The Deschutes Estuary Restoration Team

a Puget Soundkeeper Alliance Affiliate

October 6, 2020

To: Miranda Magdangal, EPA (magdangal.miranda@epa.gov)

From: Sue Patnude, Executive Director

Dave Peeler, President of the Board of Directors

Subject: Technical Review and Comments: *Total Maximum Daily Loads (TMDLs) for the Deschutes River and its Tributaries – Sediment, Bacteria, Dissolved Oxygen, pH, and Temperature, July 31, 2020 TMDLs for Public Comment*

We have completed a review of the Deschutes River TMDL. Following is a summary of our key observations; please see the attachment beginning on page 3 for our detailed comments drafted for DERT by Paul Pickett.

1. Overall, EPA, based on Ecology's earlier work, has completed this TMDL to a high technical standard. Our primary concerns are with how EPA packaged the technical information into TMDLs, and concerns with their application of the analysis in the regulatory context.

2. A major flaw in the TMDL is that nutrient limits have been set without considering the impact to Capitol Lake or Budd Inlet. Completing this TMDL without completing the TMDLs for the downstream waters is fundamentally flawed. Statements in this TMDL that nutrient limits are adequate, and that no nutrient limits are needed below Offut Lake, are unsupported and provide a dangerous precedent. The TMDL should be put on hold until the entire package of TMDLs from the Deschutes River through Budd Inlet is complete. Nutrient reductions in the lower Deschutes River may still be necessary to protect Budd Inlet and either Capitol Lake or a restored Deschutes estuary.

3. The analysis should include evaluation of the hydrology of the river, including gaining and losing reaches, and the effect of flow on dissolved oxygen (DO). Although not regulated under the Clean Water Act, variation in hydrology is still a key environmental stressor than can affect water quality and can be managed through other programs.

4. The “flow-variable TMDL” is provided with little explanation of how it is calculated or justified. Table 31 purports to show a flow-variable TMDL, but it appears to actually show the flow-variable Loading Capacity. The method of calculating flow-variable loading and allocations is not provided.

5. The use of “flow-variable” loading may weaken the TMDL. No evidence is provided that this approach is protective. Either model runs at higher flows should be run and results presented to show that proposed loading is protective, or the critical conditions loading should be applied using seasonal limits.

6. The exclusion of Black Lake from this TMDL report both misses an opportunity to address a 303d listing for total phosphorus (TP), but also neglects a major watershed area tributary to Black Lake Ditch. The TMDL should include an analysis of Black Lake and set a TMDL for the lake and allocations for downstream impairments.

7. It would be helpful if EPA would explain in layman terms:
   - how these TMDLs in practice will differ from Ecology’s, and
   - whether as a result of those differences EPA’s approach will be more or less protective than Ecology’s approach.

   This is especially important, as both approaches rely extensively on installation and maintenance of best management practices (BMPs) for nonpoint sources of pollution, and to a much lesser extent on waste load allocations for point sources of pollution.

8. While we are grateful for the high level of technical research, modeling and analysis that went into preparing both Ecology’s earlier TMDLs and these TMDLs developed by EPA, we have a real concern that these reports alone cannot result in much actual improvement in the water quality of the subject water bodies. Ecology has little authority to ensure that BMPs to prevent or remedy nonpoint source pollution are installed and maintained to the degree required by the TMDLs. No oversight agency, group or council exists, has been named or is funded to hold landowners and implementing agencies accountable. Most BMPs are voluntary and funding incentives are quite limited.

   This is a widespread problem in many watersheds in our State, but we are acutely aware of the issue in the Deschutes River basin. There is a wide mismatch between the amount of effort spent to develop these TMDLs and the anticipated level of effort to implement them. Unfortunately, we have not seen any movement by the State towards filling this gap. The result is likely to be a technically strong and accurate set of TMDLs that are only partially implemented in a haphazard manner by a small number of willing landowners. We call on EPA to exert their influence on Ecology to use what resources and authorities they have to promote and support a vibrant and effective implementation program for these TMDLs.

Review for Deschutes Estuary Restoration Team (DERT):
Total Maximum Daily Loads (TMDLs) for the Deschutes River and its Tributaries
Sediment, Bacteria, Dissolved Oxygen, pH, and Temperature
July 31, 2020 TMDLs for Public Comment

Comments by Paul J. Pickett
4 Oct 2020

Main TMDL Report

1. Section 1. Introduction
    a. This TMDL needs to explicitly state what specifically has been done to replace or supplement the TMDL Ecology submitted. This following table summarizes the differences found in this review, and the apparent effect (either unknown or the judgment of this review). A table like this should be in the report, so these differences are clear to the future reader of this report.

