaRiverTMDL
Subject: Total Maximum Daily Load for Temperatures in the Columbia and Snake Rivers.

EPA received 166 copies of this comment letter

Chris Hladick,
Regional Administrator
US Environmental Protection Agency,
Region 10 Park Place Building
1200 6th Ave.
Seattle, WA. 98101

Re: Total Maximum Daily Load for Temperatures in the Columbia and Snake Rivers.

11 August 2020

Dear Chris Hladick,

My name is (b) (6) . Thank you for this opportunity to share my deep concern for the Southern Resident Orcas and the wild chinook salmon they depend upon. As I'm sure you know, there are only 72 Southern Resident Orcas left in existence due to human interference with their primary food supply, wild chinook salmon, in the Columbia River Basin and the Salish Sea.

There are two species of orcas living in the Salish Sea and the Southern Resident Orcas cousins, the Bigg's orcas, are thriving in the same loud, polluted waters. The crystal clear difference is prey availability. The Southern Resident Orcas (salmon eaters) are starving, while the Bigg's orcas (mammal eaters) are thriving due to an abundance of their food. In just the last few years, Bigg's orcas have produced more successful births than the entire population of the Southern Resident Orcas.

We appreciate your thorough TMDL Report—we have read, studied and poured over it. As evidenced throughout this report ,and by several studies—including Governor Jay Insee's endangered Southern Resident Orca Task Force—the only real solution that will protect salmon and the Southern Residents from extinction is through the bold action of breaching the four federal lower Snake River dams. With a free flowing river the harmful warm waters will cool to temperatures salmon can survive; salmon will return in abundance (approximately two million smolts annually); and adult salmon will have more success spawning without the barriers of the dams impeding their migration. As well, the Southern Resident Orcas will be given a chance to survive in this grim race against extinction.

With the buoyant announcement of three pregnancies for the Southern Resident population in July (evidenced through photogrammetry), it is more critical than ever to move forward to protect this beloved endangered population of orcas.

The EPA literally stands for the Environmental Protection Agency—protection against harm and especially the calamity of extinction. I deeply disapprove of this apathetic suggestion that "a river's uses are no longer expressly for salmon" as a reasonable solution to lower the bar in environmental standards because the standards are too difficult to meet. This is utterly unacceptable to me. It is an absolute disgrace for an organization that holds the great responsibility of working under the name Environmental Protection Agency to stoop to indifference about two extinctions and the collapse of an ecosystem when we need you to rise up and protect.

Strong, bold, fair leadership is critical right now. It is past time to begin breaching these environmentally and economically disastrous dams. I implore you to stand proud behind your honorable name and do the difficult thing that is necessary. Please be the leader we need and breach the lower four Snake River dams in 2020. There are ways to alleviate the hardships on certain stakeholders from breaching the dams. There is no way back from extinction. With this bold action you protect two species from extinction.

Sincerely,

(b) (6)

ColumbiaRiverTMDL

From:	(b) (6)
Sent:	Monday, July 20, 2020 5:04 PM
To:	ColumbiaRiverTMDL
Subject:	Re: Long-term solution for Columbia & Snake river temperature

EPA received 6 copies of this comment letter

Dear Mary Lou Soscia, Laurie Mann and all other EPA TMDL readers,

Thank you for being a part of this urgent TMDL for temperature process. As a long-time resident of the Pacific Northwest, I'm loosely aware of the complex economic and ecological considerations for the Lower Snake and Columbia Rivers. I know how this loss of a keystone species affects ecological health across the Pacific Northwest and especially impacts indigenous communities relying on the salmon for sustenance, a birthright they've known for millennia.

I'm writing in support of a robust, multi-faceted, long-term plan to maintain lower average temperatures in the system. I want to see a plan that the public can give input on, a plan that includes:

- investment in and collaboration with state Fish & Wildlife agencies, non-profit restoration agencies and Federal agencies to restore shaded riparian areas in major tributaries, which are a point cooling source for the system;
- proactive collaboration with Idaho regulators and policymakers to implement at TMDL for the Idahoan section of the Lower Snake River;
- implementation of additional TMDLs for all 12 Cold Water Refuge (CWR) tributaries which EPA identified as significantly able to provide cooling point sources. This will ensure the long-term viability of these CWRs to ameliorate nonpoint heat sources;
- publicly-available research and modeling of the efficacy of dam-breaching scenarios to reduce nonpoint heat sources, with special attention given to those lowest megawatt capacity dams, like the 4 Lower Snake dams and the Wells and McNary dams;
- a proactive stance, including a public statement, from the EPA, that dam-breaching is an effective means of resolving this TMDL for temperature pollution.

Thanks for your consideration,

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Friday, August 7, 2020 9:33 AM
To: ColumbiaRiverTMDL
Subject: Columbia, Snake, and the SRKW

Hello,

This morning I was deeply saddened from learning the EPA’s decision to do nothing in Washington and Oregon. To do nothing for our salmon, to do nothing for our rivers, and to do nothing for our killer whales.

You have a responsibility to fight for those without a voice, and to preserve our ecosystems. The Snake and Columbia rivers have long held idle, consuming salmon across their migration to the ocean. This cannot happen.

It’s time for you to act. It’s time for you to stand up and do something productive. This is our environment, we only have one shot to protect it. So protect it, and do something.

Dearly,

A concerned citizen

ColumbiaRiverTMDL

From: (b) (6)
Sent: Thursday, August 13, 2020 6:53 AM
To: ColumbiaRiverTMDL
Subject: River water temperatures

The water temperatures in the Snake and the Columbia Rivers must not be allowed to rise and damage Salmon Migrations. Hot water kills fish. Your job in the EPA is to protect the environment and the animals. Please restore native Salmon populations. Regulate the dams so that they release cold water. Thanks, (b) (6)

"Keep on Running"

ColumbiaRiverTMDL

From: (b) (6) (b) (6)
Sent: Monday, August 10, 2020 5:30 PM
To: ColumbiaRiverTMDL
Attachments: c9d654_be020047eeb3437dbe757f89b0a1e2a6.pdf

Chris Hladick,
Regional Administrator
US Environmental Protection Agency, Region 10 Park Place Building
1200 6th Ave.
Seattle, WA. 98101

Re: Total Maximum Daily Load for Temperatures in the Columbia and Snake Rivers.

Dear Chris Hladick,

My name is (b) (6) . Thank you for the opportunity to share my deep concern for the southern resident orcas and the wild Chinook salmon they depend upon.

As I'm sure you are aware, there are only 72 southern resident orcas in existence due to human interference with their primary food supply, wild Chinook salmon, in the Columbia River Basin and the Salish Sea.

There are two species of orcas living in the Salish Sea and the southern resident orcas cousins, the Bigg's orcas, are thriving in the same loud, polluted waters. The crystal clear difference is prey availability. The southern resident orcas (salmon eaters) are starving while the Bigg's orcas (mammal eaters) are thriving due to an abundance of food. In just the last few years, Bigg's orcas have produced more successful births than the entire population of the Southern Resident Orcas.

We appreciate your thorough TMDL report for us to pore over, read and study. As evidenced throughout this report and by several studies including Governor Jay Insee's endangered southern resident orca task force, the only real solution that will protect salmon and the southern resident orcas from extinction is through the bold action of breaching the four federal lower snake river dams. With a free flowing river the harmful warm waters will cool to temperatures salmon can survive, salmon will return in abundance (approximately two million smolts annually) and adult salmon will have more success spawning without the barriers of the dams impeding their migration. Lastly, the Southern Resident Orcas will be given a chance to survive in this grim race against extinction.
With the buoyant announcement of three pregnancies for the southern resident orca population in July, evidenced through photogrammetry, it is more critical than ever to move forward to protect this beloved endangered population of orcas.

The EPA literally stands for the Environmental Protection Agency. Protection against harm and especially the calamity of extinction. I deeply disapprove of this apathetic suggestion that "a river's uses are no longer expressly for salmon" as a reasonable solution to lower the bar in environmental standards because the standards are too difficult to meet.

This is unacceptable to me. It is an absolute disgrace for an organization that holds the great responsibility of working under the name Environmental Protection Agency to stoop to indifference about two extinctions and the collapse of an ecosystem when we need you to rise up and protect.

Strong, bold, fair leadership is critical right now. It is past time to begin breaching these environmentally and economically disastrous dams.

I implore you to stand proud behind your honorable name and do the difficult thing that is necessary: Be the leader we need and Breach the Lower Four Snake River Dams in 2020. This bold action will make you responsible for protecting two species from extinction.

Sincerely,

(b) (6)

ColumbiaRiverTMDL

From: (b) (6) (b) (6)
Sent: Monday, August 10, 2020 4:38 PM
To: ColumbiaRiverTMDL
Subject: Total Maximum Daily Load for Temperatures in the Columbia and Snake Rivers.

Dear Chris.

My name is (b) (6), I am writing to petition for the safety of the Southern Resident orcas of which there are only 72 left.

I'll try to keep this brief...my purpose of writing is to add my voice to the petition to breach the Lower Four Snake River Dams. The expectation of this breach is to lower the water temperature and keep it at a level to sustain the wild Chinook salmon, which in turn supports our Southern Resident Orca populations.

These orcas are in very real need of our support right now. They are under pressure from low birth rate, poor food supply and the current threat of US Navy sonar testing in the area.

This email is to implore your intervention in the food supply of wild chinnok salmon by breaching the above noted damns.

I live and work in Vancouver and I've had the privilege to witness these amazing animals in the wild. There are two species of orcas living in the Salish Sea. Our own southern resident and the Bigg's orcas. The Biggs are a perfect control group the demonstrate despite the pollution and noise they are thriving due to an abundant food supply.

This has supported multiple live births and has grown their numbers of the years whilst our S.R are quite literally starving to death.

The southern Resident are in grave danger due to their limited numbers. They are also under threat from US Navy activity in the area. The eco system depends on these amazing animals thriving. Local tourism from whale watching is a mainstay of Vancouver summer.

The rationale that the river is no longer solely used for salmon is not a strong enough argument to lowered the environmental standards. Merely expanded upon the original use does not negate the importance of salmon, their use of the river and their spot in food chain. Standards being to difficult to meet is an opportunity to do better, to be better. It is not acceptable to lower standards because well funded organisation do not want to put in the required investment and effort to meet the standards.

I cannot express myself strongly enough. Please, look beyond the immediate needs of commerce and look ahead to a world we will be to old to see but that future generations can enjoy as we have done now.

Sincerely,
(b) (6)

ColumbiaRiverTMDL

From: (b) (6) (b) (6)
Sent: Monday, August 10, 2020 11:11 AM
To: ColumbiaRiverTMDL
Subject: CRITICAL

Chris Hladick
Regional Administrator US Environmental Protection Agency
Region 10 Park Place Building 1200 6th Ave.
Seattle, WA. 98101

Re: Total Maximum Daily Load for Temperatures in the Columbia and Snake Rivers.

Dear Chris Hladick,

My name is (b) (6). I appreciate the opportunity to share my thoughts and legitimate concerns for the Southern Resident Orcas and the wild chinook salmon that are critical to their survival.

As I'm sure you are aware, there are only 72 southern resident orcas in existence due to human interference with their primary food supply, wild chinook salmon, in the Columbia River Basin and the Salish Sea. There are two species of orcas living in the Salish Sea and the southern resident orcas cousins, the Bigg's orcas, are thriving in the same loud, polluted waters. The crystal clear difference is prey availability. The southern resident orcas (salmon eaters) are starving while the Bigg's orcas (mammal eaters) are thriving due to an abundance of food. In just the last few years, Bigg's orcas have produced more successful births than the entire population of the Southern Resident Orcas.

We appreciate your thorough TMDL report for us to read and study. As evidenced throughout this report and by several studies including Governor Jay Insee's endangered southern resident orca task force, the only real solution that will protect salmon and the southern resident orcas from extinction is through the bold action of breaching the four federal lower snake river dams. With a free flowing river the harmful warm waters will cool to temperatures salmon can survive, salmon will return in abundance (approximately two million smolts annually) and adult salmon will have more success spawning without the barriers of the dams impeding their migration. Lastly, the Southern Resident Orcas will be given a chance to survive in this **grim race against extinction**.

With the announcement of three pregnancies for the southern resident orca population in July, evidenced through photogrammetry, it is more critical than ever to move forward to protect this beloved endangered population of orcas. As the **Environmental Protection Agency,** it is your **DUTY AND OBLIGATION** to protect species against harm and especially the calamity of extinction. I deeply disapprove of this apathetic suggestion that "a river's uses are no longer expressly for salmon" as a reasonable solution to lower the bar in environmental standards because the standards are too difficult to meet. Then what are the river's uses expressly for? Human greed and apathy? This is unacceptable to me. It is an absolute disgrace for an organization that holds the great responsibility of working under the name Environmental Protection Agency to stoop to indifference about two extinctions and the collapse of an ecosystem when we need you to rise up and protect.

Strong, bold, fair leadership is critical right now. It is past time to begin breaching these environmentally and economically disastrous dams. I implore you to stand proud behind your honorable name and do the difficult thing that is necessary: Be the leader we need and Breach the Lower Four Snake River Dams in 2020. This bold action will make you responsible for protecting two species from extinction.

Sincerely,
(b) (6)

ColumbiaRiverTMDL

From: (b) (6) (b) (6)
Sent: Saturday, August 8, 2020 12:15 AM
To: ColumbiaRiverTMDL
Subject: Public Comment

Breach the lower four Snake River dams in order to keep the water cool enough for salmon to survive. This is of utmost importance.

ColumbiaRiverTMDL

From: (b) (6) (b) (6)
Sent: Friday, August 7, 2020 10:33 PM
To: ColumbiaRiverTMDL
Subject: Take the Snake River and Columbia River Dams down

Thanks
(b) (6)
(b) (6)

Peace to All Beings

ColumbiaRiverTMDL

From: (b) (6) (b) (6)
Sent: Friday, August 7, 2020 8:25 PM
To: ColumbiaRiverTMDL
Subject: Snake River Dams

The snake river and surrounding rivers that hold the life of what little salmon are left NEED to be protected. Changing the regulations would successfully end the life cycles of salmon and all animals that depend on them. Those rivers are expressly for salmon no matter what the rules are. Salmon don’t know them, and will continue to need these waters. This is unacceptable. Please save our salmon.

(b) (6)
(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Friday, August 7, 2020 11:43 AM
To: ColumbiaRiverTMDL

Dear Chris Hladick and the Environmental Protection Agency,
I implore you to not allow the lowering of environmental standards for the Columbia and Snake rivers. If allowed, the Southern Resident Orcas, of which there are only 72, will surely become extinct and the entire ecosystem would collapse.
The way to most effectively keep the river abundant, cold and free flowing is to breach the four snake river dams, which will in turn save a lot of money, and it is called for by Governor Inslee's endangered Southern Resident Orca task force.
It would be an absolute failure to allow two species to go extinct by lowering environmental protections standards of the rivers.
With three pregnancies for Southern Resident Orcas, there is hope. Please do not let them go extinct.
Thank you.
Sincerely,
(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Friday, August 7, 2020 11:43 AM
To: ColumbiaRiverTMDL
Subject: Columbia and Snake River Max Temperatures

Dear Chris Hladick and the Environmental Protection Agency,
I implore you to not allow the lowering of environmental standards for the Columbia and Snake rivers. If allowed, the Southern Resident Orcas, of which there are only 72, will surely become extinct and the entire ecosystem would collapse.
The way to most effectively keep the river abundant, cold and free flowing is to breach the four snake river dams, which will in turn save a lot of money, and it is called for by Governor Inslee's endangered Southern Resident Orca task force.
It would be an absolute failure to allow two species to go extinct by lowering environmental protections standards of the rivers.
With three pregnancies for Southern Resident Orcas, there is hope. Please do not let them go extinct.
Thank you.
Sincerely,
(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Friday, August 7, 2020 11:41 AM
To: ColumbiaRiverTMDL
Subject: Columbia and Snake River Temperatures

Dear Chris Hladick and the Environmental Protection Agency,
I implore you to not allow the lowering of environmental standards for the Columbia and Snake rivers. If allowed, the Southern Resident Orcas, of which there are only 72, will surely become extinct and the entire ecosystem would collapse.
The way to most effectively keep the river abundant, cold and free flowing is to breach the four snake river dams, which will in turn save a lot of money, and it is called for by Governor Inslee's endangered Southern Resident Orca task force.
It would be an absolute failure to allow two species to go extinct by lowering environmental protections standards of the rivers.
With three pregnancies for Southern Resident Orcas, there is hope. Please do not let them go extinct.
Thank you.
Sincerely,
(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Friday, August 7, 2020 9:49 AM
To: ColumbiaRiverTMDL
Subject: Protect Our River!

Please protect our rivers and ALL associated ecosystems! A river that is too warm for salmon is unacceptable as it distorts the critical ocean food chain and destroys life in the sea and beyond. Please don’t give up on life as we know it!

Sent from my iPhone

ColumbiaRiverTMDL

From: (b) (6)
Sent: Wednesday, July 22, 2020 6:55 PM
To: ColumbiaRiverTMDL
Subject: TMDL for Temperature in the Columbia and Lower Snake Rivers

Chris Hladick, Regional Administrator
U.S. Environmental Protection Agency, Region 10
Park Place Building
1200 6th Avenue
Seattle, WA 98101

Dear Regional Administrator Hladick,

Thank you for the opportunity to offer comments on the Total Maximum Daily Load for temperature control in the Columbia and Lower Snake Rivers.
I strongly support URGENT action to recover the salmonid species, which along with the Southern Resident Orca, are also endangered and/or threatened. Bold actions are clearly needed here; the continued spill over the dams to cool the waters, extensive planting of trees near tributaries which will also aid in cooling the waters, and most importantly, removing the lower four snake river dams as the best means for recovering the Southern Resident Killer Whales and the salmon species of the Columbia and Snake Rivers. We do not have the luxury of time, and the fragile ecosystem of the Pacific Northwest especially does not. We can no longer continue to be paralysed by studies, caucuses, nor debates. The science is clear, the experts have spoken.
As a member of the public and someone who hopes that the Southern Residents, the icons of the Northwest, remain alive for my children and their children to enjoy as I have, I respectfully ask that you listen to the science, and to the public. They are speaking clearly. The orcas need salmon to survive, as does the entire ecosystem.

Thank you for your consideration,
Sincerely,
(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Wednesday, July 22, 2020 6:26 PM
To: ColumbiaRiverTMDL
Subject: Public Comment - TMDL

Hello, I strongly support urgent action to recover the salmonid species which are also endangered and threatened, bold actions needed are; the continued spill over the dams to cool the waters, extensive planting of trees near the tributaries to also aid in cooling waters, and most importantly, removing the Lower Snake River Dams as the best means for recovering the Southern Resident Orca Whales and the Salmon species of the Columbia and Snake Rivers. We do not have the luxury of time, nor do we need more studies and debates, the science is clear

Thank you

(b) (6)

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Tuesday, July 21, 2020 2:43 PM
To: ColumbiaRiverTMDL
Subject: Columbia River TMDL

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION 10

1200 Sixth Avenue, Suite 155 WATER DIVISION Seattle, WA 98101-3188

Total Maximum Daily Load (TMDL) for Temperature in the Columbia and Lower Snake Rivers

May 18, 2020 TMDL for Public Comment

In compliance with the provisions of the Clean Water Act, 33 U.S.C. 1251 et seq., as amended by the Water Quality Act of 1987, P.L. 1004, the Environmental Protection Agency is today establishing a TMDL to address temperature loading in the mainstems of the Columbia and lower Snake Rivers in Washington and Oregon. The Regional Administrator is concurrently seeking public comment on this TMDL. Consistent with EPA's regulations in 40C.F.R.130.7(d)(2), EPA will issue a public notice seeking comment on this TMDL established by EPA. EPA will begin a 60-day public process on May 21, 2020. Comments should be provided to ColumbiaRiverTMDL@epa.gov by 5:00 pm Pacific time on ~~July 21~~ August 20, 2020.

A TMDL is a calculation that identifies the amount of a pollutant (in this case, heat) that a river or other waterbody can receive and still meet specific standards developed by a state or tribe to protect water quality. If the waterbody does not meet these standards for certain pollutants, it is considered *impaired* for those pollutants and a TMDL must be developed. The EPA assists states, territories, and authorized tribes in submitting lists of impaired waters and developing TMDLs.

ColumbiaRiverTMDL@epa.gov

July 21, 2020

Dear EPA:

Thank you for the opportunity to submit comments on EPA's Columbia River TMDL. Thank you, too, for extending the deadline to August 20 and enabling more people to submit comments.

On March 30 the US Ninth Circuit Court of Appeals rejected EPA's request to reconsider the court's earlier ruling to create within 30 days a plan to limit water temperatures on the Columbia and Snake rivers. The court ruled that EPA must issue a plan to protect salmon and steelhead from dangerously warm river temperatures caused by dams and reservoirs.

In May Washington asserted its Clean Water Act right to regulate and require 8 federal dams on the Columbia/Snake rivers to meet state standards for water quality, including temperature pollution. Consequently, there are now both federal and state laws/regulations which require temperatures below 68°.

A May 26 *Seattle Times* article reported that EPA's analysis of heat pollution in the rivers found "the effects of the dams combined with the cumulative effects of climate change push temperatures in the Columbia and lower Snake rivers over the state maximum of 68 degrees for weeks on end." It goes on to say the John Day Dam has the biggest cumulative temperature impact, and temperatures exceeded the state standard on average in August 100% of the time at Ice Harbor Dam. "Using a mathematical model to assess the temperature impacts under varying conditions, the EPA estimated a free-flowing lower Snake River would be within state temperature limits, even in August." But "so much heat is baked into the river by climate change that on the lower Columbia, the temperature standard could not be met at three of the four dams in August even in an entirely free flowing river, the EPA found."

A May 26 article in Montana's *Missoula Current* says, "In a new report, the EPA outlined the legal rationale for lowering the bar on environmental standards when they are difficult to meet. Oregon and Washington state have designated salmon habitat as one of the official uses of the rivers, which means the states must take action to ensure they are safe for salmon spawning and migration. Under certain circumstances, states can decide that certain 'uses' of rivers, like designated salmon habitat, are not attainable. Such 'attainability analyses' are usually applied to situations like Superfund sites, where habitat has been so heavily polluted that the protected species that once lived there are no longer present. That's not the case in the Snake and Columbia rivers, where every year, an average of 2 million salmon return to the rivers and streams of their birth. 'It's absurd,' said Brett VandenHeuvel, executive director of Columbia Riverkeeper… 'They're suggesting that one option of addressing this conflict is to say we're not going to protect salmon from hot water and we're not going to consider salmon a use of the river.'"

The *Missoula Current* article says, "The report concluded the main culprits heating the rivers are the basin's 14 federal dams, and the shallow reservoirs that lay slack behind them, soaking up the sun's rays. And it found **river water heated by the dams to temperatures lethal to migrating salmon would not be sufficiently cooled by actions under consideration**."

I concur. **This TMDL** does not resolve the heat pollutant problem for migrating salmon and steelhead in the lower Snake and Columbia rivers. Accordingly, it **does not comply with what the Ninth Circuit Court of Appeals directed EPA to do – issue a plan to protect salmon and steelhead from dangerously warm river temperatures caused by dams and reservoirs. The TMDL should provide for the breaching or removal of these dams ASAP**.

Removal of the dams on the Elwha River in 2014 resolved the same problem there. And a front-page article in the July 20 *Seattle Times* talks about the removal last week of the dam on the Middle Fork of the Nooksack River in Whatcom County plus other dams in recent years. Four hydroelectric dams on the Klamath River in Oregon and California will be removed as soon as the regulatory steps are completed.

While it's not a heat pollutant issue, the US government guaranteed 1855 treaty rights to fish and hunt to the Nez Perce, Umatilla, Warm Springs, and Yakima Tribes. The Columbia and Snake River dams violate those treaty rights. To paraphrase President Ronald Reagan, tear down those dams.

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Tuesday, July 21, 2020 2:12 PM
To: ColumbiaRiverTMDL
Subject: EPA Temperature of Columbia River

To Whom It May Concern,

The NorWeST stream temperature data contains an egregious error that must be corrected before any analysis from that model takes place. I have made such a request to USDA previously but they have yet to make the necessary correction.

The NorWeST stream database contains temperature readings from the Lower Snake River. Those readings should be flagged as being within a reservoir, because they are in a reservoir. As it stands, those readings are modeled as being on a free flowing river, which it is not.

Please let me know when those necessary changes are made.

Best Regards,

(b) (6)

promoting an open and honest dialogue concerning the plight of Idaho's wild Salmon and Steelhead.

ColumbiaRiverTMDL

From: (b) (6)
Sent: Tuesday, July 21, 2020 1:32 PM
To: ColumbiaRiverTMDL
Subject: comments on TMDL for Temperature in the Columbia and Lower Snake Rivers

"It represents a step, decades in the making, that holds the dams accountable for exacerbating water temperatures and jeopardizing endangered salmon and steelhead runs." Therefore, BREACH THE 4LSR DAMS!!!! Solves the high water temperature problem immediately!

