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 0.3°C 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, °C
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, °C
T_C = Applicable temperature criterion, °C

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 or permitted in the future 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 0.4°C or 0.5°C 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 0.1°C 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.