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Tuesday, July 21, 2020 12:40 PM
To: ColumbiaRiverTMDL
Cc: (b) (6)
Subject: Comments on TMDL

To whom it may concern,

My comments on the TMDL are:

1. TMDLs are designed to identify a path for attainment of water quality standards in an impaired waterbody. As such, I do not believe that the current TMDL meets that goal. Based on EPA's analyses, it does not appear that removal of dams will be sufficient to lower temperature. While this report provides recommendations for states to consider such as continued development, revision, and implementation of tributary TMDLs, funding mechanisms to address traditional nonpoint sources of heat; voluntary conservation programs; a collaborative monitoring and tracking program; and other activities designed to reduce water temperature, I do not think that this TMDL provides sufficient data to understand the likely impacts from these measures in part or combined or provides an understanding of what it will take to achieve success in protecting salmon and other fish from elevated water temperatures. More modeling should be included using combined measures. Within this modeling, it would be most useful to treat the Columbia River system as a whole, including consideration of the river portion in Canada – such considerations would also include reservoir management and perhaps floodplain development. It might also be helpful to incorporate findings from the finalized version of the *Columbia River Cold Water Refuges Plan* when that becomes available.
2. In addition, although dam removal will still result in elevated temperatures on some days, it is not clear whether this impairs fish survival in a significant way. Can fish withstand short intervals of elevated temperatures and at which developmental stages? This information would be helpful to include in this report.
3. Implementation of the TMDL depends on development of implementation plans by the states of Washington and Oregon, which may be poorly equipped to do so without additional financial and technical support. Is such funding to be made available? Can funding be built into the modernized Columbia River Treaty?

Thank you for the opportunity to provide comments. Will there by some formal response to comments and will you let me know that my comments were received?

Sincerely, (b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Tuesday, July 21, 2020 12:40 PM
To: ColumbiaRiverTMDL
Subject: [WARNING: DMARC validation failed] I demand action on the dam hot water

Dear US EPA,

I am writing to ask for your leadership to reduce water temperatures in the Snake and Columbia River to protect and restore endangered salmon, the Southern Resident orcas, and the communities who depend on them.

Specifically, I request that you consider the following points:

-The Lower Snake and Columbia rivers are too hot for endangered salmon and steelhead. The Total Maximum Daily Load (TMDL) study recently released by EPA clearly shows that the dams are the main cause of increased water temperatures.

-Large, shallow reservoirs created by the dams—coupled with intensifying climate change—threaten the Columbia and Snake rivers' already-imperiled salmon and steelhead.

-The science is clear—restoring the Lower Snake River is our very best opportunity to restore imperiled salmon and orca populations.

-I urge you to work with the people and policymakers in the Northwest to develop a comprehensive package of measures that restores the Lower Snake River and its salmon, helps feed starving Southern Resident orca, and invests in clean energy that protects the health of our communities and our river.

-Northwest people and leaders must work together to craft a bold and effective plan that achieves these goals as quickly as possible. Without effective leadership, we risk losing these iconic species and the special benefits they bring to our region. Thank you again for your careful consideration of this request.

Sincerely,
(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Tuesday, July 21, 2020 11:15 AM
To: ColumbiaRiverTMDL
Cc: senator_wyden@wyden.senate.gov
Subject: Discard the effort to change the designated use of the Columbia and Snake rivers

To: Daniel Opalski, Director

To suggest that maintaining healthy salmon habitat in the Columbia River is unattainable is absurd.

Oregon and Washington state have designated salmon habitat as one of the official uses of the Columbia and Snake rivers, which means the states must take action to ensure they are safe for salmon spawning and migration. Changing the designated use so that salmon survival is not a consideration means that not only will salmon populations decrease even more, but so will the Southern Resident orca population. I worked professionally in efforts to help the Southern Resident orcas and know how precarious their situation is. Moreover, losing salmon and orcas will severely negatively impact the human communities, and their local economies, that rely upon them.

Breaching the four Snake River dams to reduce the temperature of the Columbia River in order to help salmon is an obvious choice. A 2019 economic study by ECONorthwest found that the economic benefits of breaching the dams far outweighed those of keeping them operating.

As your agency writes: “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.” I strongly disagree and urge the EPA to discard this effort to lower the bar on environmental standards.

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Tuesday, July 21, 2020 10:38 AM
To: ColumbiaRiverTMDL
Subject: I demand action on the dam hot water

Dear US EPA,

I am writing to ask for your leadership to reduce water temperatures in the Snake and Columbia River to protect and restore endangered salmon, the Southern Resident orcas, and the communities who depend on them.

Specifically, I request that you consider the following points:

-The Lower Snake and Columbia rivers are too hot for endangered salmon and steelhead. The Total Maximum Daily Load (TMDL) study recently released by EPA clearly shows that the dams are the main cause of increased water temperatures.

-Large, shallow reservoirs created by the dams—coupled with intensifying climate change—threaten the Columbia and Snake rivers' already-imperiled salmon and steelhead.

-The science is clear—restoring the Lower Snake River is our very best opportunity to restore imperiled salmon and orca populations.

-I urge you to work with the people and policymakers in the Northwest to develop a comprehensive package of measures that restores the Lower Snake River and its salmon, helps feed starving Southern Resident orca, and invests in clean energy that protects the health of our communities and our river.

-Northwest people and leaders must work together to craft a bold and effective plan that achieves these goals as quickly as possible. Without effective leadership, we risk losing these iconic species and the special benefits they bring to our region. Thank you again for your careful consideration of this request.

I was involved professionally with efforts to help the Southern Resident orcas and understand how dire their situation is because of reduced salmon populations.

The dams must come out.

Sincerely,
(b) (6)
(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Tuesday, July 21, 2020 10:23 AM
To: ColumbiaRiverTMDL
Subject: Columbia River TMDL comment

To give up on salmon recovery and ecosystem restoration now when there are still viable options available to management is absolutely ridiculous.

ColumbiaRiverTMDL

From: (b) (6)
Sent: Tuesday, July 21, 2020 10:17 AM
To: ColumbiaRiverTMDL
Subject: I demand action on the dam hot water

Dear US EPA,

I am writing to ask for your leadership to reduce water temperatures in the Snake and Columbia River to protect and restore endangered salmon, the Southern Resident orcas, and the communities who depend on them.

Specifically, I request that you consider the following points:

-The Lower Snake and Columbia rivers are too hot for endangered salmon and steelhead. The Total Maximum Daily Load (TMDL) study recently released by EPA clearly shows that the dams are the main cause of increased water temperatures.

-Large, shallow reservoirs created by the dams—coupled with intensifying climate change—threaten the Columbia and Snake rivers' already-imperiled salmon and steelhead.

-The science is clear—restoring the Lower Snake River is our very best opportunity to restore imperiled salmon and orca populations.

-I urge you to work with the people and policymakers in the Northwest to develop a comprehensive package of measures that restores the Lower Snake River and its salmon, helps feed starving Southern Resident orca, and invests in clean energy that protects the health of our communities and our river.

-Northwest people and leaders must work together to craft a bold and effective plan that achieves these goals as quickly as possible. Without effective leadership, we risk losing these iconic species and the special benefits they bring to our region. Thank you again for your careful consideration of this request.

Sincerely,
(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Tuesday, July 21, 2020 9:55 AM
To: ColumbiaRiverTMDL
Subject: Our rivers must be safe for salmon!

Dear EPA,

We must maintain the requirement that our rivers be managed in such a way that they are livable habitats for salmon. The lives of our Southern Resident Killer Whales depend on it. It is unconscionable to give up our efforts to keep these habitats viable because it's cheaper and easier to let a critical species die.

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Tuesday, July 21, 2020 7:14 AM
To: ColumbiaRiverTMDL

Please consider the wildlife in your decision making. Please listen to your conscious. The Salmon and the Orca have no voice, but we citizens do and we speak for them in their name.

Sincerely,
(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Monday, July 20, 2020 8:31 PM
To: ColumbiaRiverTMDL
Subject: [SPAM-Sender] Lower Snake River

I live in Western Washington. I am 65 Yrs Young. I have a Bachelors Degree in Pre Vet Medicine. I urge you to manage the Snake River and Dam water flow to Prioritize Salmon and Habitat for Salmon. Salmon Play a significant Canary in the Coal Mine Scenario for our own Human Survival. Our Orca are Starving in Western Washington due to Pressure on Salmon. Please consider Breaching the Dams and manage in the mean time for Best Practices for Salmon Survival. Thank You (b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Monday, July 20, 2020 5:58 PM
To: ColumbiaRiverTMDL
Subject: EPA Report Columbia and Snake Rivers

The EPA report that proposes changing the designated use of the Columbia and Snake Rivers (and other rivers?) to not prioritize use for salmon (or other species) is not a good move! The rivers are for fish! Water quality and environmental standards should not be lowered. The problems of overheated reservoirs, species decline and extinction, and habitat damage should be fixed by any means possible, including removing dams. Stop prioritizing human consumption of our planet. There are sustainable alternatives.

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Monday, July 20, 2020 5:33 PM
To: ColumbiaRiverTMDL
Subject: Comment on TDML for the Columbia river

I am a citizen of Washington State. The proposal to remove "salmon propagation" from the formal use of the Columbia River is to devastate multiple species in the Pacific Northwest, starting with salmon. From there a wide variety of predators that include orca whales and various pinnipeds will find themselves without food.

Then the impact on humans would also be very significant. Access to healthy food and loss of recreational outlet as well as source of income. This is a bad plan. It is like saying cities are no longer for use by people.

Do not take the salmon use out of the Columbia River.

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Monday, July 20, 2020 5:24 PM
To: ColumbiaRiverTMDL
Subject: TMDL for Columbia and Snake Rivera

To whom it may concern,
Please do not lower the standards or raise the temperature limits. The Southern Resident Orcas are already close to extinction, this will put them over the edge. The fisheries that depend upon native salmon will suffer huge losses and will be unrecoverable. So many industries and habitats will be irreparably harmed at a time when so many are already struggling due to the pandemic.

Thank you,

(b) (6)
Resident of Washington State

ColumbiaRiverTMDL

From:	(b) (6)
Sent:	Monday, July 20, 2020 4:17 PM
To:	ColumbiaRiverTMDL
Subject:	Columbia River Snake River Dams

To Whom It May Concern: Im not resl good composing letters so I do apologize ahead of time. Im writing in regards to the 4 Snake River Dams that people have been so involved with learning more about their purpose and who all depends on them.

I understand that Bonneville is in major debt,after 2025?.. several thousands of customers will no longer be in conteact with this energy supplier and the dams themselves will be looking at an ungodly amount for repairs. In the meantime, the dams are costing an extreme amount of taxes to the pacific West Coast community. The research and reading material out there is undeniably understood that, economically, the dams have outlived their purpose. The really saddest part is, it seems our legislation is aware that the salmon that have always travelled,spawned and regenerated there, are greatly declining and its also starving the southern Resident Orcas. I would like to comment that people all over the nation, Argentina,Australia etc and all states are soo concerned and watch the progress, the orca family, when they come into Puget Sound and when they leave. We admire (b) (6) as well, as he knows the orca by each individual's markings. We cant help but love these orca tremendously. They continus to show us how emotionally bonded they are, how they have as much capacity to grieve like us. And very intelligent. When there are tens of thousands of people that understand the basics of the pros and cons of the snake river dams?, who benefits who dont, right from wrong. And that the orca, well the orca and salmon wouldnt be struggling if it wasnt for mankind?,, and truly this all reflects on our legislative and governmental leaders. Please breach the dams Sincerely (b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Monday, July 20, 2020 4:16 PM
To: ColumbiaRiverTMDL
Subject: TMDL for Temperature in the Columbia and Lower Snake Rivers - Public Comment

July 20, 2020

I strongly oppose re-designating the Columbia / Snake river systems as “not for fish.” The Salmon are a keystone species that feed our entire coastline. The impacts of letting these fish die out will have a cascading negative / dire impact on our environment and our economy. You have a choice to make this a huge failure with repercussions that will be felt far and wide at all levels of the food chain and economy; or a huge success if you choose to breach the 4 lower Snake River Dams and make other compensation for salmon runs on the Columbia. I hope you will choose the later and support a resilient viable food source.

Thank you,
(b) (6)

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Monday, July 20, 2020 3:36 PM
To: ColumbiaRiverTMDL
Subject: TMDL - and who wants Salmon anyway?

I'm confused - what is it about - "Oregon and Washington state have designated salmon habitat as one of the official uses of the rivers, which means the states must take action to ensure they are safe for salmon spawning and migration" that you don't understand?

Are you prepared (and happy) to be the group who brings EXTINCTION to the chinook, steelhead, and Endangered Southern Resident Killer Whales who all depend on the Columbia/Snake River System?? I see 'ignore warm water' …. This is Outrageous.

Congratulations.

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Saturday, July 18, 2020 4:00 PM
To: ColumbiaRiverTMDL
Subject: Concerns About Columbia & Snake River Temp

Dear Mary Lou Soscia, Laurie Mann and Anyone Else with Power,

A conscience friend just made me aware of the complex economic and ecological considerations for the Lower Snake and Columbia Rivers. I am one who is intensely concerned about ecological health and impact on indigenous communities.

I'm writing in support of a robust plan to maintain lower temperatures in the system. I am asking you to support a plan that the public can give input on and that includes:

- investment in and collaboration with state Fish & Wildlife agencies, non-profit restoration agencies and Federal agencies to restore shaded riparian areas in major tributaries, which are a point cooling source for the system;
- proactive collaboration with Idaho regulators and policymakers to implement at TMDL for the Idahoan section of the Lower Snake River;
- implementation of additional TMDLs for all 12 Cold Water Refuge (CWR) tributaries which EPA identified as significantly able to provide cooling point sources. This will ensure the long-term viability of these CWRs to ameliorate nonpoint heat sources;
- publicly-available research and modeling of the efficacy of dam-breaching scenarios to reduce nonpoint heat sources, with special attention given to those lowest megawatt capacity dams, like the 4 Lower Snake dams and the Wells and McNary dams;
- a proactive stance, including a public statement, from the EPA, that dam-breaching is an effective means of resolving this TMDL for temperature pollution.

Thanks for your consideration,

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Saturday, July 18, 2020 3:46 PM
To: ColumbiaRiverTMDL
Subject: Re: Columbia & Snake river temperature and long-term solutions

Dear Mary Lou Soscia, Laurie Mann and all other EPA TMDL readers,

Thank you for being a part of this urgent TMDL for temperature process. As a lifelong Oregonian and resident of the Pacific Northwest with family history going back three generations, I'm loosely aware of the complex economic and ecological considerations for the Lower Snake and Columbia Rivers. I know how this loss of a keystone species affects ecological health across the Pacific Northwest and especially impacts indigenous communities relying on the salmon for sustenance, a birthright they've known for millennia.

I'm writing in support of a robust, multi-faceted, long-term plan to maintain lower average temperatures in the system. I want to see a plan that the public can give input on, a plan that includes:

- investment in and collaboration with state Fish & Wildlife agencies, non-profit restoration agencies and Federal agencies to restore shaded riparian areas in major tributaries, which are a point cooling source for the system;
- proactive collaboration with Idaho regulators and policymakers to implement at TMDL for the Idahoan section of the Lower Snake River;
- implementation of additional TMDLs for all 12 Cold Water Refuge (CWR) tributaries which EPA identified as significantly able to provide cooling point sources. This will ensure the long-term viability of these CWRs to ameliorate nonpoint heat sources;
- publicly-available research and modeling of the efficacy of dam-breaching scenarios to reduce nonpoint heat sources, with special attention given to those lowest megawatt capacity dams, like the 4 Lower Snake dams and the Wells and McNary dams;
- a proactive stance, including a public statement, from the EPA, that dam-breaching is an effective means of resolving this TMDL for temperature pollution.

Thanks for your time and consideration,

(b) (6)

Bend, Oregon resident

Lake Oswego and Portland native

(b) (6)

Sent from my iPhone

ColumbiaRiverTMDL

From: (b) (6)
Sent: Thursday, July 16, 2020 6:57 PM
To: ColumbiaRiverTMDL
Subject: TMDL for Temperature in the Columbia and Lower Snake Rivers

I do not support the EPA option to resolve this conflict created by the inability to achieve applicable water quality criteria at all times and all places is to have the states make changes to their applicable designated uses. I do not support changing the designated “uses” of the Columbia and Snake rivers so they are no longer expressly for salmon.

In February 2020, the Army Corps of Engineers released its draft environmental impact statement outlining its plan to avoid causing the extinction of salmon by operating dams in the Columbia and Snake rivers. The sixth such document ordered by the court in a dispute filed in 2001, it found that breaching the four dams on the Lower Snake River would “provide the highest benefits” to endangered salmon.

The rate of return for young salmon and steelhead migrating out to sea from the Lower Snake River would improve by 170%. But the Army Corp of Engineers rejected that option, prioritizing the loss of electricity it would create.

Yet the 2019 economic study by ECONorthwest found that the economic benefits of breaching the dams far outweighed those of keeping them operating.

Washington State Governor Jay Inslee’s Southern Resident Orca Task Force also determined that the main problem facing the Species in the Spotlight endangered Southern Resident killer whales is lack of endangered Chinook salmon, which is 80% of their diet.

Over 138 species depend upon the Columbia and Snake river salmon. Not prioritizing, recovering, protecting this needed salmon habitat has far reaching ecosystem and economic impacts that cannot be mitigated, and contributes to salmon and Southern Resident killer whale extinction.

Sincerely,

(b) (6)

Marine Ecology Educator

ColumbiaRiverTMDL

From: (b) (6)
Sent: Friday, June 26, 2020 3:18 PM
To: ColumbiaRiverTMDL
Subject: Protecting our Columbia and Snake River Dam systems

It seems that there is a constant campaign to discredit the overwhelmingly positive aspects of our Pacific Northwest Dam systems. This time it is water temperatures.
In 2002, researchers compared pre-lower Snake River dam measurements of water temperatures from 1955-1958 to measurements taken after the dams were constructed.
They found NO evidence that river temperatures had increased as a result of the dams and instead remained unchanged or slightly lower, even though air temperatures had increased.
The research team identified air temperature and flow levels as the biggest influences on temperatures in the river.
The problem with taking an excessive and unrealistic regulatory approach is that it could add billions of dollars to the cost of operating the hydroelectric dam system without actually helping our salmon!
It is totally unfair to burden the Pacific Northwest communities with higher electric bills while farms, ranches and commercial businesses depend on our high quality, low cost power.
It seems as if the political powers that be are bent on making sure the dams are at fault for water temperatures! The weather is under God's control as are the temperatures of the rivers.
Our dams must remain in place.
Thank you for your attention to this matter.

(b) (6)

[redacted] Farmers

ColumbiaRiverTMDL

From: (b) (6)
Sent: Wednesday, June 24, 2020 11:09 AM
To: ColumbiaRiverTMDL
Subject: State Water Quality / Temperature Standards For Columbia River Dams

I have a lot of concerns regarding the state water quality standards for the Columbia River Dams.   EPA notes the significant challenge of meeting the new water quality standards in Washington and Oregon and has suggested that the states reconsider their respective standards.

Additionally, highly reputable studies have shown that dams help mitigate summer temperature extremes: a 2002 peer-reviewed study by Pacific Northwest National Laboratory showed that dams within the Columbia and Snake river basins moderate extreme water temperatures by shifting some of the summer heat into the fall and thereby flattening the temperature curve. The study refers to this phenomenon as a thermal inertia effect.

Again in 2002, researchers compared pre-lower Snake River dam measurements of water temperature from 1955-1958 to measurements taken after the dams were constructed. They found no evidence that river temperatures had increased as a result of the dams, and instead appeared to have remained unchanged or slightly lower, even though air temperatures had increased.

The team identified air temperature and flow levels as the biggest influences on temperatures in the river.

Please reconsider adding additional requirements that will raise the cost for electric customers as well as NOT helping salmon.

Thanks,

(b) (6)

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(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Tuesday, June 23, 2020 4:19 PM
To: ColumbiaRiverTMDL
Subject: Opposition to Columbia River TMDL

Dear Sir,
I believe that the data used to establish a regulatory approach, in the Columbia River TMDL, to the management of flow levels at Columbia and Snake River dams is not valid. The result is an unworkable, unrealistic system that would increase power costs to local communities and still not improve salmon numbers.

Sincerely (b) (6)
(b) (6)

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Sunday, June 21, 2020 8:57 PM
To: ColumbiaRiverTMDL
Subject: Leave the Dams Alone

It is well recognized that lower water temperatures at the end of summer is desirable for the salmon and other fish in the Columbia River, However it has not been shown conclusively that removing the dams will actually lower the temperature of the River. Any such action should not be taken until it can be proven that it will be successful. Fish kills from high temperatures occur in undamed rivers and studies have shown that the Dams actually reduce the temperature of the River.

This regulation should not be put in place at this time with the limited information that is available.
We need low cost power for the community to prosper.

(b) (6)
Sent from for Windows 10

ColumbiaRiverTMDL

From:	(b) (6)
Sent:	Wednesday, June 17, 2020 10:18 AM
To:	ColumbiaRiverTMDL
Subject:	Comments on Columbia River TMDL

Thank you for the opportunity to provide comments on the TMDL for Temperature in the Columbia and Lower Snake Rivers. My comments are noted by section in the TMDL and they are as follows.

Sec. 1 Introduction, 2nd paragraph, Page 1

U.S. EPA Region 10 is to be commended for developing the TMDL for Temperature in the Columbia and Lower Snake Rivers. It is the hope of this Idaho citizen that expected court decisions will uphold and implement the TMDL for these rivers especially in the Lower Snake River.

Sec. 1 Introduction, 2nd paragraph, Page 2

Please insert additional information to explain the regulatory status and ongoing temperature water quality activities pertaining to the upstream human activities in Idaho.

Sec. 1 Introduction, 2nd paragraph, Page 2

With one of the water quality goals to be achieved by the temperature TMDL that is to support fishable water quality in the Lower Snake River, EPA should request the Lower Snake River Dams to be operated and modified in such a way that will result in attainment of the TMDL for temperature in the Lower Snake River.

Sec. 2 Water Quality Standards, 1st paragraph, Page 6

Since water quality standards are based upon protection of the most sensitive aquatic life uses in the Columbia and lower Snake Rivers, these standards are to protect threatened summer and fall Chinook salmon and steelhead and endangered sockeye salmon. These salmonids spawn, rear and migrate in these rivers. Implementation of temperature TMDL will protect water quality for these threatened and endangered salmonids and potentially could assist in achieving recovery levels for these fish. This section should contain additional information that discusses water quality standards and protection and potential effect(s) on threatened and endangered salmonids.

Sec. 2.3 Standards for Upstream Waters, Page 10

Water temperature data for Anatone, WA on the Snake River from Table 3-2 appears to be warmer than the water quality standards for Idaho. What is the approach needed to address the excessive warm water temperature in the Snake River leaving Idaho? Please provide that information in this section.

Sec. 3.1 …Data and Water Quality Exceedances, Page 23

As stated on page 23, "Based on EPA's evaluation of available data from 2011-2016, temperature criterion exceedances at the Little Goose, Lower Monumental, and Ice Harbor Dams generally begin to occur in mid-July, ranging between 16-18 days, on average (Table 3-4). In August, water temperatures exceed the WQC for an average of 20 days below Little Goose Dam, 29 days below Lower Monumental Dam, and 31 days below Ice Harbor Dam (Table 3-5). In September, exceedances at Little Goose and Lower Monumental Dams drop

significantly, averaging 4 and 6 days, respectively. At Ice Harbor Dam, however, water temperatures exceed the criterion for an average of 14 days by an average magnitude of 0.8°C in September (Table 3-6)." Between mid-July and mid-September, the water temperature in the lower Snake River is above water quality standards during the summer migration of the threatened summer and fall chinook and steelhead and endangered sockeye salmonids. These temperature impairments need to be reduced for these fish.

Sec. 6.5.1 Dams, Tables 6-6 thru 6-8

The Snake River downriver analysis below the Clearwater Confluence demonstrates adverse temperature impairment for this river segment. This impairment needs to be corrected by modification of the river operation to achieve water quality standards such that the water quality conditions are protective of endangered and threatened salmonids migrating during July, August, and September. As a sensitivity analysis, EPA is requested to develop a case where water is not available from Dworshak Reservoir to cool water downstream of Clearwater Confluence. A second component of the sensitivity analysis would be to demonstrate how far downstream temperature water quality standards would be achieved if free flowing conditions were maintained without reservoirs behind the Snake River dams during July, August, and September. Modifications of the Snake River dams could be achieved by opening the locks and spillways during that time period.

The reach that contains the Snake River reservoirs has the largest temperature increase for the Columbia and Lower Snake Rivers. If the Snake River reservoirs temperature increases were eliminated or reduced, it is likely that the Columbia River downstream of Snake Confluence would achieve water quality standards for temperature or at least minimize adverse impacts to threatened and endangered migrating salmonids, permittees and other water users. Thus, EPA is urged to prioritize resolving adverse temperature effects from the Snake River reservoirs. EPA is requested to consider additional modeling to minimize adverse temperature effects on the Columbia River downstream of the Snake Confluence. Additional modeling should include opening the locks and spillways while reducing the reservoir depth to reduce and minimize adverse temperature effects during July, August, and September.

Lower Granite has the largest adverse temperature increase, followed by Little Goose and Ice Harbor on the Columbia and Lower Snake Rivers. EPA is urged to consider focusing upon correction of Lower Granite, Little Goose, and Ice Harbor to reduce adverse temperature effects. Additional options should be identified, modeled, and evaluated including an option of opening the locks and spillways and reducing the reservoir depth of these three dams during July, August, and September to reduce adverse temperature effects.

Sec. 7 Reasonable Assurance, pages 72-73

EPA concluded in Section 4 that dams constructed between 1932 and 1975 on the Columbia and lower Snake River have a cumulative warming impact on the mainstem rivers in the summer period. The Columbia River System Operations (CRSO) agencies (US Army Corps of Engineers, Bureau of Reclamation, and Bonneville Power Administration) are currently finalizing the 2020 Final CRSO EIS and associated NOAA Fisheries Biological Opinion for the federal hydropower system. The Final EIS and Biological Opinion may identify water temperature improvement projects for the Columbia River, similar to those identified in the Water Quality Plan for Total Dissolved Gas and Temperature (USACE 2009) and the Sockeye Salmon Passage Report (NOAA 2016). The federal power agencies continue to review control measures outlined in these plans and implement operational adjustments, as appropriate, with the potential to lower water temperatures.

Based upon the efforts of CRSO to date, water temperature has increased in the Columbia and lower Snake River to levels that exceed water quality standards. EPA should not expect any water temperature improvement from CRSO. Instead EPA should specifically request the District Court to enforce CRSO to

comply with temperature water quality standards or cease operations. Continuing to allow CRSO to operate without water quality temperature compliance, CRSO threatens the existence of threatened summer and fall chinook, steelhead, and endangered sockeye salmonids.

The Columbia River Basin Federal Caucus provides an ongoing forum for federal agencies in the Columbia River basin to work together on the planning, science, and implementation of actions to address water temperature improvements. Past and ongoing actions have included river operations, structural configurations at specific hydropower projects, and habitat restoration in the tributaries. The 2008 Columbia River Basin Federal Caucus Memorandum of Understanding identifies implementation of Clean Water Act and water temperature actions as a priority focus area for the Caucus. The Columbia River Federal Caucus coordinates with the Columbia River Federal Executives as described in the MOU, including potential coordination on water temperature improvements.

This Idaho citizen requests the Columbia River Basin Federal Caucus to prioritize its activities to reduce water temperature in the Lower Snake River during June, July, August, and September to improve salmonid aquatic habitat.

The Northwest Power Act requires the Northwest Power and Conservation Council to implement the Columbia River Basin Fish and Wildlife Program to mitigate the impact of the federal hydropower system. The Fish and Wildlife Program includes fish passage and tributary improvements, both key areas in reducing water temperature. The Fish and Wildlife Program provides an opportunity for State leadership as temperature improvement actions move forward. Members of the Council are appointed by the Governors of Idaho, Montana, Washington, and Oregon. State leadership through the Northwest Power and Conservation Council during implementation planning could provide opportunities to share information and coordinate with federal agencies on proposed actions to mitigate the temperature increases attributable to the federal hydropower system.

EPA should initiate with the Governor of Idaho actions to reduce water temperature in the Snake River upsteam of Anatone, Washington. Also, EPA should initiate an additional action to establish that Idaho and Washington have the same water quality standard in the Snake River when these States share the river as a boundary.

Thanks for the opportunity and if you have any questions, please contact me.

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Sunday, June 7, 2020 8:18 AM
To: ColumbiaRiverTMDL
Subject: Columbia and Snake rivers

I've recently found out that the U.S. Environmental Protection Agency issued a plan to control water temperature in the Columbia and Lower Snake rivers. The plan shows that the Lower Snake River dams must come down because they create large, shallow reservoirs that trap the sun's heat and make the rivers too warm for salmon. Please do not do anything that will counteract the cooling effect of the taking down of the dams because orcas and salmons, like us, are sentient beings with a right to life.

ColumbiaRiverTMDL

From: (b) (6)
Sent: Sunday, May 31, 2020 7:13 PM
To: ColumbiaRiverTMDL
Subject: Breach lower 4

Please breach the Lower 4 River Dams to Save Salmon, Save Orca & lower water temps on the Columbia River

ColumbiaRiverTMDL

From: (b) (6)
Sent: Sunday, May 31, 2020 6:13 PM
To: ColumbiaRiverTMDL

Breach the Lower Snake River Dams to save salmon and orcas! Now, before it is too late. Time is running out.

Sent from (b) (6) for Windows 10

ColumbiaRiverTMDL

From: (b) (6)
Sent: Sunday, May 31, 2020 1:24 PM
To: ColumbiaRiverTMDL
Subject: Inhospitable warm waters for salmon ~~ Salmon SURVIAL imperative.

Hello,

I am writing to support any measures that will encourage healthy growth and passage of our NWest salmon on both of these rivers.
It is no surprise that warmer waters on the rivers are becoming more problematic for our salmon. Climate change is affecting every aspect of our lives, i.e. spread of Coronavirus.

It is imperative that the states and EPA act as expeditiously as possible to lower the temperature of the waters to enable the survival of this species. Whatever it takes, make sure it's done!

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.
Thank you!

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Saturday, May 30, 2020 5:04 PM
To: ColumbiaRiverTMDL
Subject: Temperature on the Columbia and lower Snake Rivers

There are other ways to provide sustainable energy. There are no substitutes for salmon.

Sent from my iPhone

ColumbiaRiverTMDL

From: (b) (6)
Sent: Saturday, May 30, 2020 3:52 PM
To: ColumbiaRiverTMDL
Subject: Lower snake river

Breach the Lower 4 Snake River Dams to Save Salmon, Save Orcas & lower water temps on the Columbia River!

ColumbiaRiverTMDL

From: (b) (6)
Sent: Saturday, May 30, 2020 6:49 AM
To: ColumbiaRiverTMDL
Subject: Release The Snake

its time to RELEASE THE SNAKE
its your Moral & Humane Obligation
The World Is Watching USA
WE ARE ALL WATCHING
(b) (6)

ColumbiaRiverTMDL@epa.gov

ColumbiaRiverTMDL

From: (b) (6)
Sent: Friday, May 29, 2020 1:36 PM
To: ColumbiaRiverTMDL
Subject: Water temps

To whom it may concern:

I am extremely concerned by this decision, this is the only sustainably managed fishery on the planet and this would certainly place that in jeopardy!
I’m for more cold water and more salmon!
Whatever that takes!

Sent from my iPhone

ColumbiaRiverTMDL

From: (b) (6)
Sent: Friday, May 29, 2020 5:53 AM
To: ColumbiaRiverTMDL
Subject: LSR DAMS

We Need To Save Our Orcha. You NEED TO BREACH THE 4 LSR DAMS NOW
Thank You
(b) (6)

Sent from my iPhone

ColumbiaRiverTMDL

From: (b) (6)
Sent: Thursday, May 28, 2020 10:03 PM
To: ColumbiaRiverTMDL

Remove the Dams! We are killing off the most crucial pieces to our ecosystems and environment. Without salmon and Orcas, our ecosystems will collapse. We need to change the route we have been headed and do better for our rivers, our ocean, our animals, and our people! Remove the dams!

Signed a concerned citizen!

ColumbiaRiverTMDL

From: (b) (6)
Sent: Thursday, May 28, 2020 8:59 PM
To: ColumbiaRiverTMDL
Subject: Save the ocra and salmon

Dear Columbia River TMDL EPA,
The sacrifice of the salmon and resident orcas has to stop. You need to make decisions to benefit healthy water, healthy temperature for marine life to live, and provide ample food supply for ocra. They need to come first. Human greed and gluttony needs to stop. They need salmon more than us. The EPA was created to protect the land, water and animals that live in and on it. The EPA needs to show that they will put their purpose first not industry, pollution and greed. The last 72 ocra deserve to live, flourish and not starve. They need healthy water and salmon so do many other marine life. They were around 1st and their pods néed to live past the human mistakes of the dams.
Sincerely,
(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Thursday, May 28, 2020 12:05 PM
To: ColumbiaRiverTMDL
Subject: Breach 4 LSR dams/save orcas & salmon

PLEASE breach the 4 LSR dams NOW! Time is running out for 72 critically endangered southern resident orcas! Help is save salmon and orcas!

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Wednesday, May 27, 2020 2:31 PM
To: ColumbiaRiverTMDL
Subject: Cool the waters of the Columbia and Snake rivers

I have a possible suggestion to reduce river water temperatures without removing dams. The idea is to shade the slow moving areas of the rivers using satellites that could track the sun during summer months providing continuous shade as needed to reduce water warming. It seems that the satellites would not need to be too large or complicated being their sole purpose would be to provide shade by staying between the sun and the areas of the river system that need the shade. This is just an idea that would need to be studied to determine the effectiveness and cost, but it seems like it may have some merit.

Thank you for taking the time to read my suggestion and I hope it provides another possible avenue towards solving the river temperature issues.

Sent from (b) (6) for Windows 10

ColumbiaRiverTMDL

From: (b) (6)
Sent: Wednesday, May 27, 2020 1:30 PM
To: ColumbiaRiverTMDL
Subject: Save Orcas

Hi Columbia River Regulators!

How are you today!   I am sending this email to express my passion and love for saving the Orcas.

I am very sad to read in the Seattle times paper for raising the water temperature from those areas.

With love for all marine creatures, they need to live on this planet.   For the sake of humanity, please save them. It is scary all this time the world has not come together to help anyone or God's creatures. I would (I hope) like to see the Orcas and salmon live.

Please reconsider your decision. I love my planet, and the Orcas need their home too.

Please save the Orcas.

Thank you for your time.

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Wednesday, May 27, 2020 4:50 AM
To: ColumbiaRiverTMDL
Subject: Rivers are for fish

People can live without electricity. They cannot live without water and food. It’s absurd that anyone would claim a river is not for fish. I support breaching the dams to save the river and the food web it supports, from fish, to bears, to humans.

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(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Tuesday, May 26, 2020 7:16 PM
To: ColumbiaRiverTMDL
Subject: Our wildlife

To whom it may concern, (which is all of us on Earth)

I am writing to you today to request that you please breech the the 4 lower river dams of the Snake River. We need to do this to save the salmon, save the Orca, and all of our wildlife in this area. This is dire. We all know the Orca are starving; their food supply has dwindled away to practically nothing. Please, please, please breech the dams so that these majestic animals can survive for us and for future generations. Their destiny is in your hands. Please do the right thing. Thank you!

Sincerely,
(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Tuesday, May 26, 2020 5:19 PM
To: ColumbiaRiverTMDL
Subject: LSRD removal

While it’s still true that the four Lower Snake River dams still provide valuable services, but, as they are heavily tax-payer subsidized to gain these benefits, it’s clear that their economic benefits now greatly outweigh their costs.

It’s time to breach and remove them! Salmonid species, and the predators and people that rely on them, need one of the most productive salmon waterways too Be restored and Allow these imperiled fish resume their historic productivity.

Take down the dams, replace the power lost with other renewable sources, convert wasteful and water hungry agriculture to more efficient styles. Remote the balance!

Thanks for this opportunity to comment. Now do the right thing.

(b) (6)

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(b) (6)

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Tuesday, May 26, 2020 4:28 PM
To: ColumbiaRiverTMDL
Subject: Breach the Dams on the Lower Snake River

Hello! My Name is (b) (6) and I live in (b) (6). I grew up in PNW and visit San Juan Islands every summer. I am concerned about the potential loss of two keystone species, the Southern Resident Killer Whales and the salmon populations in the Columbia River. It is time to come together to come to a long term solution. The DEIS falls short of recommending dam breaching on the Lower Snake, which is the preferred action by scientists to help restore the salmon. Over $17 billion have been wasted as well as precious time in which we could have spent tax payers dollars more wisely and helped fishing communities along the coast. The federal agency approach only maintains a status quo and fails to resolve the core of the problem.

1) In the DEIS, a number of alternative strategies are listed. The Corps, Bureau and BPA have picked “MO4”. With respect to Columbia Basin salmon and steelhead recovery, the CRSO-DEIS preferred alternative (MO4) basically calls for a continuation of the *status quo* on the lower Snake River and lower Columbia River system and is, therefore entirely inadequate.
2) As stated in Chapter 2 of the Comparative Survival Study (CSS) Annual Report for 2019, "Among the federal alternatives, MO3 (the four dam breach alternative…) resulted in the highest SARs(Smolt to Adult Return) and in-river survivals…” In light of looming salmon and steelhead extinctions, MO3 (4-dam breach) must be implemented. Nothing less will enable fish survival.
3) The time has come for our 3-state governors and members of Congress to take leadership on this issue. The DEIS preferred alternative makes clear that our Federal agencies have failed to dramatically change course in order to meet the Northwest's fish-recovery challenge.

We also need to help farming and fishing communities, address climate impacts, and promote clean energy, as well as meeting our obligations to Tribal communities.

Fish hatcheries cannot meet the needs of restoration of wild fish populations due to the specific DNA characteristics of the wild salmon. Small river towns in Idaho rely on the salmon for their outdoor recreation industry, and generate $7.8 billion in consumer spending annually. This also provides 78,000 jobs and $2.3 billion in salaries and wages spread over the state.

The dams on the LSR only provide 4% of the needed power to this region. Studies by the NW Energy Coalition indicate that power from the LSR dams can be replaced by new renewable resources such as wind and solar with little or no increase in rates or greenhouse gases.

The solution is clear that we need to come together and address this salmon crisis with no-nonsense science-based solutions. Breach the dams to save our salmon before they become extinct in our lifetimes.

ColumbiaRiverTMDL

From: (b) (6)
Sent: Tuesday, May 26, 2020 4:01 PM
To: ColumbiaRiverTMDL
Subject: Temperature Loading of the Columbia and Lower Snake
Attachments: ATT00001.txt

I am writing this public comment in support of having the federal government implement ways to lower the temperature and improve the survivability of Steelhead and Salmon on the Columbia and Snake River drainages. This is long overdue and should be done with alacrity before they go completely extinct.

ColumbiaRiverTMDL

From: (b) (6)
Sent: Tuesday, May 26, 2020 3:11 PM
To: ColumbiaRiverTMDL
Subject: Temp at Columbia/Snake Dams

Dear EPA,
Perhaps the era of hydroelectric power has come to an end. The dams do so much damage to the fish despite great efforts to help them. Water temperature seems like an issue we cannot fix with compensatory measures. I would like to see the dams phased out in favor of our important ecology. We are losing the orcas. We cannot lose the salmon- so vital to our ecosystem and economy. We have choices in how we get/use our energy. Please take action to address the issue of high water temperatures at the dams.

Thank you,
(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Sunday, May 24, 2020 5:29 AM
To: Soscia, Mary Lou <Soscia.Marylou@epa.gov>
Subject: Salmon protection

Please continue to PROTECT the rivers in the US from pollution and excess heat because of dams.
We need to ensure the salmon life for future generations!
Have the EPA do all it can for the PEOPLE not corporations or developers to protect the water resources of the US.

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Tuesday, May 26, 2020 1:09 PM
To: ColumbiaRiverTMDL
Subject: Salmon and the Dams

I've been a Pacific NW resident for 56 of my 69 years. I love the out-of-doors and the environmental treasures our area holds. Two of those treasures are the orca and the wild salmon. who reside here. My information gathering tells me that, in order to save these creatures, four Lower Columbia River Dams need to be breached. Please add my name to the list of people strongly in favor of this option..

(b) (6)

ColumbiaRiverTMDL

From: (b) (6) [redacted]
Sent: Tuesday, May 26, 2020 10:11 AM
To: ColumbiaRiverTMDL
Subject: [SPAM-Sender] Removing dams on the Columbia and Snake Rivers

We should commit to having nuclear power plants with more capacity than these dams in place before we remove them. The effect of the waste heat from the power plants will have to carefully considered and planned for.

(b) (6) [redacted]

ColumbiaRiverTMDL

From: (b) (6)
Sent: Tuesday, May 26, 2020 10:06 AM
To: ColumbiaRiverTMDL
Subject: Breach lower Snake River dams

Dear EPA,

I am writing to stronly urge you to breach the lower Snake River dams to save salmon, aave orca and lower water temps on the Columbia River.
The orcas need the salmon to survive, the region does not need the power from these four dams. Please, it's time to do the right thing for these iconic species.

Sincerely,
(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Tuesday, May 26, 2020 9:13 AM
To: ColumbiaRiverTMDL
Subject: BREACH THE LOWER 4 SNAKE RIVER DAMS

Please breach the lower 4 Snake River dams to save salmon, save Orca and lower water temps on the Columbia River.
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Thank you!

(b) (6)

(b) (6)

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Tuesday, May 26, 2020 8:37 AM
To: ColumbiaRiverTMDL
Subject: Snake River dams

Hello,
Please breach the lower four Snake River dams to help with the salmon population in the Columbia River. It's the right thing to do.
Regards,
(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Monday, May 25, 2020 10:15 PM
To: ColumbiaRiverTMDL
Subject: Breech the dams!!

Breech the 4 lower Snake river dams to save the Salmon, Orca, and lower the water temperatures in the Columbia River!! Extinction is forever! We need to be responsible for our actions and fix this problem NOW, this can not wait.
Thank you,
(b) (6)

Sent from my iPhone

ColumbiaRiverTMDL

From: (b) (6)
Sent: Monday, May 25, 2020 6:04 PM
To: ColumbiaRiverTMDL
Subject: Breach the dams

Good evening,

I'm writing to ask you to please breach the lower four Snake River dams. This is incredibly important and will save the orcas and the Salmon.

Orcas have been my favorite animals since I was 2 years old and I moved to Washington from Georgia to be closer to them. Now they are dying. Please help them. Please breach the dams.

Thank you,

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Monday, May 25, 2020 4:15 PM
To: ColumbiaRiverTMDL
Subject: Snake River Dams

Please breach the four lower Snake River dams, this is needed to re-establish ecological well being of salmon and orca populations, and to lower water temperatures on the Columbia River.
-(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Monday, May 25, 2020 2:17 PM
To: ColumbiaRiverTMDL
Subject: Lower Snake River Dams

I am requesting that the 4 dams be breached on the Lower Snake River in order to replenish the Salmon population and to preserve water temperatures

There have been numerous studies and the breaching of the dams is the way to save the River.

Sincerely,

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Monday, May 25, 2020 1:56 PM
To: ColumbiaRiverTMDL
Subject: 4 Lower Snake River Dams

Please breach the 4 Lower Snake River dams to save juvenile salmon, save Orcas, and lower river water temps. Thank you, (b) (6)

Sent from Pogonip, an iPad of even more distinction

ColumbiaRiverTMDL

From: (b) (6)
Sent: Monday, May 25, 2020 1:25 PM
To: ColumbiaRiverTMDL
Subject: Columbia and Lower Snake River Die Off

Dear EPA employees,

As a concerned citizen and member of (b) (6), I am disappointed in the EPA for failing to do its job! I praise the diligent work of Advocates for the West law firm and the Ninth Circuit Court's decision finding EPA neglectful of doing their job! So unfortunate! So much time has been lost and so many salmon and steelhead have died needlessly due to your inept management of the river. There needs to be immediate remediation of the river to protect not only the salmon and steelhead but other animal species that depend on salmon and steelhead for their very survival. Because of your ineptitude, the charismatic megafauna, nearly a mascot for Washington state - THE ORCA WHALE is dying out!

If that is not enough, your ignorance has inhibited the ability of local native peoples from living their cultural traditions and fishermen from earning a living wage. The very least that can happen now is for the EPA to transmit the management of TDML to the states of Oregon and Washington for incorporation in to their current water quality management plans. Funding for the management needs to come out of the EPA budget and be of a magnitude that takes into account the the liability for past mismanagement by the EPA or there may need to be further lawsuits against your agency which I am willing to continue to support through my own personal financial support and my own activism to right the wrongs of your agency, Please do the next right thing and as soon as possible - transmit dollars and authority to the states of Oregon and Washington for TMDL in the Columbia and lower Snake Rivers. Local oversight will be better able to manage what is happening in the PNW than a far removed EPA can.

Please know that I am confident my state officials will be able to direct competent mangers to revitalize the rivers for a clean and viable environment and economy.

Thank you for your time and sorry I felt the need to chastise you in the beginning of my letter but your negligence and mismanagement of that which I hold dear is quite frustrating.

May you stay safe during this time of virus uncertainty and find a way to make your life contribute to a higher cause than economic growth by realizing the path forward is to actively respect our shared common spaces through protection of our vulnerable environment by ceding care to those who know best - scientists focused on conservation.

Sincerely,

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Monday, May 25, 2020 1:02 PM
To: ColumbiaRiverTMDL
Subject: Breach the lower snake river dams.

Hello,
I'm writing to ask that you breach the 4 lower snake river dams, if it is not within your authority to do so, please urge the USACE to breach them. It's necessary for the survival of wild salmon, and the threatened, and very close to biologically extinct southern resident killer whales.
If these were private they would have been down already. The country is heading to a financial crisis, and there are millions to be saved of taxpayer dollars.
Thank you for your time.
Sincerely,
(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Monday, May 25, 2020 12:35 PM
To: ColumbiaRiverTMDL
Subject: snake river dams

Please immediately breach the lower 4 Snake River dams to save salmon, save fish-eating orca & lower water temps on the Columbia River. These can be moved to non-operational status and then the earthen berms removed. This can be done quickly and cheaply and will save rate-payers money too.
Thank you,
(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Monday, May 25, 2020 12:17 PM
To: ColumbiaRiverTMDL
Cc: (b) (6)
Subject: River Temperatures and Salmon

As a fifth generation Oregonian, who was born in Hood River overlooking the mighty Columbia, I want to express my deep concerns over any regulation or policy change that might be detrimental to salmon. I view salmon, steelhead, and other native fish species as the highest priority in managing the Columbia and Snake rivers, and the dams that span their banks.

Water temperatures and releases from mainstem dams should be managed in such a way as to make salmon and steelhead the highest priority. These runs of fish sustained people living in the region for thousands of years, and they remain an important food source for tribal nations, and those of us living in the Northwest. If properly managed, they also provide a renewable resource worth millions of dollars to regional economies. We should make protecting and enhancing salmon and steelhead runs our main objective in managing these rivers and the dams that control their flows.

(b) (6)
[redacted]

ColumbiaRiverTMDL

From: (b) (6)
Sent: Monday, May 25, 2020 11:57 AM
To: ColumbiaRiverTMDL
Subject: Remove the lower four Snake River Dams

To Whom It May Concern:

I would like to strongly encourage you to remove the lower four Snake River Dams in order to not only save the native salmon but also to save all of the species (specifically the orcas who are in critical danger) that rely on the salmon to survive. Removing these dams would also lower the temperature of the Columbia River.

Thank you,

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Monday, May 25, 2020 11:49 AM
To: ColumbiaRiverTMDL
Subject: Dams and sea life

Good morning,
I was made aware of the issue that the dam causes to sea life.

I ask you to please consider opening the lower 4 Snake River Dams to save salmons and orcas.

Thanks,
(b) (6)

ColumbiaRiverTMDL

From:	(b) (6)
Sent:	Monday, May 25, 2020 11:04 AM
To:	ColumbiaRiverTMDL
Subject:	Time to Heal the Columbia River Basin Watershed (TMDL's)

Dear EPA,

It is time to breach the 4 dams on the lower Snake River. This will help the orcas, salmon and will lower water temperatures on the beautiful Columbia River. We need to heal the watershed.

Respectfully,

(b) (6)

(b) (6)

(b) (6):

(b) (6)

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Monday, May 25, 2020 10:56 AM
To: ColumbiaRiverTMDL
Subject: Temperatures too high for salmon.

I was raised 3 miles below Ice Harbor Dam on the Snake river. I've lived at the mouth of the Columbia and now live on the Columbia (b) (6) Salmon are an icon of the Northwest. They help maintain a healthy ecosystem for the Columbia/Snake watersheds, they provide good nutrition to humans and wildlife and their presence puts millions of dollars back into our economy.

Dams raise water temperatures. Remove the lower 4 Snake river dams to open up habitat and cool the water. We need to plant wide strips of riparian buffers of native trees, bushes and grasses on all our waterways to cool and clean the water besides to reduce flooding. We need to buy up private land on the floodplains so rivers can have room to move as climate disruption is bringing increased flooding.

I expect the EPA to use the best science and advocate for a healthier planet, not coddle Big Business. Please DO YOUR JOB! Thank you.

Sincerely,
(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Monday, May 25, 2020 8:09 AM
To: ColumbiaRiverTMDL
Subject: I....can't.....even....

I have no idea who created this report concerning salmon at the Columbia River, but whomever it is, should be fired at the very least.......

To suggest that the rivers can no longer be used by fish, that salmon no longer belong in the rivers and that we're not going to protect them is absurd and deeply cynical." Please do your job, to set standards and take actions necessary to meet those standards.

By virtue of the fact that the earth has spent the last 8 weeks healing itself from our destruction while we shelter in place, should be enough for anyone with a scientific mind and a heart to see that our air, land, and water deserve to be protected from those who only see dollar signs in it's exploitation. That is the charter of the EPA, and if you don't understand that, leave and let someone else who knows what they're doing take over.

Good grief, I must be living in the twilight zone if I have to write such a letter to you......

--
Regards,

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Monday, May 25, 2020 7:56 AM
To: ColumbiaRiverTMDL

To USEPA,.

"To suggest that the rivers can no longer be used by fish, that salmon no longer belong in the rivers and that we're not going to protect them is absurd and deeply cynical." Please do your job, to set standards and Take actions necessary to meet those standards even if it means reassessing they flow and the installation of the 4 dams. It is essential we resolve and repair the river, to meert the specific standards developed by the states and the tribe to protect water quality, And the fish who rely on that water and humans (and Orcas) who rely on that fish.

Do not simply declare that the waterbody does not meet the standards for certain pollutants, and it is considered *impaired* and create a new TMDL. Rather complete the studies and identify a way to get to safe temperature levels for salmon. Rather consider the various flow rates and even if necessary remove sime or all of the four Lower Snake River dams.

(b) (6)

Environmental scientist and Educator

ColumbiaRiverTMDL

From: (b) (6)
Sent: Monday, May 25, 2020 7:36 AM
To: ColumbiaRiverTMDL
Subject: Saving the rivers

To whom it may concern:

In response to the EPA suggesting Oregon and Washington simply reclassify the Snake and Columbia rivers in order to feasibly save the Salmon is disgusting. The EPA stands for the Environmental PROTECTION Agency in case someone has forgotten. Salmon were in these rivers before humans and many many different parts of the ecosystem that depend on healthy salmon runs will be severely impacted if nothing is done to try and bring the temperature down. I really hope the EPA starts seeing the big picture and reverses their course on the use classification for the Snake and Columbia Rivers.

Thank you for taking the time to read this and I sure hope the EPA starts to protect rivers and streams again so all animals can enjoy the rivers again.

Sincerely,

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Sunday, May 24, 2020 5:52 PM
To: ColumbiaRiverTMDL
Subject: Columbia and Snake Rivers

I strongly disagree with said guidelines. The rivers were life before we were where. Energy is not a replacement for a food source.

ColumbiaRiverTMDL

From: (b) (6)
Sent: Sunday, May 24, 2020 12:12 PM
To: ColumbiaRiverTMDL
Subject: Comment on Temperature TMDL for the Columbia River

To Whom It May Concern:

This comment is in response to the report on Columbia River water temperatures released by the EPA on or about 19 May 2020. That report strengthens my conviction that the four lower Snake River dams need to be breached.

I have paddled and fished that stretch of river for more than 40 years. My opinion is based both on firsthand knowledge and on a broad spectrum of scientific data regarding salmon health and recovery in the Columbia River basin.

Thanks for entering my comment in the comments record.

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Sunday, May 24, 2020 7:39 AM
To: ColumbiaRiverTMDL
Subject: Columbia river temperature

Remove the snake river dams

Sent from my Verizon, Samsung Galaxy smartphone

ColumbiaRiverTMDL

From: (b) (6)
Sent: Saturday, May 23, 2020 1:41 PM
To: ColumbiaRiverTMDL
Subject: WA DOE river temperature provision a bad decision

River temperatures should not be included in WA DOE permitting process.
Allowing such would reduce clean power availability from the extensive hydropower generation system and increase costs to users while not providing temperature 'benefits' that it claims.
The increased costs and potential disruptions from including would reduce our regions available economic resources and shrink the pool of revenue available for use to continue restoration and water quality improvements to the Columbia River system.
The WA DOE decision is based on bad science. As important is EPA permit this relates to is for managing pollution from equipment, not temperature control of an entire river system.

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Saturday, May 23, 2020 9:46 AM
To: ColumbiaRiverTMDL
Subject: Saving Salmon

Do I really need to write this email to say how critically important salmon are to these rivers, wildlife, the ecosystem and people? Have we not done enough damage to the environment already without saying that salmon and fish should not be saved?
I urge you to do whatever it takes to preserve the salmon, a keystone species, a food source, and probably a national security issue if we ever had to rely on it to survive.

Thank you,

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Thursday, May 21, 2020 5:11 PM
To: ColumbiaRiverTMDL
Subject: Lower snake

Hi all,

I support the EPA plan to reduce water temperature to protect salmon in the Columbia and Lower Snake rivers. The plan shows that the dams create large, shallow reservoirs that trap the sun's heat and make the rivers too warm for salmon. There is strong evidence that the Lower Snake River dams must come down in order to save salmon and orcas.

Thank you for your work.
Please stay safe,
(b) (6)

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: [SPAM-Sender] About Sea Lions
Date: Wednesday, August 19, 2020 11:37:57 AM

With all due respect and thank you's for the job you do: please consider fuller scenerios than the incomplete one of killing one species with the plan to save another.
Ecology is far more complex than that.
Please be on the team that helps get fish farms out, and in this case, removes dams.

It's way too late for remedial methods.
Keep Wild salmon wild.
The best way, the most effective way to preserve salmon, is to undo human interference.
Please.
(b) (6)

Sent from my iPhone

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: Act to save salmon
Date: Thursday, August 20, 2020 11:56:28 PM

EPA Columbia and Lower Snake Rivers,

Hello. I’m writing to ask you for your help. It doesn’t take a genius, a scientist, or a government official to understand that orca and people need salmon and that salmon need cool water. Everyone in the PNW knows this. The TMDL study the EPA released admits that the dams on the Lower Snake River are the primary cause of high water temps that kill and that climate change will only keep making the situation worse. There will be fewer and fewer salmon until there are none. There will be fewer and fewer orcas until there are none. There will be fewer and fewer dollars brought in to local economies until there are none.

The TDML says the dams and climate change are at fault, but it doesn’t recommend that specific action that is desperately needed and widely supported. Instead it's recommendation is to “change the standards.” Ridiculous. It’s obvious to all who’ve read the science that restoring the Lower Snake by breaching the dams is the only way to immediately undo the damage we’ve done and to increase salmon populations that so many communities and ecosystems depend on. No one can hide behind cowardly bar-raising, evasive moves any longer. Everyone knows that reducing temperature pollution is necessary--the only way to protect these species from extinction. Even the ACE likely knows this, despite their failure to admit it. No more copouts. No changing standards. We desperately need you to DO THE RIGHT THING. I’m asking you today to take action and lead. Say you’re going to work together to reduce the high temperatures, state the reasons and the action needed, and then do it. Work with state ecologists and stakeholders to develop a regional solution that removes the death dams and restores the Lower Snake River. *Just doing your job* will save lives. Thanks for reading. Stay well.

(b) (6)
[redacted]

From:	(b) (6)
To:	ColumbiaRiverTMDL
Subject:	Breach the Dams!
Date:	Wednesday, August 19, 2020 5:28:23 PM

To whom it may concern:
Southern Resident Killer Whales in the Pacific Northwest are in grave danger. There are only 72 left in the wild. They need salmon to survive, and several dams in the area are contributing to declining salmon levels. I am asking that you breach the Lower Four Snake River Dams!

Sent from my iPhone

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: Breach the FLSRD and Save the Endanger Salmon and Steelhead
Date: Wednesday, August 19, 2020 9:32:30 PM

Hi Sir/Madam

My name is (b) (6), a local resident of (b) (6), and I have live in the Pacific Northwest for almost my entire life. The Orca (Killer Whale) is one of my favorite animals that I love since I was small. I am writing this statement about my regards for reevaluating plans of breaching the Four Lower Snake River Dam in the Columbia River. Not just to save our Endanger Southern Resident Killer Whales, but just to save Chinook Salmon and other native fishes that a threaten from over Fishing, Pollution, and Climate Change.

Our friends (Southern Resident Orcas) have been starving to death due to the Chinook recent decline. I saw J35 named, “Tahlequah” carried her lifeless child on top of her head and told us that she is in deep pain and suffering. At that moment I was shocked and sadden that these beautiful animals are facing extinction. Their prefer food that they eat are stolen by us, destroyed by us and poison by us; and those are real facts. And you are damn sure that you know!

Hydro Electric Dam are essential in rivers, yes. But they have the biggest cons to them. They block annual migration for fishes path, kills them, and warms the rivers temperature up. You know that the dams (including the Four Lower Snake River Dam) don’t last forever. Don’t you?! There are other green economic resource available aside from Dams. It can be expensive from the start, but over time we can get use it in the long run. And we can combat the threat of Climate Change. Instead, you decide to put your head in the sand continued to ignore it and made it much much worst.

My request is this, breach the Lower Snake River Dam within at least a year to save the SRKW and the endanger Chinook Salmon! I don’t care if it hurts you or the people in government, they needed to be breach ASAP!! But if you fail to breach this dam, then you are a coward, a fool, pathetic, a failure to save the species from extinction and the next generations of people!

Local Resident

(b) (6)
August 19th, 2020

(b) (6)

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: Columbia & Snake rivers
Date: Wednesday, August 19, 2020 6:42:01 PM

It is important to the health of the Columbia and Snake Rivers that the EPA does not raise the accepted temperature of these waters. Instead the 4 lower snake river dams should be breached ensuring a cool and free flowing habit for salmon and thus food for the endangered southern resident Orcas!

- (b) (6)

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: Columbia River Needs To Cool Down
Date: Thursday, August 20, 2020 2:26:03 PM

Please do not lower environmental standards for the Columbia River. The most consistent environmental and economic solution to the problem of overheating river water, after studies spanning 20+ years, is breaching the Lower Four Snake River Dams. The Southern Resident Orcas are a TREASURE, and they need SALMON. Free flowing rivers are cold rivers where salmon can swim, spawn, survive and thrive.

As the western United States is burning and choking under wildfire smoke over an incredibly widespread area, it becomes more and more obvious that we all MUST make decisions that protect our environment. This is NOT the time to be lowering standards.

Please,

(b) (6)

From:	(b) (6)
To:	ColumbiaRiverTMDL
Subject:	Concerned Citizen, Salmon truly need healthy, cool rivers...
Date:	Wednesday, August 19, 2020 3:55:14 PM

Hello,
My name is (b) (6) ,
I grew up in and around the areas concerned for the extinction, or preservation of a species... Salmon, and Orcas, I am sure you are aware of those to which I am referring. It has come to my attention that the proposed notion the rivers are not only for salmon has been put forth under the basis that the current standards are too difficult to meet. I want to be clear, this is irrational, and disrespectful. It is our responsibility to be self sufficient, and to uphold our environment in an ecologically sustainable way to maintain ourselves for future generations and our own, and be good neighbors to our brothers and sisters in the waters, land and sea. Ask yourself, what am I capable of? What are we capable of? We made it to the moon. It is not too 'hard' to sustain our own method and amount of pollutant and waste clean up, or we are an uncreative species with no hope and no solid morals. When those who are meant to protect, instead stand aside, it is not for those they are supposed to be protecting, it is because they want to protect themselves. We do not need the protecting our rivers, our salmon, our orcas, our future needs now. We need now, to act. I ask you to think, what CAN you do? There is always something. Right now two vital pieces of the chain of life are fading. The salmon and Rocas you have power to protect, need you. Do not lower the standards. Do you want that to be your legacy? Find a way to meet them. Make it happen. Demand it. Help it be so. You are powerful! How shall you implement that? Who are you really protecting? A whole family must swim, spawn, thrive, and now, survive, in a damned, polluted, overfished zone. Their ecosystem predators, who depend on that finned family, suffer, starve, decline, and will do so more, until they are erased. We have no way of knowing the ultimate impact on life if we allow this to happen. It is irreversible. We must be responsible, and prevent it. Instead of lowering the standards, help people meet them. And then. Raise them. And do it again.
Sincerely,
(b) (6)

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: Cool the water down
Date: Friday, August 14, 2020 12:29:09 PM

To Whom It May Concern,

I have lived in Idaho and California for most of my life. I remember watching my grandfather fly fish in streams around Moscow, catching trout as long as his forearm. My Dad caught a sturgeon once on the Snake River before it was dammed up. He brought us down to the river for a protest with (b) (6) to keep the Salmon and Snake wild above Lewiston.

I didn't know what we were doing then, but I certainly do now. Many of my best childhood memories are about the Snake River BEFORE it was dammed into a slow moving lake.

Since then, my professional work (b) (6) (b) (6) for Native American tribes, I have learned about the many ways dams kill fish.

The lower 4 dams on the Snake are NOT necessary. A run-of-river dam at those locations that allowed safe fish passage would generate the same amount of electricity. Holding back the Snake is just selfishness on the part of the water ski boaters. The river was AMAZING before it turned into a muddy swamp.

The salmon are critical to the ecosystem up and down the river. We need salmon much more than we need dams.

Thank you, (b) (6)

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: Do not lower EPA standards for Snake Rover temps
Date: Thursday, August 20, 2020 11:07:00 PM

The choice should be clear.

Salmon need *cold* and clean water to survive and the dams are creating slack water that retains heat, driving up river temps (and making it more difficult for smolts to drift backward to sea, instead using up precious energy at a precarious stage in life).

Anyone who believes, let alone acts on the notion that lowering the EPA standards for river temps is a better option than letting the Snake flow free again is being governed not by science, nor by basic logic, nor by ecological principles, since all of those areas point to one solution for lowering Snake River temps: breaching the money-losing, HUD rate-hiking, salmon-killing, and orca-starving LSRDs.

Whoever is reading this, please consider the larger historical context in which you live. Move away from cowardice and toward the obvious, though admittedly more courageous solution.

Breach the damn dams.

For salmon,

(b) (6)

--
Sent from iPhone Gmail Mobile

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: EPA and our Rivers
Date: Sunday, August 16, 2020 9:54:46 AM

Please keep temperatures down in our rivers to save salmon and protect our waterways.
Thanks. (b) (6)

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: EPA Study Calls for Bold Action
Date: Monday, August 17, 2020 7:47:25 PM

EPA Columbia and Lower Snake Rivers,

Your leadership is needed in reducing Snake River and Columbia River water temperatures that have risen primarily due to dams according to the EPA's TMDL study.

In concert with Dept. of Fish & Wildlife, PNW policymakers, and the FERC, please work up annual compromises over the next five years that will phase down hydroelectric power in lieu of wind/solar--particularly for the lower Snake River Dam removal--and mitigate community power grid impacts, while increasing and balancing the flows of water critical to the survival of the species, the ecosystems, and the industries and economies that depend on these rivers.

The critical state of endangered resident populations in these rivers, and the Pacific Ocean, requires urgent action.

Thank you for your leadership in this important work.

(b) (6)

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: Kestone Species & Policy Changes
Date: Tuesday, August 18, 2020 11:58:30 AM

EPA Columbia and Lower Snake Rivers,

Keystone species such as Orcas and Salmon provide countless benefits to ecosystems humans depend upon for resources. Decline in these species is a scientifically recognized indicator or diminished ecosystem health.

I am writing to ask for your leadership to reduce water temperatures in the Snake and Columbia River to protect and restore endangered salmon, the Southern Resident orcas, and the communities who depend on them.

Specifically, I request the you consider the following points:

The Lower Snake and Columbia rivers are too hot for endangered salmon and steelhead. The Total Maximum Daily Load (TMDL) study recently released by EPA clearly shows that the dams are the main cause of increased water temperatures.

Large, shallow reservoirs created by the dams, coupled with intensifying climate change—threatens the Columbia and Snake rivers' already imperiled salmon and steelhead.

The science is clear—restoring the Lower Snake River is our very best opportunity to restore imperiled salmon and orca populations. I urge you to work with the people and policymakers in the Northwest to develop a comprehensive package of measures that restores the Lower Snake River and its salmon, helps feed starving Southern Resident orca, and invests in clean energy that protects the health of our communities and our river.

Northwest people and leaders must work together to craft a bold and effective plan that achieves these goals as quickly as possible. Without effective leadership, we risk losing these iconic species and the special benefits they bring to our region.

Thank you again for your careful consideration of this request.

(b) (6)
[redacted]

From:	(b) (6)
To:	ColumbiaRiverTMDL
Subject:	Objection To Changing The Role Of The Columbia & Snake Rivers.
Date:	Thursday, August 13, 2020 9:31:30 PM
Attachments:	806B86E1FE8647A392EEF731CB61EBB3.png

Dear Chris Hladick,

My name is (b) (6), thank you for allowing for public comment on the agency's recent proposal to Oregon & Washington that would change the use of the Columbia & Snake River dams. I would like to address my opposition to the proposal largely having to do with the current critical state of the Southern Resident Orca in the Salish Sea. I want to note that I did send a letter to you last week, but I want to go into a little more detail in this e-mail.

In the Salish Sea there are two species of Orca; the Southern Residents & their cousins the Bigg's. Right now there are only 72 Southern Resident Orca still alive (albeit just barely). On the other hand the Bigg's Orca are thriving with a population of at least 280. Both of these Orca live under the same pressures (toxins, noise, boat harassment ect.) except for one. There is one pressure the Southern Resident Orca have to deal with that every other Orca species in the Northwest doesn't. Prey availability. That makes ALL the difference. Despite what some people might say, the lack of prey for the Southern Resident Orca is the only reason for their devastatingly low numbers. Their food source is the also endangered Chinook Salmon that travel from the Snake & Columbia Rivers to the Pacific & back. Bigg's Orca & every other transient Orca species are thriving because they eat mammals, which are not under any major threat YET. In fact in the past 20 years the Bigg's have had more successful births than the entire current Southern Resident population. Just because their food source is everywhere.

The Southern Resident Orca are not able to change their food source because they are physically incapable of doing so. They have evolved to only be able to eat Chinook Salmon in the Salish Sea & maybe one or two other fish on occasion. They have to constantly leave their home to have a slightly better chance at finding food which is dangerous since they are often having to go near shipping lanes. They cherish their home very much, so much that they are constantly returning even though they know there is hardly anything to eat which really says something about who they are, and what they have been forced to go through for 60 years. Losing food & family, sometimes they lose family before they are even born. Since 2007 there have been a total of 42 pregnancies with all three of the Southern Resident Orca pods (J, K, & L). Of those 42 births only 4 of those Orca born are still alive today. Most of the Orca have been forced to abort (which no animal should ever be subjected to something like that). Some of the Orca who were born successfully died shortly after. Of those babies who died belonged to an Orca named Tahlequa who was seen in 2018 carrying her dead calf for half a month.

This is all because the babies are being nourished with contaminated body fat from the mother. This fat is contaminated because some of what little fish the Orca can find is laced with toxic material which then settles in their bodies. When they can't find food they have to burn that fat which poisons them, and their children. So the only way to prevent them from needing to burn that fat is by allowing them to have access to Chinook Salmon so their bodies don't need to cannibalize themselves. Each Southern Resident Orca has to eat 100 pounds of Chinook Salmon every single day in order to live as well as the Bigg's Orca. So all three of those pods that make up that 72 Orca population need a total of 1,314 tons of Chinook Salmon every year. Right now they are getting absolutely nothing like that. Each Orca is getting around 70 pounds of Chinook Salmon every week at best (which is just ONE fish a week). The proposal would end up bringing that down to 70 pounds a month, which is not nearly enough for them, and certainly not enough for their babies.

That's how important the rivers are. They are what carry fish all the way to these endangered animals, but with this proposal allowing higher temperatures, that could be a thing of the past. The river's role has ALWAYS been to feed the large population of wild life in the Northwest. It should not be used to generate power or deliver goods any more. Ice Harbor, Lower Monumental, Little Goose, & Lower Granite all have to come down. Blocking water and having spills is reducing the water depth making it unable to block out the effects of climate change, and the fish are being cooked in the water. If communities are relying on these rivers for materials, you have to get them to change whether it is using the trains that run along the rivers or using aircraft because what they are dependent on is killing wildlife. None of the Southern Resident Orca deserve to starve & certainly no animals need to be killed (as I saw in a recent article you are fine with the idea of the government killing Sea Lions on the Columbia river), just because the consequences of building dams & not installing an affective work around system never crossed the minds of the engineers who built the dams. They certainly don't deserve to die just because the rules are not being enforced.

The chance of the Southern Resident Orca going extinct WITHIN THE CENTURY in 2015 was 9%. Now in 2020 with everything going on (terminal 2 construction, potential US Navy killings, dams, trans-mountain pipeline ect.) the chance of them all dying out is 59%. The group of people who should be defending them are refusing to do anything, and in fact are even making it easier for harm to come to them. The only slight glimmer of hope is that right now three of the Southern Resident Orca are pregnant including the Orca that lost her baby two years ago, Tahlequah. This pregnancy won't mean anything though if they don't survive. The only way for them to live a full life is to give them tons of Chinook every year, and that can't happen unless the rivers are cold. That can't happen unless AT LEAST the four lower snake river dams come down. You have to prioritize the river's one role, to deliver salmon to the Northwest, and not prioritize the needs of people who refuse to adapt even though they have been shown countless times they are able to. The Orca can't adapt to the needs of those people, but they don't deserve to die because of that.

The time for the dams to collapse under weight of a new era clean energy has been around for too long. You are the head of one of the loudest voices in the government for the environment. So use it to protect it not make it easier for it to be destroyed. Make the waters flow deep & cold with the food needed to bring life to the Northwest. Bring those four lower Snake River dams in 2020. Stop the extinction of the Southern

Resident Orca, and Chinook Salmon.

Sincerely,

(b) (6)

(b) (6)

Sent from (b) (6) for Windows 10

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: Our beloved Orcas
Date: Thursday, August 20, 2020 6:29:28 PM

Dear Chris Hladick,

My name is (b) (6) and I'm writing to you on behalf of those who cannot speak for themselves. who have been watching their babies starve to death before their eyes and knowing there's nothing they can do for them, and those babies we've lost who never get a chance at life because of human error.

In the past 4 years all the babies born to Southern Residents have died of starvation. This news has been breaking my heart for years, especially knowing there's so much we can be doing to stop it from happening. They have all died because there's not enough fish in the sea for the Southern Resident orca pods. The salmon populations they depend on are dwindling and suffering from overfishing, diseases from fish farms and overheated water from too many dams. If those who have the power to save them make the right design and breach the Lower Snake River dams, they won't be saving only the salmon but also many generations of orcas to come and the dreams of the people who've grown up loving them; the people who don't want their children to grow up in a world where the orcas are extinct because of humans like us.

Thank you for your time and for caring,

Sincerely (b) (6) and the whales we have lost

From: (b) (6)
To: ColumbiaRiverTMDL
Cc: (b) (6)
Subject: Please do not relax water temperature standards for the Columbia River Basin
Date: Wednesday, August 19, 2020 9:15:37 AM

Dear Decision Makers,

Healthy Rivers support Healthy Ecosystems, which in turn support Wild Salmon and the myriad creatures reliant upon them. Healthy Ecosystems are critical to a livable future for all residents of the Pacific Northwest.

Salmonoids require cool waters to survive and to ignore their need by relaxing current water temperature standards currently in place for their survival, is to seal the demise of the remaing iconic 3% of historic Wild Snake River Salmon returns. Doing so will damn any promise of a bountiful Columbia River basin for future generations.

Please do not facilitate any further relaxing of water temperature standards and hold Bonneville Power accountable for protecting Wild Salmon.

Clearly the numerous mitigation efforts and vast sums of money invested in protecting dwindling Wild Salmon returns to the Snake River Watershed have failed and, the only viable realistic solution is to breach the 4 Lower Snake River Dams. They must be breached and soon!

Please continue in following your moral duty to protect the environment by maintaining the temperature standards in place for the protection of the Snake and Columbia River Systems. It is inexcusable to relax these standards and in doing so, providing Bonneville Power the excuse to continue ignoring that the most effective solution is that of Breaching the 4LSRDS.

Thank you for protecting the interests of the environment and in doing so, safeguarding the interests of future generations.

In trust,

(b) (6)

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: Preserve the salmon
Date: Wednesday, August 19, 2020 8:30:56 PM

My young grandson who has a deep & abiding love & loyalty to the environment... asked me to message you!
"Please breach the lower Four Snake River Dams to prevent declining levels of salmon!

(b) (6)

(b) (6)

(b) (6)

[redacted]

We cannot change what has already happened; but we can change what happens next...

(b) (6)

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: public comment - Save the orca, breach lower 4 snake river dams to free the salmon to
Date: Thursday, August 20, 2020 9:07:56 PM

The lower four dams of the Snake River mist be breached immediately to allow for the salmon the run and provide food to the Southern Resident Orcas. This is urgent to save both the Orca and Salmon from immediate extinction. Please act now!

Sincerely,
(b) (6)

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: Reduce water temps and remove dams to save salmon and orcas
Date: Monday, August 17, 2020 2:56:41 PM

EPA Columbia and Lower Snake Rivers,

I am writing to ask for your leadership to reduce water temperatures in the Snake and Columbia River to protect and restore endangered salmon, the Southern Resident orcas, and the communities who depend on them.

Specifically, I request the you consider the following points:

The Lower Snake and Columbia rivers are too hot for endangered salmon and steelhead. The Total Maximum Daily Load (TMDL) study recently released by EPA clearly shows that the dams are the main cause of increased water temperatures.

Large, shallow reservoirs created by the dams, coupled with intensifying climate change—threatens the Columbia and Snake rivers' already imperiled salmon and steelhead.

The science is clear—restoring the Lower Snake River is our very best opportunity to restore imperiled salmon and orca populations. I urge you to work with the people and policymakers in the Northwest to develop a comprehensive package of measures that restores the Lower Snake River and its salmon, helps feed starving Southern Resident orca, and invests in clean energy that protects the health of our communities and our river.

Northwest people and leaders must work together to craft a bold and effective plan that achieves these goals as quickly as possible. Without effective leadership, we risk losing these iconic species and the special benefits they bring to our region.

Thank you again for your careful consideration of this request.

(b) (6)
[redacted]

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: Remove dams/keep water temperatures down
Date: Saturday, August 15, 2020 1:11:22 PM

Hello,

I am writing as a concerned citizen about rising water temperatures in rivers due to dams killing salmon which are an important link in food chain for all. Remove dams and keep water temperatures down. Thank you!

(b) (6)

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: salmon need cold rivers & SRKW need salmon - breach the dam
Date: Thursday, August 20, 2020 5:32:26 PM

Hello, A free flowing river is a cold river where salmon swim, spawn, survive + thrive. It's imperative we save wild salmon. Salmon are critically important for the southern resident orcas as their primary food source.

The most consistent, environmental and economic solution after copious studies spanning 20+ years is breaching the Lower Four Snake River Dams. I URGE YOU TO BREACH THE LOWER FOUR SNAKE RIVER DAMS.

A free flowing river is a cold river where salmon can swim, spawn, survive and thrive.

The Columbia River once produced more salmon than any river on Earth. Columbia River salmon support the entire ecosystem and the critically endangered 72 remaining southern resident orcas.

The southern resident orcas are starving as their primary food force: chinook salmon is nearing extinction due to dams, hot water, overfishing and pollution.

When the SRKW have access to more salmon they will survive extinction. When wild salmon have access to a free flowing, cold snake river they will survive extinction. **By breaching the lower four snake river dams we will save two species from extinction and the Columbia & snake river basin will see an 8 billion dollar increase economically.**

Thank you, (b) (6)

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: Salmon Survival
Date: Tuesday, August 18, 2020 7:52:05 AM

In addition to being absolutely appalled by the resolutions to " cull" the Sea Lion and Cormorant populations, we fully support the following:

scientists support salmon and steelhead restoration by removing the 4 lower Snake River dams.

Fishery scientists have monitored Snake River wild salmon population declines since the 1950s. They have intensively studied the plight of the wild salmon in the last several decades using advanced tagging methods and modeling. The role that dams and reservoirs, habitat, hatcheries, harvest, predators and the ocean play in salmon survival is well understood.

In order to restore Snake River salmon populations to sustainable numbers, scientists have determined that they must consistently return adults to the uppermost Snake River dam, Lower Granite, at a minimum rate of 2% to 6%. Since 1975 when the eight dams (four on the lower Columbia River and four on the lower Snake River) were completed, return rates have only rarely exceeded the 2 percent survival minimum. From 1994 to 2004, they ranged from 0.35 to 2.5 percent, exceeding 2 percent in just a single year.

An extensive modeling effort completed in 2000 analyzed of the causes of mortality for Snake River salmon. The model demonstrated that the four lower Snake River dams were the most significant factor preventing recovery. The cumulative effect of eight dams on the lower Columbia and lower Snake Rivers is too much for salmon survival and if the four dams on the lower Snake were removed (cutting the total number of dams Snake River stocks face in half), these salmon can rebound to healthy levels.

More recent studies also show that populations of other Columbia Basin salmon that migrate through four or less dams and reservoirs, such as those from the Yakima and John Day rivers are performing significantly better than those from the Snake river. Those populations, like the Snake, also encounter mortality as a result of habitat destruction, harvest, hatcheries, predators and ocean conditions, but they are not imperiled. The difference lies in the number of mainstem dams they encounter. A key benefit for Snake River populations is the amount of high quality habitat they have that is not found in the other Columbia basins.

As a result of this extensive research, hundreds of federal, state, tribal and independent scientists have concluded that removing the four lower Snake River dams is the best and perhaps only means to protect these fish from extinction and recover healthy populations.

Thank you

(b) (6)

[redacted]

[redacted]

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: salmon
Date: Saturday, August 15, 2020 5:58:10 PM

Please keep the water temperatures down to safeguard the lives of salmon. They have enough trouble with the dams themselves without increasing the temperatures of the river. We are supposed to be nature's stewards.

(b) (6)

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: Save salmon, orcas and Indigenous culture
Date: Thursday, August 20, 2020 6:48:24 AM

EPA Columbia and Lower Snake Rivers,

I known you treasure the salmon and the orca, two of our unique and iconic Northwest species.

And I also know you respect the Indigenous Tribes whose cultures have evolved around the salmon and the orca and who have forever identified with, protected, and depended on the salmon and the orca.

I ask for your leadership to reduce water temperatures in the Snake and Columbia River to protect and restore endangered salmon, the Southern Resident orcas, and the indigenous and fishing communities who depend on them.

Specifically, I request the you consider the following points:

The Lower Snake and Columbia rivers are too hot for endangered salmon and steelhead. The Total Maximum Daily Load (TMDL) study recently released by EPA clearly shows that the dams are the main cause of increased water temperatures.

Large, shallow reservoirs created by the dams, coupled with intensifying climate change—threatens the Columbia and Snake rivers' already imperiled salmon and steelhead.

The science is clear—restoring the Lower Snake River is our very best opportunity to restore imperiled salmon and orca populations. I urge you to work with the people and policymakers in the Northwest to develop a comprehensive package of measures that restores the Lower Snake River and its salmon, helps feed starving Southern Resident orca, and invests in clean energy that protects the health of our communities and our river.

Northwest people and leaders must work together to craft a bold and effective plan that achieves these goals as quickly as possible. Without effective leadership, we risk losing these iconic the salmon and the orca and the special benefits they bring to our region. Even more crucial we put at risk, one more time, the cultural identity and survival of the original people who have forever called the Northwest home.

Thank you for the careful consideration you give to this request and thank you for you immediate action to protect salmon, orcas and Indigenous lives.

(b) (6)

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: Save the orcas!
Date: Wednesday, August 19, 2020 3:53:14 PM

The best solution to help the salmon and orcas survive is to breach the Lower Four Snake River Dams.

I urge you to take this action.

Thank you,
(b) (6)

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: Save the Salmon
Date: Wednesday, August 19, 2020 3:31:20 PM

A PNW without wild salmon is no Pacific Northwest we want to live in. Growing up I remember going on field trips to bonneville. They said the fish ladders would save the salmon. They lie. They are dying off faster than ever. It’s time to remove the lower snake river dams and save the salmon and Souther Resident killer whales. Please don’t ruin the most beautiful place on earth.

Sent from my iPhone

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: Saving the Whales
Date: Wednesday, August 19, 2020 3:46:19 PM

I would please ask you to breach the Lower Four Snake River Dams to save the 72 killer whales that are left in the wild. It is our duty as people on this earth to help in any way we can after the damages we have caused.

Thank you

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: Snake River Dams
Date: Wednesday, August 19, 2020 10:07:45 PM

Hello and thank you for your time,
My name is (b) (6) and I am a college student from Seattle. Although I have a lot of respect for the EPA, I think the proposition this agency introduced to raise standards is just as poor of a mitigation strategy as the harmful hatchery system—both crippling salmon populations behind the public's back. I understand that the current administration would not support something as logically sound as breaching these four nugatory dams, but I'm pleading to any smart official left in this agency. Salmon are at the heart of every culture that has lived off of this land, and to kill them and endanger many more species would be a tarnish on the entire human race and reflect its negligence exactly.
Thanks again,
-A Concerned Citizen

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: Snake River TDML Comment
Date: Thursday, August 20, 2020 9:29:32 AM

Chris Hladick:

The EPA's response to the Total Maximun Daily Load (TMDL) Study is unacceptable. We cannot lower temperature standards when endangered Chinook salmon, and endangered salmon eating orca whales, are sliding towards extinction. Salmon need a cold river. The four Snake River Dams & Reservoirs warm the water to a lethal level. Why is the solution not to breach the Snake River Dams? By following the guidence of the 2002 EIS the Army Corps of Engineers can act on alternative 4, dam breaching. This solution was studied a second time in the 2020 EIS. We need you and the EPA to tell the Corps of Engineers to place the dams into a non-operational status, breaching the Lower Snake River dams. This must be done to lower water temperatures and comply with the current EPA standard.

(b) (6)

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: Snake River TMDL
Date: Thursday, August 20, 2020 1:23:04 PM

The Lower Snake River dams need to breached. It is unacceptable to change water temperature standards when Chinook salmon and Southern Resident Killer Whales are depending on us to get this right. We don’t have time to muck about with political nonsense. They need the water to be less than 68 degrees. Do what is right for the survival of these species and to comply with the current EPA standard. Breach the dams.

(b) (6)

Sent from my iPhone

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: SOS
Date: Sunday, August 16, 2020 5:00:21 PM

Save our salmon. Do not allow river temperatures to rise above temperatures that threaten salmon survival. If that means removing or bypassing dams, so be it.
Respectfully,
(b) (6)

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: SRKW
Date: Monday, August 17, 2020 3:29:12 PM

I'm writing in regards to the public comment period regarding the Lower Snake River Dams. These dams need to be breached for so many reasons, but this comment is in regard to the SRKWs.

Just take them down. Allow the salmon population to increase as well as the SRKWs. I'm sure many comments will be sent w scientific info provided about why it's a good idea, so I'll just keep it simple. Take them down. There are plenty of other energy resources available these days. I need my grandchildren to grow up w salmon and SRKW.

Thank you in advance.

(b) (6)

Sent from my iPhone

From:	(b) (6)
To:	ColumbiaRiverTMDL
Subject:	STOP the CULL
Date:	Friday, August 14, 2020 8:12:37 AM

Not right
Opposition to the slaughter of marine mammals

Sent from my iPhone

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: Support for caps on Snake/Columbia water temperatures
Date: Sunday, August 16, 2020 11:25:32 AM

I am a biologist, biology instructor, and long-time resident of the Pacific Northwest.

I strongly support the draft rule capping maximum water temperatures for the Columbia and lower Snake Rivers.

The recently released EPA report shows that the Snake River often exceeds temperature standards before it enters Washington from Idaho, as does the Columbia River when it enters Washington from Canada.

These high temperatures are contributing to the decline in salmon populations in the Pacific NW, with a secondary consequence of decline in orca populations due to diminished food sources.

Diminished salmon populations are also harmful to the fisheries of the Pacific Northwest, and harmful economically and culturally to Northwest Native communities.

Sincerely,
(b) (6)

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: Support for rule to Cap Maximum Water Temperatures
Date: Monday, August 17, 2020 2:54:30 PM

I strongly support the draft rule capping maximum water temperatures for the Columbia and lower Snake Rivers. The recently released EPA report shows that the Snake River often exceeds temperature standards before it enters Washington from Idaho, as does the Columbia River when it enters Washington from Canada. These high temperatures are contributing to the decline in salmon populations in the Pacific NW, with a secondary consequence of decline in orca populations due to diminished food sources.

I am concerned about our current climate crisis. Anything we can do, like this draft rule, is essential to take!

(b) (6)
Washington State Resident
(b) (6)

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: The ones we have lost
Date: Thursday, August 20, 2020 6:28:48 PM

Chris Hladick,
Regional Administrator
US Environmental Protection Agency, Region 10 Park Place Building 1200 6th Ave.
Seattle, WA. 98101

Dear Chris Hladick,
My name is (b) (6) and I'm writing to you on behalf of those who cannot speak for themselves. The mothers who have been watching their babies starve to death before their eyes and knowing there's nothing they can do for them, and those babies we've lost who never get a chance at life because of humans error.

In the past 4 years all the babies born to Southern Residents have died of starvation. This news has been breaking my heart for years, especially knowing there's so much we can be doing to stop it from happening. They have all died because there's not enough fish in the sea for the Southern Resident orca pods. The salmon populations they depend on are dwindling and suffering from overfishing, diseases from fish farms and overheated water from too many dams.
If those who have the power to save them make the right design and breach the Lower Snake River dams, they won't be saving only the salmon but also many generations of orcas to come and the dreams of the people who've grown up loving them; the people who don't want their children to grow up in a world where the orcas are extinct because of humans like us.

Thank you for your time and for caring,

Sincerely (b) (6) and the whales we have lost

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: The time to act is now, for the future of healthy ecosystems that our lives and native species depend on.
Date: Monday, August 17, 2020 1:37:27 PM

EPA Columbia and Lower Snake Rivers,

I am writing to ask for your leadership to reduce water temperatures in the Snake and Columbia River to protect and restore endangered salmon, the Southern Resident orcas, and the communities who depend on them.

Specifically, I request the you consider the following points:

The Lower Snake and Columbia rivers are too hot for endangered salmon and steelhead. The Total Maximum Daily Load (TMDL) study recently released by EPA clearly shows that the dams are the main cause of increased water temperatures.

Large, shallow reservoirs created by the dams, coupled with intensifying climate change—threatens the Columbia and Snake rivers' already imperiled salmon and steelhead.

The science is clear—restoring the Lower Snake River is our very best opportunity to restore imperiled salmon and orca populations. I urge you to work with the people and policymakers in the Northwest to develop a comprehensive package of measures that restores the Lower Snake River and its salmon, helps feed starving Southern Resident orca, and invests in clean energy that protects the health of our communities and our river.

Northwest people and leaders must work together to craft a bold and effective plan that achieves these goals as quickly as possible. Without effective leadership, we risk losing these iconic species and the special benefits they bring to our region.

Thank you again for your careful consideration of this request.

(b) (6)
[redacted]

From:	(b) (6)
To:	ColumbiaRiverTMDL
Subject:	Urgent Message Regarding the Snake River Dam
Date:	Thursday, August 20, 2020 7:52:00 PM

To:
Chris Hladick,
Regional Administrator
US Environmental Protection Agency, Region 10 Park Place Building 1200 6th Ave.
Seattle, WA. 98101

Dear Chris Hladick,

My name is (b) (6), and I'm writing to you on behalf of those who cannot speak for themselves. The mothers who have been watching their babies starve to death before their eyes and knowing there's nothing they can do for them, and those babies we've lost who never get a chance at life because of humans error.

In the past 4 years all the babies born to Southern Residents have died of starvation. This news has been breaking my heart for years, especially knowing there's so much we can be doing to stop it from happening. They have all died because there's not enough fish in the sea for the Southern Resident orca pods. The salmon populations they depend on are dwindling and suffering from overfishing, diseases from fish farms and overheated water from too many dams.
If those who have the power to save them make the right choice and breach the Lower Snake River dams, they won't be saving only the salmon but also many generations of orcas to come and the dreams of the people who've grown up loving them; the people who don't want their children to grow up in a world where the orcas are extinct because of humans like us.

Thank you for your time,

Sincerely,
(b) (6) and all the whales we have already lost.

From: (b) (6)
To: ColumbiaRiverTMDL
Subject: URGENT: Snake River TDML Comment
Date: Thursday, August 20, 2020 12:40:12 PM

The EPA's response to the Total Maximun Daily Load (TMDL) Study is unacceptable. We cannot lower temperature standards when endangered Chinook salmon, and endangered salmon eating orca whales, are sliding towards extinction. Salmon need a cold river. The four Snake River Dams & Reservoirs warm the water to a lethal level. Why is the solution not to breach the Snake River Dams? By following the guidence of the 2002 EIS the Army Corps of Engineers can act on alternative 4, dam breaching. This solution was studied a second time in the 2020 EIS. We need you and the EPA to tell the Corps of Engineers to place the dams into a non-operational status, breaching the Lower Snake River dams. This must be done to lower water temperatures and comply with the current EPA standard.

(b) (6)

Dear Chris Hladic,

My name is (b) (6) Thank you for taking the time to read this letter. I am writing to you out of great concern. We need to help salmon. They are a keynote species that both humans and ocean life rely on for both food and industry. Salmon are also a key component to river health and the health of the intertidal zone. They are the number one food source of our 72 resident orcas, a mammal that is already under great stress.

Due to the stagnant water in the 14 dams on the Snake River, the water is over 68 degrees in temperature. The 68 degree temperature is the warmest that salmon can withstand. This means that the over 2 million salmon that return to the Snake River (either swimming up river to lay eggs or down river to become mature fish) are going to die at some point along the way due to the warm water temperature.

Salmon provide thousand upon thousands of jobs. This is an Environmental and Economic issue. Not to mention it is against the law under the Clean Water Act to have an uninhabitable environment for salmon. Heat is a form of pollution, dams are polluting the Snake River.

Please do something and fight to have the 4 lower Snake River dams breached. Cool the river and support salmon and those that rely on them, meaning all of us.

We are depending on you.

Sincerely,

(b) (6)

Chris Hladick
Regional Administrator
US Environmental Protection Agency
Region 10 Park Place Building
1200 6th Ave. Seattle
WA. 98101

Re: Total Maximum Daily Load for Temperatures in the Columbia and Snake Rivers.

Dear Chris Hladick,

My name is (b) (6), thank you for the opportunity to share my deep concern for the southern resident orcas and the wild chinook salmon they depend upon. As I'm sure you are aware, there are only 72 southern resident orcas in existence due to human interference with their primary food supply, wild chinook salmon, in the Columbia River Basin and the Salish Sea.

There are two species of orcas living in the Salish Sea and the southern resident orcas cousins, the Bigg's orcas, are thriving in the same loud, polluted waters. The crystal clear difference is prey availability. The southern resident orcas (salmon eaters) are starving while the Bigg's orcas (mammal eaters) are thriving due to an abundance of food. In just the last few years, Bigg's orcas have produced more successful births than the entire population of the Southern Resident Orcas.

Having moved to Vancouver last year, I can see how much of an impact culturally not just to First Nations peoples but to all members of the community orcas have. An entire tourism industry is based upon the mere chance to witness these extraordinary creatures. And these are just culturally significant, without mentioning the environmentally important role orcas and salmon play in balancing the ecosystem and maintaining biodiversity.

We appreciate your thorough TMDL report for us to pore over, read and study. As evidenced throughout this report and by several studies including Governor Jay Insee's endangered southern resident orca task force, the only real solution that will protect salmon and the southern resident orcas from extinction is through the bold action of breaching the four federal lower snake river dams. With a free flowing river the harmful warm waters will cool to temperatures salmon can survive, salmon will return in abundance (approximately two million smolts annually) and adult salmon will have more success spawning without the barriers of the dams impeding their migration.

Lastly, the Southern Resident Orcas will be given a chance to survive in this grim race against extinction. With the buoyant announcement of three pregnancies for the southern resident orca population in July, evidenced through photogrammetry, it is more critical than ever to move forward to protect this beloved endangered population of orcas. The EPA literally stands for the Environmental Protection Agency. Protection against harm and especially the calamity of extinction. I deeply disapprove of this apathetic suggestion that “a river’s uses are no longer expressly for salmon” as a reasonable solution to lower the bar in environmental standards because the standards are too difficult to meet. This is unacceptable to me. It is an absolute disgrace for an organization that holds the great responsibility of working under the name Environmental Protection Agency to stoop to indifference about two extinctions and the collapse of an ecosystem when we need you to rise up and protect. Strong, bold, fair leadership is critical right now.

It is past time to begin breaching these environmentally and economically disastrous dams. I implore you to stand proud behind your honorable name and do the difficult thing that is necessary: Be the leader we need and Breach the Lower Four Snake River Dams in 2020.

This bold action will make you responsible for protecting two species from extinction. This will be remembered, and those responsible for avoiding the worst will be revered.

Sincerely,

(b) (6)

ColumbiaRiverTMDL

From: (b) (6)
Sent: Wednesday, May 20, 2020 2:08 PM
To: ColumbiaRiverTMDL
Subject: Comments on Columbia River Basin TMDL
Attachments: SalmonHistoricalReports.pdf; SnakeWaterTemps1950s.pdf

Attached are two files as PDF's; one containing Water Temperature data measured on the Lower Columbia River in 1875 (SalmonHistoricalReports.PDF) and the other containing Water Temperature data measured on the Lower Snake River in the 1950's (SnakeWaterTemps1950s.PDF).

As can be seen from a Data Table contained in the first attachment, Water Temperatures of 70 Degrees F were measured on the Lower Columbia River in 1875; and on the date of this Temperature measurement in 1875 data collection was 'terminated' so possibly the Water Temperatures in 1875 got even hotter than 70 Degrees F on the Lower Columbia River downstream of Portland, Oregon.

The second attachment contains daily Water Temperature data collected by the United States Geological Survey (USGS) during the 1950's on the Lower Snake River downstream of Clarkston, Washington. As can be seen from this attachment, exceeding 68 Degrees F on the Lower Snake River was an 'Annual Event' even under 'Natural Conditions' prior to the construction of the Lower Snake River Dams; the first of which came online in the early 1960's.

Please consider this Historical Temperature Data as part of the current TMDL process; and include it in your current reports. This information is contained within Federal Reports published as Public Information.

(b) (6)

Encl 1-1

UNITED STATES COMMISSION OF FISH AND FISHERIES.

PART IV.

REPORT

OF

THE COMMISSIONER

FOR

1875–1876.

A—INQUIRY INTO THE DECREASE OF THE FOOD-FISHES.
B—THE PROPAGATION OF FOOD-FISHES IN THE WATERS OF THE UNITED STATES.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1878.

Encl 1-2

APPENDIX B.

INLAND FISHERIES.

umet, it will probably be useless to introduce new food-fishes. But other streams, and the numerous lakes in this part of the State can be successfully restocked. Eels would without doubt succeed, and the finding of the small shad at Riverdale proves that they have lived for a few years in that stream.

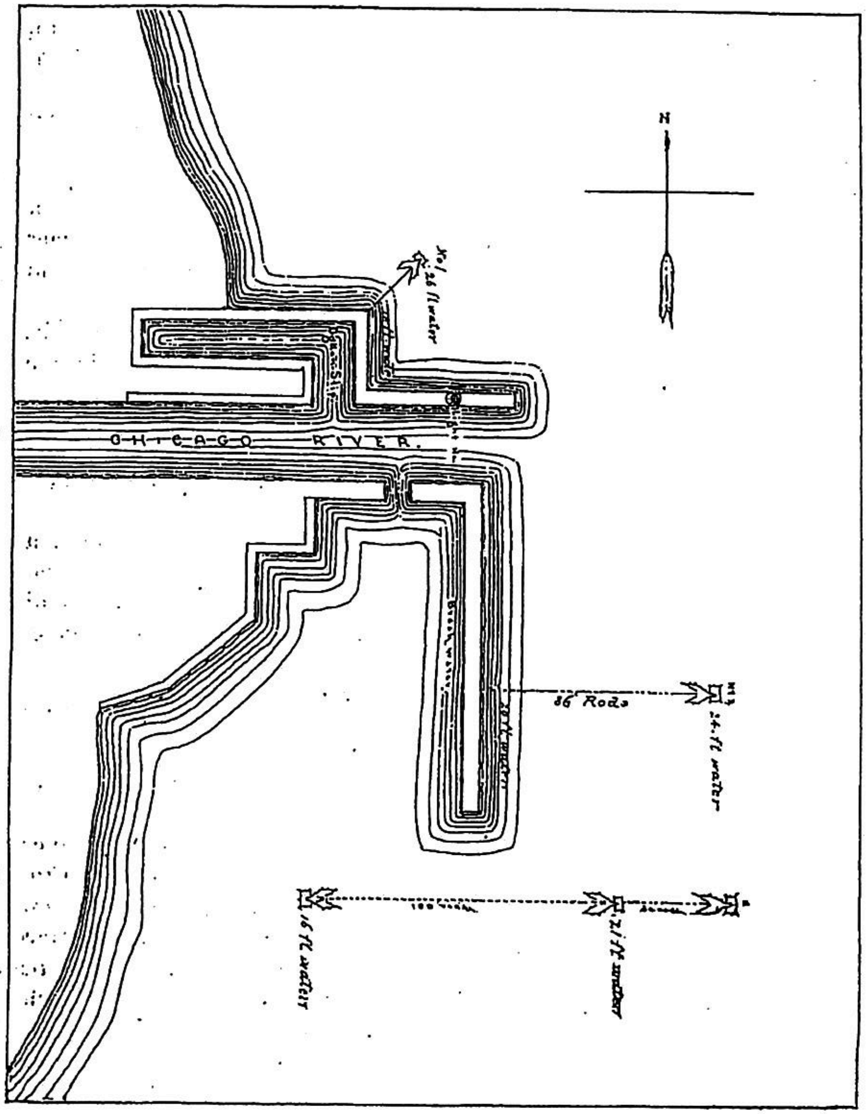

Diagram showing position of nets in Chicago Harbor.

Enc 1-3

III.—THE SALMON FISHERIES OF THE COLUMBIA RIVER.

By Livingston Stone.

San Francisco, Cal., *December* 31, 1875.

Sir: I beg leave to report as follows:

In pursuance of instructions received from you from Washington, I left San Francisco for the Columbia River on the 1st day of May, 1875, and arrived at Portland, Oreg., on the 6th day of the same month. From this point I made various excursions up the Willamette and up and down the Columbia from the ocean to Celilo, 210 miles from the mouth of the river, giving special attention to the natural history of the salmon and the business of the river canneries, besides looking up a favorable point for the artificial propagation of salmon.

In regard to the natural history of the salmon I was able to gather quite a large number of facts, but could make only very little certain progress, in the limited time that I had to spend on the Columbia, toward determining the number and characteristics of the many varieties of salmon which frequent the river.

The facts which I collected in regard to the natural history of the salmon, together with the other results of my investigations, will be found in the course of the following report.

LIVINGSTON STONE.

Prof. Spencer F. Baird,

United States Commissioner of Fish and Fisheries.

A—THE COLUMBIA RIVER.

The Columbia, as is generally known, is the most productive salmon river of the world. Its vast tributaries, extending over many degrees of latitude and longitude, furnish immense spawning-grounds for the accommodation of the parent fish, while the broad and deep channel of the main stream for hundreds of miles affords a magnificent highway, free of obstruction, for their easy ascent of the river.

These advantages the salmon have availed themselves of in an extraordinary degree, and they pour through the mouth of the Columbia and up its current in an abundance unknown to any other river in the inhabited portions of the globe.

The abundance of the salmon, however, is not their only peculiarity in this wonderful river. They occur in greater variety also than in any other known river of the world.

While there is only one anadromous salmon in the Sacramento, one in the Penobscot, one in the Miramichi, one in the Rhine, and one in the British rivers, there are said to be no less than twelve distinct varieties in the Columbia. These in all their Protean forms, occasioned by differences of age, season, and sex, have constituted a labyrinth which has always been an invincible puzzle to naturalists.

In the very brief time that I spent on the Columbia it was quite impossible to acquire anything like an exhaustive knowledge of the different varieties in the river. I consequently confined myself chiefly to inquiries into the characteristics of the Chinook salmon (*Salmo quinnat*), which I had an opportunity to see and study, and to gathering such information as I could regarding the other kinds, from the fishermen and other salmon-experts of the river.

The results of my investigation in regard to the *Salmo quinnat* will be found in the form of answers to Professor Baird's very valuable series of questions relating to fishes.

B—QUESTIONS RELATIVE TO THE FOOD-FISHES.—SALMO QUINNAT.

1.—NAME.

Question. What is the name by which this fish is known in your neighborhood? If possible make an outline sketch for better identification.

Answer. This fish is known in the Columbia River as the "Chinook salmon," the "Tyee salmon," and the "common salmon of the Columbia."

2.—DISTRIBUTION.

Question. Is it found throughout the year, or only during a certain time; and for what time?

Answer. The Chinook salmon are not found in the main Columbia throughout the year, but begin to enter the river in February and continue to run until some time in September.

Question. If resident, is it more abundant at certain times of the year, and at what times?

Answer. They are most abundant from April to August, the greatest number making their appearance in the month of July.

3.—ABUNDANCE.

Question. How abundant is it, compared with other fish?

Ans· They vastly exceed in abundance any other fish of the river.

Question. Has the abundance of the fish diminished or increased within the last ten years, or is it about the same?

Answer. The salmon have not increased in the Columbia River during the last ten years, and it is not known that they have diminished any. Fewer Chinook salmon now make their appearance in the upper rivers, but this is sufficiently accounted for by the fact that such a vast quantity are now netted in the main river on their way up. On the Willamette River the fishermen claim that the salmon have very much diminished, and that they caught only twenty or thirty now where they used to catch a hundred. This is undoubtedly true, but it does not prove that the salmon of the Columbia are diminishing, for it may be, and probably is, only the natural result of so many thousand more being stopped and caught in the main river below than there used to be. This must, of course, lessen the number that enter the Willamette.

Question. If diminished or increased, what is the supposed cause?

Answer.

Question. What is the amount, or extent, of the change in abundance?

Answer.

4.—SIZE.

Question. What is the greatest size to which it attains (both length and weight), and what the average?

Answer. The largest specimen that I ever saw weighed had a length of 35 inches, a girth of 31 inches, and a weight of 65½ pounds. One of the fishermen told me that he saw one caught in May, 1843, which weighed 83 pounds. This is the largest Columbia River salmon that I have heard of. The average weight is 22 or 23 pounds whole, and 16¾ or 17 pounds dressed. Out of 98,000 salmon taken at Clifton, Oreg., in 1874, only one weighed as much as 65 pounds.

Question. State the rate of growth per annum, if known, and the size at one, two, three, or more years.

Answer. The rate of growth is not known. There is every reason to believe, however, that it is similar to that of the Sacramento salmon. (See Report of United States Commissioner of Fish and Fisheries, 1872–'73, pp. 185, 186.)

Question. Do the sexes differ in respect to shape, size, rate of growth, &c.?

Answer. In the spring the sexes are exactly alike in appearance. At and near the spawning-season they differ very much. Their rate of growth appears to be nearly the same.

5.—MIGRATIONS AND MOVEMENTS.

Question. By what route do these fish come in to the shore, and what the subsequent movements?

gression to that point is about 100 miles a month. Dr. Suckley, in the Pacific Railroad Reports, estimates that the *Salmo scouleri* ascends the river at the rate of 100 miles a week. This variety, however, is a fall salmon and in great haste to deposit its spawn, which undoubtedly accounts for the difference of speed in the two instances. The spring (or summer) salmon are a week going from the Cascades to the Dalles. They are only a day or two getting through the Dalles, for they are seen above the Dalles a day or two after their first appearance at the mouth of the Dalles.

Question. If anadromous, what is the length of their stay in fresh water, and when do they return to the sea?

Answer. This question cannot be determined until it is known whether the fall runs of salmon are distinct from the *Salmo quinnat*. All of this latter variety return to the sea (or die) in August and September, as none are found in the river after that time having the characteristics of the spring run of the *Salmo quinnat*. It may be added here that vast shoals of the young of some salmon descend the Columbia in summer, passing the lower fisheries in June and July, and also that full-grown salmon of some variety are caught in considerable quantities, nearly exhausted, on the back of the drift-nets of the Lower Columbia in July and August.

Question. Do the different sexes or ages vary in this respect?

Answer. They do not.

Question. Do these fish come on to the breeding grounds before they are mature; or do you find the one or two year old fish with the oldest?

Answer. Fish of all sizes and ages above a year old are found together, on the breeding-grounds, except the salmon parrs recently hatched.

Question. What are the favorite localities of these fish? Say whether in still water or currents; shallow or deep water; on the sand; in grass; about rocks, &c.

Answer. These salmon are found anywhere in the river in deep water, in shallow water, over sand, gravel, and rocks; everywhere except in lagoons or sloughs, aside from the river, where the water stagnates.

Question. What depth of water is preferred by these fish?

Answer. No depth in particular.

Question. What the favorite temperature and general character of water?

Answer. The temperatures of the Lower Columbia are given below.

Encl 1-5

Table of daily temperatures of the water of the Columbia River at Clifton, Oreg., Sundays excepted.

Date.	7 a.m.	12 m.	Date.	7 a.m.	12 m.	Date.	7 a.m.	12 m.
1875.	°	°	1875.	°	°	1875.	°	°
May 10	51	51½	June 11	52½	60	July 14	66	67
11	50¾	51	12	52½	60	15	66	67
12	50	50½	14	59	60	16	66	67½
13	51	52	15	59½	60½	17	66	68
14	52	52	16	59½	61	19	67	68½
15	52	52½	17	59	61	20	67½	69
17	53	54	18	59	60	21	67½	69
18	54	54	19	59	60	22	68	68
19	53½	54	21	58½	59½	23	68	68
20	54	54½	22	59	59	24	68	69
21	54	54½	23	58	59	26	68	70
22	54	54½	24	58	58½	27	68	7[illegible]
24	54	55	25	58	59	28	68	69
25	54	55½	26	58	59½	29	67	68
26	54	55½	28	59	60	30	67	68
27	54½	55½	29	60	60½	31	66	67½
28	54½	56	30	60	60½	Aug. 2	66	67
29	54½	56	July 1	60	61	3	65½	66
31	55	56	2	60½	61½	4	65	67
June 1	55	56	3	60½	60½	5	65	66
2	55	56	5	62	63	6	66	67
3	55	56	6	63	64½	7	67	68
4	55½	56½	7	64	65	9	66	67
5	55½	56½	8	64	65	10	65	67½
7	56	57	9	65	66	11	66	67
8	56½	57½	10	65½	67	12	67	69
9	57	58	12	66	67	13	67	69½
10	58	59	13	66	67	14	68	70

The headwaters are, of course, much colder in the summer months. All parts of the river seem to suit the salmon, from which it may be inferred that all the temperatures of the table, together with the colder ones of the tributaries, are satisfactory to the *Salmo quinnat*

6.—RELATIONSHIPS.

Question. Do these fish go in schools after they have done spawning, or throughout the year, or are they scattered and solitary?

Answer. They do not go in proper schools as mackerel and other sea fish do. I think each salmon makes its progress on its own individual account; but such vast numbers ascend the river at a time that they appear to move in schools.

Question. Have they any special friends or enemies?

Answer. Seals, sea-lions, otters, eagles, and ospreys are their special enemies. They have no friends that are of any good to them, that I am aware of. I should, however, except the Oregon legislature, which has at last provided a close-time for salmon, which example the Washington Territory assembly ought to follow as soon as possible.

Question. To what extent do they prey on other fish; and on what species?

Answer. The salmon devour great quantities of smelts and other smaller fish, when in salt water; but in fresh water they do not eat anything. Out of 98,000 salmon examined at the cannery of J. W. Cook & Co., at Clifton, Oreg., in 1875, only three had food in their stomachs, the Silverside Salmon, the Hard-heads, the Humpback Salmon, the Hooknosed Salmon, the Brook Trout, the larger Brook Trout, the Salmon Trout, the Lake Trout.

I discovered afterward that Mr. Cook was right as far as he went; but as I had just arrived on the river and had not identified any of the fishes at that time except the *Salmo quinnat*, the contradictory character of my information seemed very discouraging.

The varieties mentioned by Mr. Cook I afterward found to be as follows:

The Chinook Salmon is the *Salmo quinnat*.
The Blueback is the *Salmo gairdneri*.
The Silverside Salmon is the *Salmo* sp. ?
The Hard-head is the *Salmo truncatus*.
The Humpbacked Salmon is the *Salmo proteus*.
The Hooknosed Salmon is the *Salmo scouleri*.
The Brook Trout is the *Fario stellatus*.
The large Brook Trout is the *Salmo masoni*.
The Salmon Trout is the *Salmo gibbsii*.
The Lake Trout is the *Salmo* sp. ?

On the Willamette I was told by the fishermen that there were, besides the varieties just mentioned, the Dog Salmon, the Klackamas Chinook Salmon, the Klackamas Trout, the Fall Chinook Salmon, the Fall Silver Salmon, and, in fact, a different salmon or trout in almost every different river. I could not identify any of these except the first, which is certainly the *Salmo canis* of Suckley, but it is very doubtful whether the *Salmo canis* and also the *Salmo Scouleri* are not merely the altered forms of some of the varieties of fish already mentioned after undergoing the very great changes which come on as the eggs and milt become ripe for the spawning-season. Indeed I feel very sure that the *Salmo canis* is a form of one of the other varieties which it takes at the approach of the spawning-period.

D—METHODS OF FISHING.

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The various methods of fishing for the *Salmonidæ* on the Columbia may be found mentioned in the answers given above to Professor Baird's questions on the *Salmo quinnat*, but I will also offer here a recapitulation of the different methods of capturing the fish. They are—

1. By drifting with drift-nets, as at all the canneries of the Columbia.
2. By hauling a seine, as at Chinook and various points on the Columbia.
3. By set (gill) nets, as at Oregon City, on the Willamette.
4. By scoop-nets, as at the Dalles and the Falls of the Willamette.
5. By dip-nets, as at the Dalles.
6. By hook and line, as at the mouth and also at the headwaters of the Columbia, for salmon, and in all the smaller streams for trout.

7. By traps and weirs, as at Oak Point and various places on the Columbia.
8. By fishing-rakes, as at the Lower Columbia, and the Cowlitz for smelts.
9. By "twitching-hooks," as at the Falls of the Willamette for salmon.
10. By spearing, as everywhere, among the Indians, where the water is shallow enough.

E—THE CANNERIES OF THE COLUMBIA.

Every one has heard of the canneries of the Columbia. They have well deserved the reputation they have acquired, for seldom has a branch of industry assumed so quickly such large proportions or yielded such large profits to those engaged in it. It is only a very few years since the first salmon-cannery on the Columbia, commenced operations, and last year (1874) there were fourteen large establishments, employing in the aggregate nearly two thousand men and turning out nearly twenty million pounds of salmon in cans.

In May, 1875, I visited the cannery of the Oregon packing company carried on by J. W. and V. Cook through whose kindness I was enabled to obtain much information about the process of canning salmon, as well as about the fisheries and natural history of the salmon of the Columbia. The Messrs. Cook employ about one hundred and fifty men, mostly Chinamen. They run an average of twenty boats through the fishing season, (from the middle of April to the middle of August) and their buildings which are conveniently located and very methodically constructed cover nearly half an acre of ground. The buildings extend to the waters edge or rather they are built out over the water so that small boats can go under them. In front of the cannery is a platform very firmly built on piles which forms a wharf to which the ocean steamers can run up. At one corner of the establishment, and just in the rear of the wharf is a large rack opening on the river which receives the salmon fresh from the water just as the boats bring them in from the seines. This rack is capable of holding one or two thousand salmon. From the rack the salmon are passed to the cleaning bench, where the heads, tails, fins, and entrails are removed, and the body of the fish thoroughly washed in three different waters and with a hose. From the cleaning bench the salmon is passed on to the cutter where a system of revolving knives cuts the fish transversely into pieces about 4 inches long. These pieces are then passed on to the canning bench, where chinamen who are required to wash their hands every half hour, cut up the fish with meat knives into pieces of a suitable size for canning, and pack them into cans. The filled cans are then pushed on to the next bench where the covers are fitted on. The next set of Chinamen solder on the covers and pass them on to another set, who place them on iron racks and lower them into the boilers. After being sufficiently boiled the cans are taken out, washed, cooled, tested, labelled, cased, and placed on the wharf ready for shipment. In the course of the entire process the salmon pass through forty or fifty hands. In 1874, the Cook Bro's. cut up 98,000 salmon, averaging in weight between 16 and 17 pounds when dressed. They shipped upwards of 30,000 cases containing 48 one-pound cans each.

There were in all in the spring of 1875, fourteen canneries on the Columbia the first being at Astoria, only a few miles above the bar at the mouth of the Columbia, and the last or uppermost being 60 miles up the river at Rainier.

I give below a list of the Columbia River canneries in May, 1875, in the order in which they come as one descends the river from Portland, Oregon.

Name.	Number of cases shipped in 1874. (In round numbers.)
1. R. D. Hume, Rainier. (Sixty miles from the mouth of the river. Not running now.	6,000
2. William Hume	23,000
3. George W. Hume	35,000
4. Joseph Hume	30,000
5. A. S. Hapgood	25,000
6. John West & Co	35,000
7. T. M. Warren	25,000
8. Watson Bro's & Braman	16,000
9. Oregon Packing Company, (J. W. & V. Cook)	30,000
10. R. D. Hume, Bayview	37,000
11. Columbia River Salmon Company	10,000
12. Meigler & Co	16,000
13. Badnlot & Co., Astoria	15,000
14. Booth & Co., Astoria. (Had not begun operations)	
Total	303,000

As each case contains 48 one-pound cans* this makes a total of 14,256,000 pounds of canned salmon that were put up at the canneries of the Columbia River in 1874.

The cannery of Booth & Co., at Astoria, which made no returns last year for the simple reason that it was not built, was ready to commence work at the beginning of the season of 1875. This establishment now employs about 175 men and does a large share of its work by steam. It is the largest on the river and in May, 1875, the proprietors expected to turn out 45,000 cases of salmon, the coming season.

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Some notion of the magnitude of these establishments may be arrived at by considering that at some of the larger ones the tin alone for the cans costs between $50,000 and $100,000. The salmon themselves that are consumed in all the canneries of the river in a year, if placed lengthwise in a line, would reach upwards of 500 miles; while the cans if laid on their sides and placed end to end would reach from New York to Omaha.

The prices of canned salmon have varied very much during the last few years. In 1874 the average price was $6 a case, or 12½ cents per

*Usually, though, some two-pound cans are put up.

pound can. At the beginning of the season in April, 1875, prices had dropped to $4.80 a case, or 10 cents a can, which did not pay expenses, the cost being on an average, $5 a case. In consequence the canneries in 1875 did not open at all at first, but a little later prices went up again to $5.90, which gave a margin of profit, and the canneries began operations.

Prices have averaged between $5.20 and $5.40 a case this year, which has enabled the canning establishments to make a moderate profit; but the business is not as it has been in past years, when the larger canneries cleared from $30,000 to $70,000 in a season.

Besides the fish that were canned on the Columbia last year, (1874,) there were about 250,000 salted and barreled. The salted salmon bring from $7 to $8 per barrel of 200 pounds in San Francisco. A considerable number of salmon are, of course, consumed fresh, but owing to the very limited market for them at home, and the impracticability of exporting them fresh, the quantity so used is in comparison exceedingly small. (See answers to questions relative to food fishes of the United States pages 4-44.)

In concluding these notes on the Columbia River, I will say that in pursuance of my instructions to look up a suitable point for hatching the Columbia River salmon artificially, I made careful inquiries and at last found a place which appears to be in every way suited to the purpose. It is at Klackamas Falls, about 25 miles up the Klackamas River, where both the *Salmo quinnat* and the *Salmo truncatus* can be captured at their respective spawning seasons in vast quantities. Should the United States Fish Commission ever decide to carry on salmon hatching operations on the Columbia, I think it can be done here with distinguished success.

REPORT

OF THE

W. S.

COMMISSIONER OF FISH AND FISHERIES

ON

INVESTIGATIONS IN THE COLUMBIA RIVER BASIN

IN REGARD TO

THE SALMON FISHERIES.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1894.

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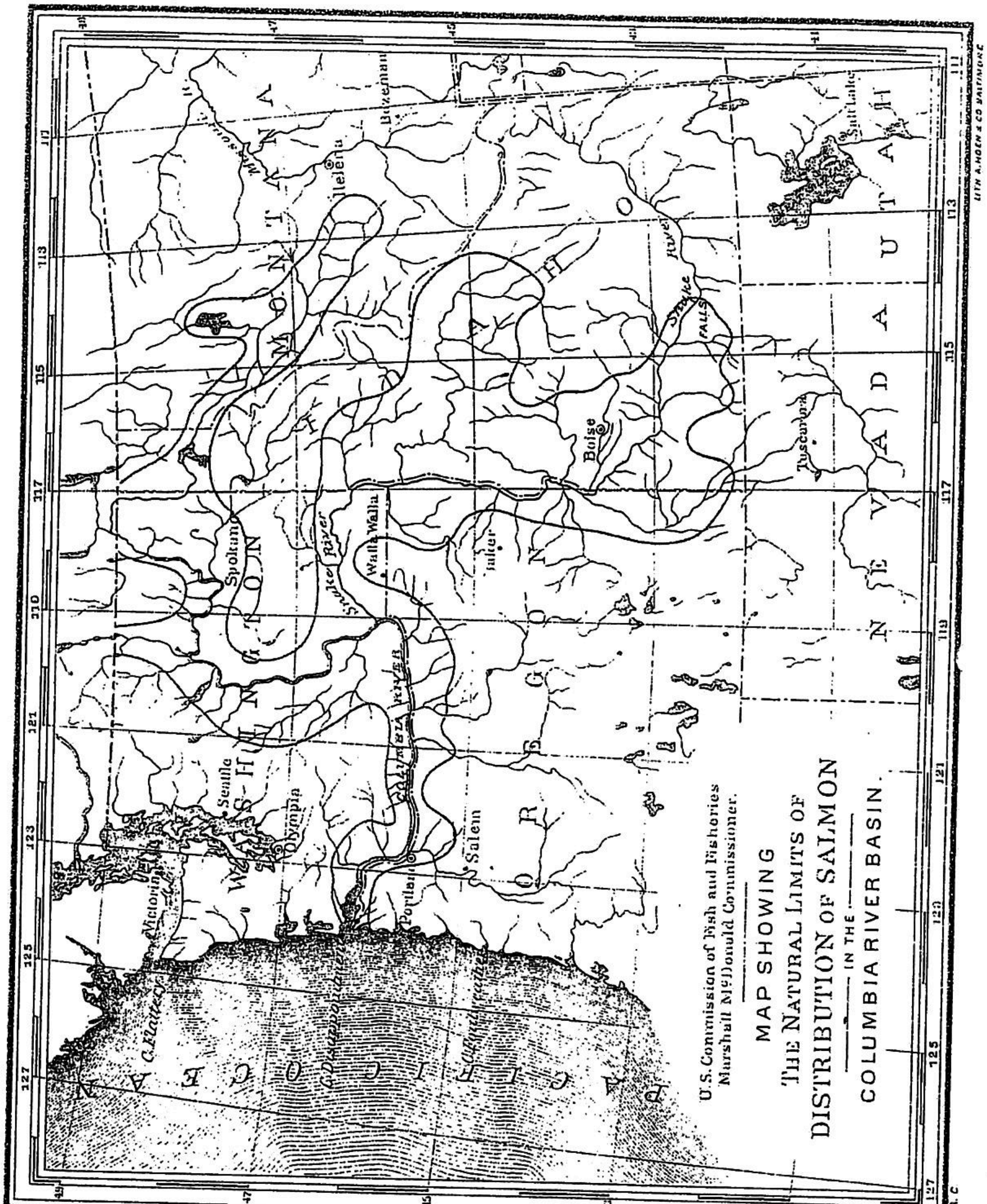
U.S. Commission of Fish and Fisheries
Marshall McDonald Commissioner.
MAP SHOWING
THE NATURAL LIMITS OF
DISTRIBUTION OF SALMON
IN THE
COLUMBIA RIVER BASIN.
Victoria
Seattle
Olympia
Portland
Salem
Spokane
Walla Walla
Helena
Bozeman
Boise
Tuscarora
Salt Lake
Columbia River
Snake River
FALLS
M.A.C
LITH. A. HOEN & CO. BALTIMORE

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THE SALMON FISHERIES OF THE COLUMBIA RIVER BASIN.

By MARSHALL McDONALD,
United States Commissioner of Fish and Fisheries.

U. S. COMMISSION OF FISH AND FISHERIES,
Washington, D. C., May 31, 1894.

Hon. ADLAI E. STEVENSON,
President of the Senate:

SIR: In compliance with instructions conveyed in the provisions of the Sundry Civil Bill, which became a law August 5, 1892, I have the honor to submit a report of investigations in the Columbia River Basin.

The first of the provisions above referred to authorized the expenditure from the appropriation for inquiry respecting food-fishes of $2,000, or so much thereof as may be necessary, "In examining the Clarke's Fork of the Columbia River, with the view to ascertain the obstructions which prevent the ascent of salmon up said river to the Flathead Lake and adjacent waters."

The second provision directed an investigation and report respecting the advisability of establishing a fish-hatching station at some suitable point in the State of Washington, and appropriated for the same "$1,000, or as much thereof as may be necessary."

It was not known whether the failure of the salmon to enter the Clarke Fork of the Columbia was due to natural obstructions preventing their ascent, or was to be attributed to the extensive fishing operations prosecuted in the Lower Columbia, or possibly to other causes to be disclosed by the proposed investigation. Again, the location of the hatchery proposed for the State of Washington would be necessarily determined by our ability to secure an adequate supply of spawning salmon within convenient distance of the hatchery.

It appearing probable that the methods of the large fisheries pursued in the Lower Columbia, if permitted to continue, would effectually intercept the run of salmon to the headwaters, and thus defeat the object for which the hatchery is proposed, it was thought proper and expedient to institute a general investigation covering the entire Columbia River Basin, and if conditions were disclosed threatening disaster to these valuable and productive fisheries, to bring the matter to the attention of Congress and the States interested in their prosperity.

The direction of the field investigation was intrusted to Prof. B. W. Evermann, assistant in the Division of Inquiry Respecting Food-Fishes, whose report is appended to and constitutes an integral part of the report of the Commissioner of Fisheries.

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A very complete statistical investigation into the history, methods, apparatus, present conditions, product, and annual value of the salmon fisheries of the Columbia has also been made by Mr. W. A. Wilcox, under the direction of Dr. H. M. Smith, assistant in charge of the Division of Statistics and Methods of the Fisheries, the results of which are embodied and discussed in the report which is herewith respectfully submitted.

CONDITIONS DETERMINING THE SALMON PRODUCTION OF A RIVER BASIN.

There are fundamental conditions determining the salmon production of a river basin and the nature and extent of the fisheries which may be maintained without overtaxing the productive capacity of the river. All the species of salmon which are the object of the fisheries are alike under the constraint of a natural law, which compels them to enter the fresh waters for the purpose of spawning. Some species ascend to a relatively short distance above tide water. Others, like the chinook, push their migrations to the remotest sources of the rivers and tributary streams when not prevented by natural or artificial obstructions. Where the area of distribution is contracted by the erection of barriers, dams, or other obstructions which the salmon can not surmount, the production of the river is diminished *pro tanto*, for the reason that the young salmon remain for some months in the waters in which they are hatched—they must here find their food—and consequently the extent of the feeding-grounds open to them will be the measure of nature's ability to repair the waste occasioned by natural casualties and the fishing operations. If there be no contraction of the breeding area by artificial obstructions, but, on the other hand, the times, methods, and apparatus of the fisheries are such as to intercept or in a large measure prevent the run of salmon into and up the rivers, then a serious decline in the fisheries is inevitable.

It is possible by fish-cultural operations pursued on an adequate scale, by hatching and planting the fry in the head waters of the Columbia and its tributary streams, to realize the full productive capacity of the river, so long as eggs can be obtained in sufficient numbers to furnish a basis for the extensive operations required. This would not be possible, however, if the fishing operations in the lower river practically excluded the salmon from the streams to which it would be necessary to have recourse to obtain a supply of eggs. It is evident, therefore, that fish-cultural operations can not be relied upon exclusively or chiefly to maintain the salmon supply in the Columbia. The regulation of the times, methods, and apparatus of the fisheries should be such as to assure the largest opportunity practicable for reproduction under natural conditions. Artificial propagation should be invoked as an aid and not as a substitute for reproduction under natural conditions.

THE LIMITS OF MIGRATION OF SALMON.

The limits of migration of salmon in the Columbia River basin, as determined by impassable falls in the larger tributaries of the Columbia and their affluents, is shown in the accompanying chart, there being no serious obstructions existing in the main river within the limits of the United States.

The area of distribution is approximately 90,000 square miles. This immense tract is drained by innumerable streams of clear cold water, into which the salmon enter for the purpose of spawning and up which they ascend till their progress is stopped

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by falls or other obstructions which they cannot surmount. These waters furnish the feeding-grounds of the young salmon during their early life, which is spent in the fresh waters. Their migration seaward does not begin until they are at least a year old and have attained a length of from 8 to 10 inches. These streams are the nurseries of the great salmon fisheries of the lower Columbia. From each goes out every year a colony, more or less numerous, to swell the aggregate of young salmon necessary to repair the waste by natural casualty and by capture.

The area of natural distribution has not as yet been very materially abridged. Certain streams, such as the Bruneau and the Boise, have been obstructed by dams near their mouths, but the vast extent of waters still accessible to salmon and affording suitable breeding and feeding grounds, indicates that we must look to other causes to explain any ascertained deterioration in the salmon fisheries of the Columbia.

DECREASE OF SALMON IN THE HEAD WATERS OF THE COLUMBIA RIVER.

The investigations made by Prof. Evermann and the parties under his direction establish conclusively the fact that there has been a very great reduction in the number of salmon frequenting the head waters of the Columbia River and its tributaries. This decrease is more notable in the main river. In the early history of the fishery salmon were found in the head waters in marvelous abundance. According to the information obtained by Prof. Evermann:

> They were abundant in the Columbia River at Kettle Falls as late as 1878. Since then there has been a great decrease. They have been scarce since 1882. Since 1890 there have been scarcely any at Kettle Falls. The Meyers Brothers say that they have been almost unable to buy any salmon for their own table from the Indians for three years. Certain Indians with whom we talked at Kettle Falls said salmon were once very abundant there, but that very few are seen now. Other persons testified to the same effect. Essentially the same information was obtained regarding the decrease of salmon in other parts of the upper tributaries of the Columbia, viz: at Spokane, in both the Big and Little Spokane rivers, and in the Snake River and its various tributaries.

Dr. O. P. Jenkins, an assistant of Prof. Evermann, makes the following report in reference to the Yakima River, Washington:

> The Yakima is the main stream of the valley. It receives many tributaries, the main ones being Manistash and Wilson creeks. The river near the city (Ellensburg) is 160 feet wide, by an average of 10 feet deep, and flows with a velocity of 1 foot per second. Temperature at 9:15 a.m., August 24, 1893, 60° F.; water clear. Those acquainted with the facts state that formerly, up to about 1885, salmon of three or four kinds, including the quinnat, ran up the stream to this valley and spawned in the river in great numbers; at present very few make their appearance.

There is no reason to doubt—indeed, the fact is beyond question—that the number of salmon now reaching the head waters of streams in the Columbia River basin is insignificant in comparison with the number which some years ago annually visited and spawned in these waters. It is further apparent that this decrease is not to be attributed either to the contraction of the area accessible to them or to changed conditions in the waters which would deter the salmon from entering them. We must look to the great commercial fisheries prosecuted in the lower river for an explanation of this decrease, which portends inevitable disaster to these fisheries if the conditions which have brought it about are permitted to continue.

The relations of the decreased number of salmon in the head waters to the development of the commercial fisheries is brought out in a very instructive way by an analysis of the following table:

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Summary of the salmon-canning industry of the Columbia River from its origin to the present time.

Year.	Gross weight of salmon utilized.	Number of cases packed.	Value.	Average value per case.	Year.	Gross weight of salmon utilized.	Number of cases packed.	Value.	Average value per case.
	Pounds.					*Pounds.*			
1866	260,000	4,000	$64,000	$16.00	1881	35,750,000	550,000	$2,475,000	$4.50
1867	1,170,000	18,000	288,000	16.00	1882	35,184,500	541,300	2,600,000	4.80
1868	1,820,000	28,000	392,000	14.00	1883	40,911,000	629,400	3,147,000	5.00
1869	6,500,000	100,000	1,350,000	13.50	1884	40,300,000	620,000	2,915,000	4.70
1870	9,750,000	150,000	1,800,000	12.00	1885	35,997,000	553,800	2,500,000	4.51
1871	13,000,000	200,000	2,100,000	10.50	1886	29,152,000	448,500	2,135,000	4.76
1872	16,250,000	250,000	2,325,000	9.30	1887	23,140,000	356,000	2,124,000	5.97
1873	16,250,000	250,000	2,250,000	9.00	1888	24,211,005	372,477	2,327,981	6.25
1874	22,750,000	350,000	2,625,000	7.50	1889	20,685,495	309,885	1,609,820	5.34
1875	24,375,000	375,000	2,250,000	6.00	1890	28,781,385	435,774	2,407,456	5.52
1876	29,250,000	450,000	2,475,000	5.50	1891	26,450,635	398,953	2,240,964	5.62
1877	24,700,000	380,000	2,052,000	5.40	1892	32,185,995	487,338	2,679,069	5.50
1878	29,900,000	460,000	2,300,000	5.00	1893	24,050,000	370,000	2,107,500	5.70
1879	31,200,000	480,000	2,640,000	5.50					
1880	34,450,000	530,000	2,650,000	5.00	Total	658,424,515	10,098,427	59,029,790	5.85

Canning operations on the Columbia River began in 1866, when 4,000 cases were packed and sold at an average of $16 per case. As early as 1872 the total pack reached 250,000 cases, the price per case having declined to $9. Each succeeding year operations were extended and reached their culmination in 1883 and 1884, when upwards of 600,000 cases were packed each season. From this time on the catch declined, having reached its lowest point in 1889, the number of cases packed that season being 309,885, or less than half the number of cases packed in 1883 and 1884.

Up to 1888, practically the entire pack consisted of the king or chinook salmon, and the fishing season did not extend beyond the first of August. In 1889 the packers began canning bluebacks and steelheads to make up the deficiency in the supply, and extended their operations to the first of September.

DETAILED STATISTICS OF THE SALMON INDUSTRY OF THE COLUMBIA RIVER, 1889-92.

The following series of tables shows, in some detail, the extent of the salmon fishery and canning industry of the Columbia River during the years 1889 to 1892, inclusive, as determined by the inquiries conducted by this Commission.

The number of fishermen and shore employes connected with the salmon industry in each of the years named is indicated in Table A:

A.—*Table showing the number of persons employed in the salmon industry of the Columbia River from 1889 to 1892.*

How engaged.	1889.	1890.	1891.	1892.
Oregon:				
Fishermen	1,606	1,648	1,929	2,064
Shoresmen and cannery employes	870	1,028	1,057	1,100
Total	2,476	2,712	2,986	3,164
Washington:				
Fishermen	1,535	1,510	1,575	1,677
Shoresmen and cannery employes	594	602	654	704
Total	2,129	2,112	2,229	2,381
Total for river:				
Fishermen	3,141	3,194	3,504	3,741
Shoresmen and cannery employes	1,464	1,630	1,711	1,804
Total	4,605	4,824	5,215	5,545

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Quality of Surface Waters of the United States 1952

Parts 9–14. Colorado River Basin to Pacific Slope Basins in Oregon and Lower Columbia River Basin

Prepared under the direction of S. K. LOVE, *Chief, Quality of Water Branch*

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1253

Prepared in cooperation with the States of California and Utah, U. S. Bureau of Reclamation, and with other agencies

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1957

Encl 3 -1

SNAKE RIVER MAIN STEM--Continued

SNAKE RIVER NEAR CLARKSTON, WASH.

LOCATION.--One mile downstream from gaging station, 1 mile upstream from Alpowa Creek, 8 miles downstream from Clarkston, Asotin County, and 133 miles upstream from mouth.
DRAINAGE AREA.--103,200 square miles, approximately (above gaging station).
RECORDS AVAILABLE.--Chemical analyses, November 1951 to September 1952.
Water temperatures: November 1951 to September 1952.
EXTREMES, 1951-52.--Dissolved solids: Maximum, 283 ppm Sept. 21-30; minimum, 96 ppm May 21-31.
Hardness: Maximum, 152 ppm Sept. 21-30; minimum, 51 ppm June 1-10.
Specific conductance: Maximum daily, 463 micromhos Nov. 20; minimum daily, 118 micromhos May 28.
Water temperatures: Maximum observed, 73°F Aug. 8-11, 14; minimum observed, 32°F Jan. 14.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Portland, Oregon. Records of discharge for gaging station near Clarkston for water year October 1951 to September 1952 available in WSP 1247. No appreciable inflow between gaging station and sampling point except during periods of heavy local rains.

Chemical analyses, in parts per million, water year November 1951 to September 1952

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C) Parts per million	Dissolved solids Tons per acre-foot	Dissolved solids Tons per day	Hardness as $CaCO_3$ Calcium, magnesium	Hardness as $CaCO_3$ Noncarbonate	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Nov. 14, 16-7, 19-20, 1951	30,780	35	--	37	14	29	6.1	190	38	14	0.5	3.4	0.24	a 271	0.37	22,520	150	0	29	1.0	398	7.5	6
Nov. 21, 26-29	31,620	30	--	34	12	27	5.1	158	40	15	.5	2.5	--	a 244	.33	20,830	134	5	29	1.0	372	7.8	6
Dec. 1-10	44,540	30	0.14	32	11	24	5.3	147	37	13	.5	2.7	--	225	.31	27,060	125	5	28	.9	344	7.6	15
Dec. 12-15, 17	32,960	34	--	37	12	27	6.8	177	36	14	.4	3.2	.13	a 258	.35	22,960	142	0	28	1.0	385	7.0	20
Jan. 4-10, 1952	29,860	29	.02	34	11	26	6.4	151	40	16	.3	1.8	--	231	.31	18,620	130	6	29	1.0	366	7.2	10
Jan. 11-20	31,610	27	.02	34	12	26	3.0	151	41	15	.5	2.8	.08	236	.32	20,140	134	10	29	1.0	365	7.7	3
Jan. 21-31	33,460	27	.04	34	12	25	3.0	152	40	15	.5	3.0	--	235	.32	21,230	134	10	28	.9	361	7.8	3
Feb. 1-10	45,070	27	.20	29	11	22	3.2	132	34	12	.5	3.4	--	212	.29	25,800	118	9	28	.9	311	7.7	17
Feb. 11-20	36,820	27	.14	30	10	22	3.1	134	36	13	.5	3.0	.06	215	.29	22,540	116	6	29	.9	321	7.7	15
Feb. 21-29	37,240	26	.06	34	12	23	3.0	151	39	15	.5	2.7	--	231	.31	23,230	134	10	27	.9	354	7.8	7
Mar. 1-10	35,870	26	.04	35	12	25	3.2	156	40	16	.6	2.6	--	240	.33	23,240	137	10	28	.9	368	7.6	5
Mar. 11-20	46,610	25	.06	34	12	24	3.2	151	38	14	.6	2.8	.06	236	.32	29,700	134	10	27	.9	358	7.6	8
Mar. 21-31	75,750	25	.04	28	9.2	19	3.2	124	29	11	.5	3.5	--	197	.27	40,290	108	6	27	.8	295	7.6	15
Apr. 1-10	104,510	25	.04	22	7.5	15	2.7	100	22	8.0	.5	3.1	--	160	.22	45,150	86	4	27	.7	234	7.4	15
Apr. 11-20	146,100	24	.25	21	8.3	15	2.6	97	19	7.4	.5	2.5	.06	162	.22	64,760	87	7	27	.7	219	7.0	23
Apr. 21-30	194,500	23	.23	18	6.8	12	2.4	83	15	6.1	.5	1.7	--	137	.19	71,940	73	5	26	.6	186	7.3	22
May 1-10	183,600	18	.16	16	5.8	10	1.8	75	13	5.4	.5	1.4	--	123	.17	60,970	64	2	25	.5	167	7.3	17
May 11-20	196,700	19	.14	15	4.9	9.3	2.0	67	13	4.9	.4	1.7	.03	113	.15	60,010	58	3	25	.5	157	7.3	15
May 21-31	193,300	16	.06	14	4.2	8.8	1.4	60	11	4.0	.4	.9	--	96	.13	50,100	52	3	26	.5	137	7.4	14
June 1-12	155,500	15	.06	14	3.9	9.5	1.6	63	12	4.7	.4	1.1	--	97	.13	40,720	51	0	28	.6	144	7.4	12
June 13-20	104,940	20	.04	18	5.6	13	2.4	82	18	7.0	.4	.6	.04	128	.17	36,270	68	1	28	.7	190	7.6	5
June 21-30	84,330	19	.04	18	5.6	13	2.0	86	19	6.2	.4	.8	--	127	.17	28,920	68	0	29	.7	193	7.6	5

a Sum of determined constituents.

SNAKE RIVER MAIN STEM--Continued

SNAKE RIVER NEAR CLARKSTON, WASH.--Continued

Temperature (°F) of water, November 1951 to September 1952

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		--	40	--	39	38	46	51	56	63	71	63
2		--	--	--	39	38	46	51	57	64	72	65
3		--	37	--	39	39	46	52	59	64	72	64
4		--	35	35	40	39	47	52	61	70	72	64
5		--	--	35	38	39	49	54	61	65	72	65
6		--	39	36	38	39	50	52	60	66	72	65
7		--	40	35	39	39	50	53	59	66	71	65
8		--	39	36	38	40	48	55	61	66	73	63
9		--	--	35	39	40	47	54	60	66	73	64
10		--	39	36	39	41	47	53	60	69	73	64
11		--	--	35	38	42	48	54	59	70	73	63
12		--	38	37	38	42	48	55	58	72	72	63
13		--	39	38	38	42	49	56	62	72	71	61
14		43	39	32	37	42	49	56	57	71	73	61
15		--	40	38	37	42	49	56	57	71	71	59
16		42	--	37	37	43	49	53	59	71	69	60
17		42	42	37	37	43	50	54	59	70	70	60
18		--	--	36	37	43	51	55	61	69	--	60
19		40	--	36	37	42	52	56	62	69	68	61
20		41	--	35	37	43	51	56	63	70	67	61
21		40	--	37	--	43	50	55	62	67	69	62
22		--	--	34	36	43	49	54	61	67	68	62
23		--	--	34	--	43	51	56	60	68	69	59
24		--	--	35	36	46	53	56	61	67	69	61
25		--	--	36	37	44	55	56	58	68	69	61
26		43	--	37	37	45	55	57	59	69	67	62
27		43	--	37	38	46	56	57	60	70	65	65
28		38	--	38	39	46	56	57	63	71	66	60
29		45	--	38	38	46	54	57	59	71	65	59
30		--	--	39	--	46	51	56	62	71	64	62
31		--	--	39	--	45	--	56	--	72	66	--
Average		--	--	36	38	42	50	55	60	69	70	62

Encl 3-2

Quality of Surface Waters of the United States 1953

Parts 9–14. Colorado River Basin to Pacific Slope Basins in Oregon and Lower Columbia River Basin

Prepared under the direction of S. K. LOVE, *chief, Quality of Water Branch*

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1293

Prepared in cooperation with the States of California and Utah, U. S. Bureau of Reclamation, and with other agencies

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1958

Encl 4-1

SNAKE RIVER MAIN STEM--Continued

SNAKE RIVER NEAR CLARKSTON, WASH.

LOCATION.--One mile downstream from gaging station, 1 mile upstream from Alpowa Creek, 8 miles downstream from Clarkston, Asotin County, and 133 miles upstream from mouth.
DRAINAGE AREA.--103,200 square miles, approximately (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: November 1951 to September 1953.
Water temperatures: November 1951 to September 1953.
EXTREMES, 1952-53.--Dissolved solids: Maximum, 312 ppm Oct. 21-31; minimum, 96 ppm June 24-30.
Hardness: Maximum, 168 ppm Sept. 21-30; minimum, 53 ppm June 1-10.
Specific conductance: Maximum daily, 529 micromhos Nov. 30, Dec. 3; minimum daily, 133 micromhos May 21.
Water temperatures: Maximum observed, 72°F Aug. 7-8; minimum observed, 34°F Nov. 29-30.
EXTREMES, 1951-53.--Dissolved solids: Maximum, 312 ppm Oct. 21-31, 1952; minimum, 96 ppm May 21-31, 1952, June 24-30, 1953.
Hardness: Maximum, 168 ppm Sept. 21-30, 1953; minimum, 51 ppm June 1-10, 1952.
Specific conductance: Maximum daily, 529 micromhos Nov. 30, Dec. 3, 1952; minimum daily, 118 micromhos May 28, 1952.
Water temperatures: Maximum observed, 73°F Aug. 8-11, 14, 1952; minimum observed, freezing point Jan. 14, 1952.
REMARKS.--Values reported for dissolved solids are residue on evaporation. Records of specific conductance of daily samples available in district office at Portland, Oreg. Discharge records for gaging station near Clarkston for water year October 1952 to September 1953 given in WSP 1287. No appreciable inflow between gaging and sampling point except during periods of heavy local rains.

Chemical analyses, in parts per million, water year October 1952 to September 1953

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-10, 1952..	21,890	35	0.09	39	15	35	3.9	217	47	15	0.6	1.9	--	305	0.41	18,030	159	0	32	1.2	459	8.0	5
Oct. 11-20	22,260	34	.07	39	16	37	3.9	211	52	18	.6	2.5	0.13	295	.40	17,730	163	0	32	1.3	479	7.6	5
Oct. 21-31	22,170	32	.04	39	16	37	4.5	205	53	18	.5	2.1	--	312	.42	18,680	163	0	32	1.3	472	8.2	8
Nov. 1-30	20,670	30	.04	40	16	36	4.5	204	54	19	.5	2.1	.11	310	.42	17,300	166	0	31	1.2	472	7.9	8
Dec. 1-31	20,960	35	.03	39	15	37	4.5	192	56	19	.6	2.9	.10	300	.41	16,980	159	2	33	1.3	474	8.0	5
Jan. 1-10, 1953..	23,120	33	.02	39	15	35	4.5	190	53	20	.6	3.0	--	291	.40	18,170	159	3	32	1.2	463	7.8	10
Jan. 11-31.......	48,630	28	.13	26	9.9	21	3.2	123	31	12	.5	2.9	.06	197	.27	25,870	106	5	29	.9	301	7.7	25
Feb. 1-10	58,030	27	.17	22	9.1	17	3.0	108	26	9.5	.5	1.7	--	173	.24	27,110	92	4	28	.8	256	7.7	25
Feb. 11-28	35,200	28	.09	29	11	24	3.0	142	36	14	.5	2.0	.09	218	.30	20,720	118	1	30	1.0	340	7.8	15
Mar. 1-10.......	32,450	28	.10	31	12	24	2.6	142	38	15	.5	1.9	--	229	.31	20,060	127	10	29	.9	352	7.5	10
Mar. 11-20......	39,350	25	.09	29	11	22	2.8	130	37	14	.5	1.6	.10	210	.29	22,310	118	11	28	.9	330	7.4	10
Mar. 21-31......	52,220	27	.23	26	10	19	2.3	116	31	11	.5	1.3	--	188	.26	26,510	106	11	27	.8	283	7.3	20
Apr. 1-10	50,910	24	.11	24	9.3	17	2.3	108	28	10	.5	1.0	--	173	.24	23,780	98	10	27	.7	266	7.6	20
Apr. 11-23	48,080	24	.11	23	9.1	17	2.3	108	28	10	.5	.8	.08	170	.23	22,070	95	6	27	.8	261	7.3	15
Apr. 24-30	112,060	21	.28	14	5.6	9.3	1.5	64	23	5.5	.5	.7	--	113	.15	34,170	58	6	25	.5	153	7.4	25
May 1-10	93,860	19	.20	15	5.7	11	1.9	68	17	5.9	.5	.5	--	117	.16	29,650	61	5	27	.6	169	7.4	25
May 11-20.......	93,740	20	.05	15	4.6	12	1.5	70	18	5.8	.2	.8	.10	112	.15	28,350	56	0	31	.7	166	7.4	20
May 21-31.......	115,800	21	.06	15	4.9	13	1.5	72	19	5.2	.3	.7	--	116	.16	36,270	58	0	32	.7	171	7.6	20

SNAKE RIVER MAIN STEM--Continued

SNAKE RIVER NEAR CLARKSTON, WASH.--Continued

Temperature (°F) of water, water year October 1952 to September 1953
[Once-daily measurement at approximately 8 a.m.]

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	58	51	35	37	45	42	49	50	56	61	70	65
2	62	48	36	38	45	42	47	50	56	61	68	65
3	61	48	37	38	45	41	49	50	56	62	70	65
4	61	45	37	39	45	43	48	52	56	63	70	64
5	58	46	37	39	45	42	49	54	55	64	--	64
6	57	--	37	39	45	42	50	56	55	64	71	64
7	57	44	39	40	45	44	50	56	55	65	72	64'
8	57	42	39	40	44	46	50	55	55	61	72	65
9	58	42	37	42	42	44	50	53	55	61	71	66
10	57	45	39	42	42	47	47	51	55	66	70	64
11	58	47	38	42	43	47	48	53	57	67	70	68
12	56	44	39	42	42	46	48	53	57	69	71	68
13	60	47	39	42	43	47	48	54	57	70	70	67
14	52	46	39	43	42	45	49	54	57	70	70	67
15	52	44	38	42	42	46	48	55	57	70	69	67
16	53	44	40	43	43	47	50	56	58	69	71	66
17	53	45	40	42	42	46	52	57	58	70	70	65
18	56	44	39	42	43	45	52	56	58	--	69	65
19	55	44	39	43	41	45	50	56	58	70	70	65
20	53	45	39	43	41	45	49	55	57	69	71	60
21	51	44	40	43	43	45	51	54	57	69	70	60
22	55	40	36	44	39	47	50	53	58	69	67	61
23	55	40	39	43	39	45	50	53	58	69	69	62
24	56	40	37	44	39	47	52	53	59	67	66	60
25	51	39	36	45	40	49	50	52	59	69	66	56
26	51	39	36	44	42	48	56	53	59	67	66	59
27	52	37	36	43	45	49	50	54	59	68	67	59
28	50	36	36	41	45	49	49	54	60	68	67	61
29	52	34	37	42	--	50	51	56	59	69	66	57
30	51	34	37	43	--	49	50	55	60	69	70	57
31	52	--	38	43	--	49	--	55	--	70	65	--
Average	55	43	38	42	43	45	50	54	57	67	69	63

Encl 4-2

Quality of Surface Waters of the United States 1954

Parts 9–14. Colorado River Basin to Pacific Slope Basins in Oregon and Lower Columbia River Basin

Prepared under the direction of S. K. LOVE, *Chief, Quality of Water Branch*

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1353

Prepared in cooperation with the States of California and Utah, U.S. Bureau of Reclamation, and with other agencies

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1959

Encl 5-1

SNAKE RIVER NEAR CLARKSTON, WASH.

LOCATION.--One mile downstream from gaging station, 1 mile upstream from Alpowa Creek, 8 miles downstream from Clarkston, Asotin County, and 133 miles upstream from mouth.
DRAINAGE AREA.--103,200 square miles, approximately (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: November 1951 to September 1954.
Water temperatures: November 1951 to September 1954.
EXTREMES, 1953-54.--Dissolved solids: Maximum, 314 ppm Oct. 21-31; minimum, 79 ppm May 11-22.
Hardness: Maximum, 176 ppm Oct. 21-31; minimum, 37 ppm May 11-22.
Specific conductance: Maximum daily, 500 micromhos Oct. 26; minimum daily, 91.8 micromhos May 22.
Water temperatures: Maximum observed, 71°F July 16-17; minimum observed, 35°F Jan. 21.
EXTREMES, 1951-54.--Dissolved solids: Maximum, 314 ppm Oct. 21-31, 1953; minimum, 79 ppm May 11-22, 1954.
Hardness: Maximum, 176 ppm Oct. 21-31, 1953; minimum, 37 ppm May 11-22, 1954.
Specific conductance: Maximum daily, 529 micromhos Nov. 30, Dec. 3, 1952; minimum daily, 91.8 micromhos May 22, 1954.
Water temperatures: Maximum observed, 73°F Aug. 8-11, 14, 1952; minimum observed, freezing point Jan. 14, 1952.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Portland, Oreg. Records of discharge for gaging station near Clarkston for water year October 1953 to September 1954 given in WSP 1347. No appreciable inflow between gaging and sampling point except during periods of heavy local rains.

Chemical analyses, in parts per million, water year October 1953 to September 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C) Parts per million	Tons per acre-foot	Tons per day	Hardness as $CaCO_3$ Calcium, magnesium	Noncarbonate	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
Oct. 1-10, 1953 ..	22,320	31		36	16	39	4.2	198	51	17		1.6	--	296	0.40	17,840	156	0	34	1.4	459	7.5
Oct. 11-20.......	22,620	34		39	16	40	4.5	211	50	16		2.0	0.13	305	.41	18,630	163	0	34	1.4	474	7.7
Oct. 21-31.......	22,910	32		44	16	40	4.2	225	57	18		2.0	--	314	.43	19,420	176	0	32	1.3	490	7.8
Nov. 1-10	23,600	34		36	15	38	4.2	193	54	18		1.9	--	300	.41	19,120	152	0	34	1.3	463	7.7
Nov. 11-20	22,340	31		40	15	33	3.8	190	50	18		2.3	--	285	.39	17,190	162	6	30	1.1	440	7.6
Nov. 21-30	25,980	30		36	14	33	3.8	170	51	18		2.3	--	272	.37	19,080	147	8	32	1.2	420	7.6
Dec. 1-6	25,980	29		36	13	30	3.8	164	48	18		2.0	--	262	.36	18,380	143	9	31	1.1	403	7.6
Dec. 11-20	26,020	28		37	13	31	3.8	164	50	20		1.8	--	266	.36	18,690	146	11	31	1.1	409	7.6
Dec. 21-31	28,260	28		34	14	28	3.2	160	44	16		2.6	--	248	.34	18,920	142	11	29	1.0	392	7.6
Jan. 1-10, 1954 ..	26,440	27		34	13	30	3.3	160	45	17		2.0	--	251	.34	17,920	138	7	31	1.1	399	7.7
Jan. 11-20.......	26,520	28		36	14	28	2.8	164	47	19		1.8	.08	255	.35	18,260	147	13	29	1.0	402	7.8
Jan. 21-31.......	27,790	28		34	14	26	2.8	152	42	17		2.0	--	240	.33	18,010	142	18	28	.9	374	7.8
Feb. 1-10	33,750	27		29	12	22	2.8	134	36	16		2.1	--	212	.29	19,320	122	12	28	.9	327	7.6
Feb. 11-20	38,450	26		27	11	21	2.8	125	34	14		1.9	.06	200	.27	20,760	113	10	28	.9	303	7.5
Feb. 21-28	41,140	27		26	9.8	19	2.1	117	32	12		1.6	--	189	.26	20,990	105	9	28	.8	293	7.6
Mar. 1-10.......	35,970	27		28	10	21	1.9	127	34	12		1.5	--	199	.27	19,330	111	7	29	.9	314	7.6
Mar. 11-20	48,720	24		23	8.7	16	2.0	106	27	10		1.3	.04	166	.23	21,840	93	6	27	.7	256	7.4
Mar. 21-31	34,860	23		25	9.0	19	2.6	118	31	11		1.7	--	178	.24	16,750	99	3	29	.8	287	7.8

SNAKE RIVER MAIN STEM--Continued

SNAKE RIVER NEAR CLARKSTON, WASH.--Continued

Temperature (°F) of water, water year October 1953 to September 1954

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	57	51	46	38	42	45	45	50	54	61	69	67
2	55	49	46	41	45	46	46	54	54	63	69	66
3	59	47	45	38	43	44	46	51	55	63	69	66
4	55	48	48	41	43	42	47	51	55	68	65	65
5	55	48	44	42	43	45	47	54	56	69	65	66
6	55	48	44	41	43	45	47	54	55	68	69	65
7	58	49	--	42	41	44	47	55	56	70	65	65
8	55	51	--	42	44	45	49	56	57	69	67	61
9	--	47	--	42	43	47	--	56	56	68	69	61
10	56	49	--	39	42	47	48	57	55	68	67	62
11	60	46	--	--	41	46	51	55	56	68	65	64
12	57	47	43	39	44	47	50	54	56	68	66	66
13	56	47	39	39	42	46	51	55	56	69	67	64
14	62	47	41	38	44	45	52	54	56	69	67	--
15	57	48	41	38	44	44	50	56	60	70	67	63
16	57	47	41	37	44	46	50	59	58	71	67	63
17	60	45	42	36	44	43	52	59	56	71	68	61
18	59	47	42	36	44	45	50	58	55	70	68	62
19	59	46	41	37	43	46	52	57	58	70	68	61
20	58	46	41	36	45	45	52	57	56	70	68	61
21	53	46	41	35	44	43	53	56	58	70	67	63
22	50	45	39	39	47	43	51	55	60	68	66	61
23	55	44	40	37	45	45	54	57	59	--	66	60
24	55	46	38	38	46	46	--	55	61	69	65	61
25	53	46	--	38	45	45	53	55	60	68	65	62
26	48	47	39	38	46	47	54	54	62	69	65	--
27	--	--	38	38	44	47	54	54	61	68	67	61
28	54	48	39	38	45	46	54	54	60	68	65	59
29	56	45	40	39	--	46	--	55	61	68	64	58
30	56	47	36	41	--	45	52	54	60	69	68	55
31	50	--	38	39	--	44	--	54	--	70	66	--
Average	56	47	41	39	44	45	50	55	57	68	67	62

Encl 5-2

Quality of Surface Waters of the United States 1955

Parts 9–14. Colorado River Basin to Pacific Slope Basins in Oregon and Lower Columbia River Basin

Prepared under the direction of S. K. LOVE, *Chief, Quality of Water Branch*

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1403

Prepared in cooperation with the States of California and Utah, U.S. Bureau of Reclamation, and with other agencies

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1959

Encl 6-1

SNAKE RIVER MAIN STEM

SNAKE RIVER NEAR CLARKSTON, WASH.

LOCATION.--One mile downstream from gaging station, 1 mile upstream from Alpowa Creek, 8 miles downstream from Clarkston, Asotin County, and 133 miles upstream from mouth.
DRAINAGE AREA.--103,200 square miles, approximately (above gaging station).
RECORDS AVAILABLE.--Chemical analyses: November 1951 to September 1955.
Water temperatures: November 1951 to September 1955.
EXTREMES, 1954-55.--Dissolved solids: Maximum, 298 ppm Sept. 21-30; minimum, 76 ppm June 9-16, 18, 23.
Hardness: Maximum, 166 ppm Dec. 21-31; minimum, 34 ppm June 9-16, 18, 23.
Specific conductance: Maximum daily, 513 micromhos Dec. 23; minimum daily, 97.9 micromhos June 13.
Water temperatures: Maximum, 74°F July 23, 24, 25; minimum, 33°F Feb. 21, Mar. 4.
EXTREMES, 1951-55.--Dissolved solids: Maximum, 314 ppm Oct. 21-31, 1953; minimum, 76 ppm June 9-16, 18, 23, 1955.
Hardness: Maximum, 176 ppm Oct. 21-31, 1953; minimum, 34 ppm June 9-16, 18, 23, 1955.
Specific conductance: Maximum daily, 529 micromhos Nov. 30, Dec. 3, 1952; minimum daily, 91.8 micromhos May 22, 1954.
Water temperatures: Maximum, 74°F July 23, 24, 25, 1955; minimum, freezing point Jan. 14, 1952.
REMARKS.--Values reported for dissolved solids are residues on evaporation. Records of specific conductance of daily samples available in district office at Portland, Oreg. Records of discharge for water year October 1954 to September 1955 given in WSP 1397.

Chemical analyses, in parts per million, water year October 1954 to September 1955

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180C) Parts per million	Dissolved solids Tons per acre-foot	Dissolved solids Tons per day	Hardness as $CaCO_3$ Calcium, magnesium	Hardness as $CaCO_3$ Noncarbonate	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
Oct. 1-10, 1954...	23,110	31		37	15	40	4.1	187	59	18		1.6	--	294	0.40	18,340	154	1	35	1.4	457	7.9
Oct. 11-20	25,580	32		36	15	39	4.0	181	59	20		2.1	0.12	286	.39	19,750	152	3	35	1.4	452	7.8
Oct. 21-31	25,550	31		37	14	37	3.9	178	55	18		2.2	--	276	.38	19,040	150	4	34	1.3	437	8.0
Nov. 1-10	24,740	31		37	15	36	4.0	187	54	18		2.6	--	290	.39	19,370	154	1	33	1.3	455	8.0
Nov. 11-20.......	25,560	29		36	14	34	3.7	179	50	18		2.4	.08	275	.37	18,980	147	1	33	1.2	434	7.6
Nov. 21-30.......	25,000	31		37	13	32	3.6	174	49	17		2.5	--	273	.37	18,430	146	3	32	1.2	426	7.8
Dec. 1-10........	23,880	30		37	14	34	4.0	181	52	18		2.7	--	282	.38	18,180	150	2	32	1.2	445	7.8
Dec. 11-20.......	21,850	31		38	15	34	4.0	183	52	19		3.0	.06	286	.39	16,870	156	7	31	1.2	450	8.0
Dec. 21-31.......	20,990	34		42	15	33	3.3	190	56	19		2.3	--	296	.40	16,780	166	11	30	1.1	465	7.8
Jan. 1-10, 1955...	23,070	32		39	15	32	3.3	176	52	18		2.5	--	278	.38	17,320	159	15	30	1.1	434	7.9
Jan. 11-20	21,680	32		40	15	32	3.3	186	52	19		2.1	.08	285	.39	16,680	162	9	30	1.1	440	7.9
Jan. 21-31	21,460	31		38	14	31	3.3	172	50	18		1.7	--	270	.37	15,640	152	11	30	1.1	424	8.1
Feb. 1-10........	21,840	29		40	14	31	3.3	176	49	18		2.0	--	270	.37	15,920	157	13	29	1.1	427	7.6
Feb. 11-19.......	20,790	30		35	12	29	3.6	164	46	18		1.2	.05	256	.35	14,370	137	2	31	1.1	405	7.7
Feb. 20-28.......	19,590	29		37	12	30	3.6	168	47	19		1.7	--	262	.36	13,860	142	4	31	1.1	417	7.9
Mar. 1-10	20,220	27		36	12	30	3.6	168	45	18		1.3	--	255	.35	13,920	139	2	31	1.1	408	7.7
Mar. 11-20.......	23,090	25		32	11	28	3.6	150	43	18		1.1	.05	238	.32	14,840	125	2	32	1.1	379	7.8
Mar. 21-31.......	26,380	24		31	12	27	3.6	149	42	17		1.1	--	234	.32	16,670	127	5	31	1.0	372	8.0

SNAKE RIVER BASIN

SNAKE RIVER MAIN STEM--Continued

SNAKE RIVER NEAR CLARKSTON, WASH.--Continued

Temperature (°F) of water, water year October 1954 to September 1955

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	55	48	38	38	38	39	46	49	54	57	71	65
2	--	47	38	38	36	39	45	51	53	59	72	68
3	55	46	39	38	35	39	47	51	53	57	70	68
4	59	47	40	35	34	33	46	53	54	56	71	72
5	56	47	38	37	36	--	45	54	57	59	70	69
6	55	50	38	37	36	39	45	54	55	56	70	68
7	57	47	38	37	40	45	--	54	56	59	69	--
8	56	49	39	37	42	39	45	55	56	59	70	68
9	60	47	39	36	37	38	49	53	57	59	69	71
10	59	47	43	35	35	39	47	54	57	61	70	68
11	56	46	43	34	36	41	47	54	58	61	72	67
12	57	47	40	35	39	41	47	54	58	64	70	64
13	58	47	39	36	40	41	47	54	59	64	70	62
14	55	--	39	35	39	40	47	51	57	65	71	66
15	56	48	39	35	38	39	47	49	57	67	67	63
16	58	48	36	35	39	39	47	50	57	70	71	61
17	55	47	36	38	37	38	47	52	57	69	69	61
18	59	48	35	36	34	38	47	52	56	70	70	59
19	53	46	37	35	35	38	47	54	57	70	68	60
20	52	46	34	36	36	41	47	56	58	71	70	60
21	--	46	35	36	33	41	49	55	60	71	67	58
22	52	47	35	37	38	43	50	54	61	73	68	58
23	58	49	39	37	37	45	50	54	60	74	68	57
24	59	48	36	36	40	40	50	54	59	74	67	--
25	52	50	35	37	40	39	50	53	59	74	66	50
26	59	47	34	36	38	39	50	54	58	72	66	58
27	47	45	34	38	37	--	48	53	59	72	65	56
28	46	43	34	35	39	44	48	54	59	70	68	60
29	46	44	35	35	--	44	50	54	58	70	60	56
30	47	40	38	35	--	45	49	52	--	69	66	55
31	47	--	40	35	--	45	--	54	--	70	61	--
Average	55	47	38	36	37	40	48	53	57	66	68	62

Encl 6-2

Quality of Surface Waters of the United States 1956

Parts 9–14. Colorado River Basin to Pacific Slope Basins in Oregon and Lower Columbia River Basin

Prepared under the direction of S. K. LOVE, *Chief, Quality of Water Branch*

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1453

Prepared in cooperation with the States of California, New Mexico, and Utah, U.S. Bureau of Reclamation, and with other agencies

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1960

Encl 7-1

SNAKE RIVER MAIN STEM

SNAKE RIVER AT CENTRAL FERRY, NEAR POMEROY, WASH.

LOCATION.--At bridge on U. S. Highway 295 at Central Ferry, Garfield County, 14 miles northwest of Pomeroy, and about 36 miles downstream from gaging station near Clarkston.
DRAINAGE AREA.--103,200 square miles, approximately (at gaging station).
RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1956.
Water temperatures: October 1955 to September 1956.
EXTREMES, 1955-56.--Dissolved solids: Maximum, 257 ppm Oct. 21-31; minimum, 68 ppm May 15-31.
Hardness: Maximum, 136 ppm Oct. 1-10; minimum, 32 ppm May 15-31.
Specific conductance: Maximum daily, 434 micromhos Oct. 25; minimum daily, 73 micromhos May 25, 27.
Water temperatures: Maximum, 79°F July 25; minimum, freezing point several days during January and February.
REMARKS.--Chemical quality samples were collected at station near Clarkston, Washington (1 mile downstream from gaging station) from November 1951 to September 1955. Records of specific conductance of daily samples available in district office at Portland, Oreg. Records of discharge for gaging station near Clarkston for water year October 1955 to September 1956 given in WSP 1447. No appreciable inflow between sampling point and gaging station except during periods of heavy local runoff.

Chemical analyses, in parts per million, water year October 1955 to September 1956

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C) Parts per million	Tons per acre-foot	Tons per day	Hardness as $CaCO_3$ Calcium, magnesium	Noncarbonate	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
Oct. 1-10, 1955	21,940	20	0.05	33	13	33	4.2	160	51	17	0.4	1.9	--	256	0.35	15,160	136	5	34	1.2	415	8.0
Oct. 11-20......	25,510	23	.05	31	12	31	4.1	151	49	16	.3	2.4	0.04	246	.33	16,940	127	3	34	1.2	396	7.9
Oct. 21-31......	23,480	23	.01	32	12	33	4.0	157	51	18	.4	2.1	--	257	.35	16,290	129	0	35	1.3	413	8.0
Nov. 1-5, 9-11, 15-20..........	26,310	24	.01	30	12	29	3.8	149	46	16	.3	2.2	.02	238	.32	16,910	124	3	33	1.1	383	8.0
Nov. 6-8, 12-14, 21-30	32,410	21	.05	25	9.8	23	3.5	121	36	12	.3	2.6	--	197	.27	17,240	103	4	32	1.0	309	7.7
Dec. 1-4, 13-15, 20-21	34,300	22	.04	27	8.1	22	3.1	116	33	12	.3	2.7	--	191	.26	17,690	101	6	31	1.0	296	7.7
Dec. 5-12, 16-19	28,430	25	.00	29	11	25	3.6	133	39	14	.5	2.2	.08	218	.30	16,730	118	9	31	1.0	347	7.7
Dec. 26-31	69,400	--	--	16	4.2	11	2.5	66	--	5.5	--	3.0	--	--	--	--	57	3	28	.6	166	7.6
Jan. 1-14, 1956 .	40,690	25	.03	24	7.5	19	2.9	103	28	10	.3	2.5	--	174	.24	19,120	91	7	31	.9	258	7.0
Jan. 15-31......	47,490	26	.10	24	8.4	20	3.0	110	28	10	.4	2.5	.02	188	.26	24,110	94	4	31	.9	274	7.0
Feb. 1-10, 12-14, 17-19	32,920	25	.00	30	10	24	3.2	132	36	14	.3	2.3	--	214	.29	19,020	I16	8	30	1.0	334	7.6
Feb. 11, 15-16, 20-29	38,320	24	.02	29	8.3	21	3.1	120	31	12	.3	2.5	.04	194	.26	20,070	106	8	29	.9	301	7.6
Mar. 1-19......	43,730	25	.06	27	8.6	19	3.0	117	29	11	.3	2.6	.02	187	.25	22,080	103	7	28	.8	286	7.7
Mar. 20-31	96,870	23	.19	17	6.0	11	2.7	76	16	6.5	.2	2.7	--	141	.19	36,880	67	5	25	.6	182	7.4
Apr. 1-13	87,120	22	.05	20	5.6	12	2.7	84	18	7.8	.2	1.6	--	138	.19	32,460	73	4	25	.6	202	7.6
Apr. 14-30	153,900	17	.06	12	2.6	7.0	1.8	50	9.6	3.2	.2	1.0	.01	98	.13	40,720	41	0	25	.5	120	7.3
May 1-14	141,400	17	.02	13	3.1	8.9	1.7	57	12	4.5	.3	.8	--	94	.13	35,890	45	0	29	.6	135	7.1
May 15-31	223,600	11	.04	8.7	2.4	5.7	1.4	41	7.5	3.0	.2	.8	.04	68	.09	41,050	32	0	27	.4	92	6.8

SNAKE RIVER MAIN STEM--Continued

SNAKE RIVER AT CENTRAL FERRY NEAR POMEROY, WASH.--Continued

Temperature (°F) of water, water year October 1955 to September 1956

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	59	--	41	37	32	39	--	51	60	66	71	68
2	--	46	42	39	32	40	47	51	59	64	71	68
3	59	46	41	37	32	40	48	52	54	64	71	67
4	57	47	--	--	32	--	47	53	55	64	72	67
5	56	46	39	39	33	41	47	--	55	64	70	67
6	--	44	--	38	34	40	47	--	55	65	72	62
7	58	45	--	38	33	41	48	53	58	67	73	61
8	55	--	39	--	34	41	--	49	61	68	74	61
9	55	47	39	40	35	40	50	51	63	72	74	--
10	54	38	38	39	36	40	50	50	61	73	74	61
11	54	--	--	39	36	--	51	50	59	73	74	68
12	54	39	39	39	--	40	51	51	60	75	74	69
13	55	--	37	38	37	42	53	--	61	74	75	70
14	--	35	36	--	--	43	53	53	60	74	76	69
15	58	33	34	--	35	42	--	55	52	74	75	69
16	58	--	--	39	34	40	50	--	54	73	75	70
17	58	33	35	--	35	44	52	--	59	74	76	71
18	57	34	--	--	--	--	52	58	61	76	76	70
19	59	35	35	--	--	44	52	58	60	76	77	71
20	58	--	35	39	34	45	53	--	62	75	77	--
21	58	34	36	40	36	46	52	55	62	75	76	--
22	56	33	--	40	--	46	--	56	62	75	76	--
23	57	--	--	42	36	45	52	55	60	77	--	--
24	55	--	--	41	39	40	51	55	--	78	--	--
25	56	39	--	33	39	--	51	55	62	79	72	--
26	--	40	41	37	38	44	51	54	64	76	71	--
27	--	--	39	37	39	46	--	56	67	77	71	--
28	52	38	--	35	40	47	--	55	66	77	61	--
29	51	40	--	32	39	47	--	54	66	77	61	--
30	--	40	--	31	--	--	50	--	67	76	68	62
31	48	--	--	32	--	--	--	--	--	76	69	--
Average	--	--	--	--	35	--	--	--	60	73	72	--

Encl 7-2

Quality of Surface Waters of the United States 1957

Parts 9–14. Colorado River Basin to Pacific Slope Basins in Oregon and Lower Columbia River Basin

Prepared under the direction of S. K. LOVE, *Chief, Quality of Water Branch*

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1523

Prepared in cooperation with the States of California, New Mexico, and Utah, U.S. Bureau of Reclamation, and with other agencies

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1961

Encl 8-1

SNAKE RIVER MAIN STEM

SNAKE RIVER AT CENTRAL FERRY NEAR POMEROY, WASH.

LOCATION.--At bridge on U. S. Highway 295 at Central Ferry, Garfield County, 14 miles northwest of Pomeroy and about 36 miles downstream from gaging station near Clarkston.
DRAINAGE AREA.--103,200 square miles, approximately (at gaging station).
RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1957.
Water temperatures: October 1955 to September 1957.
EXTREMES, 1956-57.--Dissolved solids: Maximum, 269 ppm Oct. 1-15; minimum, 69 ppm June 1-15.
Hardness: Maximum, 150 ppm Jan. 1-31; minimum, 22 ppm Apr. 27-30.
Specific conductance: Maximum daily, 449 micromhos Oct. 18; minimum daily, 93 micromhos June 6.
Water temperatures: Maximum, 76°F July 25; minimum, freezing point Feb. 16-18, 20.
EXTREMES, 1955-57.--Dissolved solids: Maximum, 269 ppm Oct. 1-15, 1956; minimum, 68 ppm May 15-31, 1956.
Hardness: Maximum, 150 ppm Jan. 1-31, 1957; minimum, 22 ppm Apr. 27-30, 1957.
Specific conductance: Maximum daily, 449 micromhos Oct. 18, 1956; minimum daily, 73 micromhos May 25, 27, 1956.
Water temperatures: Maximum, 79°F July 25, 1956; minimum, freezing point on several days during January and February, 1956, February 1957.
REMARKS.--Chemical quality samples were collected at station near Clarkston, Washington (1 mile downstream from gaging station) from November 1951 to September 1955. Records of specific conductance of daily samples available in district office at Portland, Oreg. Records of discharge for gaging station near Clarkston for water year October 1956 to September 1957 given in WSP 1517. No appreciable inflow between sampling point and gaging station except during periods of heavy local runoff.

Chemical analyses, in parts per million, water year October 1956 to September 1957

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C) Parts per million	Tons per acre-foot	Tons per day	Hardness as $CaCO_3$ Calcium, magnesium	Noncarbonate	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
Oct. 1-15, 1956..	25,780			36	13	35		168	54	18		2.2	--	269	0.37	18,720	143	5	34	1.3	432	7.7
Oct. 16-31.......	28,920			36	12	34		164	54	18		2.4	0.05	268	.36	20,930	139	5	34	1.3	428	7.6
Nov. 1-30	28,100			35	12	31		158	49	16		2.3	--	254	.35	19,270	137	7	33	1.2	406	7.5
Dec. 1-4, 31.....	25,840			37	12	31		162	47	16		2.1	.01	256	.35	17,860	142	9	33	1.1	405	7.6
Jan. 1-31, 1957..	23,960			37	14	31		168	51	18		2.3	.01	266	.36	17,210	150	12	31	1.1	425	7.7
Feb. 1-25	26,500			34	12	26		153	44	16		2.6	.04	237	.32	16,960	134	9	29	1.0	382	7.5
Feb. 26-28	119,800			17	5.5	13		78	18	5.5		4.1	--	160	.22	51,750	65	1	30	.7	190	7.5
Mar. 1-21........	70,990			21	6.9	16		98	24	8.5		2.1	.06	166	.23	31,820	81	1	29	.8	237	7.7
Mar. 22-31	57,540			17	6.0	12		80	17	6.5		1.3	--	132	.18	20,510	67	1	28	.6	190	7.6
Apr. 1-26	86,860			17	5.0	12		78	17	6.0		1.2	.05	126	.17	29,550	63	0	29	.7	180	7.5
Apr. 27-30	81,720			6.0	1.6	7.1		50	9.7	3.5		.7	--	80	.11	17,650	22	0	27	.7	115	7.1
May 1-21........	197,400			11	2.0	6.5		45	8.8	2.5		.5	.04	78	.11	41,570	36	0	28	.5	103	7.1
May 22-31.......	203,400			13	3.6	7.9		59	13	4.8		.7	--	91	.12	49,980	47	0	25	.5	134	7.3
June 1-15........	179,700			10	2.6	6.6		48	9.7	3.2		.5	--	69	.09	33,480	36	0	26	.5	106	7.0
June 16-30	75,380			14	3.5	10		64	14	4.2		.5	.05	92	.13	18,720	49	0	30	.6	149	7.1
July 1-17........	42,470			19	6.2	17		91	25	8.0		.7	.08	139	.19	15,940	73	0	33	.9	224	7.4
July 18-31.......	27,990			25	7.8	25		121	37	11		1.0	--	185	.25	13,980	94	0	35	1.1	303	7.7

SNAKE RIVER MAIN STEM--Continued

SNAKE RIVER AT CENTRAL FERRY NEAR POMEROY, WASH.--Continued

Temperature (°F) of water, water year October 1956 to September 1957
/Once-daily measurement at approximately 4 p.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	60	46	40	38	--	--	40	45	62	68	73	73
2	60	45	40	--	--	35	40	45	62	69	75	73
3	62	45	40	38	--	35	40	45	62	70	74	73
4	61	45	39	38	--	35	43	45	62	--	--	73
5	60	45	--	38	--	35	43	--	62	70	73	--
6	60	45	--	38	--	35	43	45	60	--	74	73
7	61	45	--	36	--	35	43	45	60	72	74	73
8	61	45	40	36	--	--	--	45	60	71	75	--
9	62	45	40	36	--	35	43	45	58	72	75	--
10	59	45	40	--	--	35	43	45	60	73	75	72
11	59	45	--	36	--	35	43	45	60	74	--	72
12	59	45	--	34	--	--	43	--	60	74	--	72
13	59	45	40	34	--	--	43	53	60	74	--	--
14	58	45	42	34	--	37	43	53	60	--	--	--
15	56	45	42	34	--	35	43	--	60	73	75	--
16	56	--	42	--	32	37	43	--	--	73	74	--
17	56	--	42	34	32	40	--	53	60	72	74	--
18	55	--	--	34	32	40	43	53	60	72	--	70
19	54	--	42	34	--	40	43	--	62	73	--	70
20	54	--	42	34	32	40	45	--	64	73	--	71
21	54	--	42	--	35	40	--	--	63	--	--	--
22	--	--	40	--	--	--	45	--	63	74	74	--
23	50	--	40	--	--	40	45	57	--	72	--	70
24	50	--	40	--	--	40	45	58	64	75	--	69
25	51	--	--	--	35	40	45	60	65	76	--	65
26	50	--	40	--	35	40	45	60	65	73	75	--
27	48	--	38	--	35	40	45	60	66	74	72	65
28	47	40	40	--	35	40	45	62	--	--	74	67
29	47	40	40	--	--	40	45	62	66	74	74	66
30	47	40	40	--	--	40	48	60	--	75	74	66
31	47	--	38	--	--	40	--	--	--	73	73	--
Average	55	--	--	--	--	38	44	--	62	73	--	--

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