Issue	Ecology	EPA	Effect
System potential nutrients	Tribs 10th percentile from study, GW median from study	Tribs 25th percentile from ecoregion	Unclear - can't find data used for inputs in Ecology model
nutrient allocations	DIN and OP set to natural	TN and TP	not sure, units cannot be compared. Total nutrients are more appropriate
DO WLAs	narrative, 0.2 decrease at outfall	loads set for each discharger	limits where Ecology had none
Flow-weighted LAs	not used	loads weighted by flow	More lenient at high flows, not tested with model
nutrients in black lake ditch and percival creek	temperature only	set loads	limits where Ecology had none
site potential tributary temperatures	critical conditions temperatures	temperatures at criteria	more stringent
fine sediment loading	cu. Yd./yr	tons/year	Units cannot be compared - mass load seems better
fine sediment sources	large unknown source	used RUSL model for erosion	stronger analysis - address "unknown source"
turbidity target	not addressed	turbidity correlated to sediment for daily load	stronger analysis - annual and daily limits

2. Section 1.2, Scope of TMDLs in this Document
    a. Listings that this review will address:

Parameter	Waterbody
Fine Sediment	Deschutes River
DO	Deschutes River

	Black Lake Ditch
	Percival Creek
	Black Lake Ditch

b. The current 303d listings on Ecology's website includes listings not approved by EPA and missing from this report:

Parameter	Waterbody
Total Phosphorus	Black Lake
	Capitol Lake

The TMDL appears to be incomplete without addressing these listings.

- Black Lake is tributary mostly to Black Lake Ditch. (The lake is connected to the Black River only through wetlands.)
- Total phosphorus in Capital Lake is linked to upstream conditions, including sediment.

At a minimum, the TMDL should explain why these parameters were not included.

c. The TMDL should identify other impaired waters resulting from this analysis. For example, the analysis should have identified impairment for sediment from the currently listed segment downstream to Capitol Lake.

3. Section 4.4.1, Seasonal Variation and Critical Conditions
   a. This discussion misstates the approach to seasonality. The use of an annual average specifically ignores seasonality. A limit for annual sediment loading is reasonable, but seasonality should be addressed by looking at the seasonal variability of high flow events, which are likely to create the highest turbidity. The daily load either should look at higher percent reductions at high flow events, or should be expressed as a load-duration curve of daily flows.
4. Section 4.4.2, Margin of Safety (Sediment TMDL)
   a. The use of "conservative assumptions" is not supported by the documentation. The only conservative approach was the use of two methods to pick a more restrictive target.
   b. Statistical method does not really provide a margin of safety – the confidence band around the regression between turbidity and TSS suggests that turbidity may be much higher for any given TSS event that the regression used for the TMDL suggests.
   c. The description of the upland source assessment does not support the assertion of conservative assumptions. The rainfall used appears to be average values. If conservative literature values support an erosive year, this should be specifically described.
   d. The margin of safety is not supported by the the use of the 95th percentile flow for determining the TMDL. The use of a high flow with the concentration target results in load equivalent to much higher TSS levels at lower flows. This is a non-conservative approach. (See comment above regarding seasonal variation.)
   e. The margin of safety does not address climate change. Increased intensity of winter rainfall may increase erosion.
5. Section 4.4.4, Reserve Allocation
   a. The impairment documented by the 303d listing upstream almost certainly continues downstream to the mouth of the river. Therefore, wasteload allocations should be provided to all point sources in

the Deschutes River basin likely to be sources of sediment, including stormwater, gravel pit, and construction general permits. TMDL calculations should address these sources and set a TMDL target for the mouth of the river.

   b. Providing no waste load allocations for sediment effectively bans all point sources to the Deschutes River. Is this what EPA intended?
   c. Since the high levels of sediment come from nonpoint sources, no reserve allocation should be provided for sediment. However, a "de minimus" allocation for point sources would be reasonable for small amounts less that the measurement variability.

6. Section 4.4.5, Load Allocations: As discussed above regarding seasonal variation and margin of safety, the proposed load allocations are not protective of water quality standards in the Deschutes River. The load allocation should include additional factors of safety for the seasonality and variability at the daily scale of high turbidity events; higher rainfall intensity from climate change; and the variability of the TSS-turbidity relationship.
7. Page 51, Section 6.2, "Based on the results of this model scenario, EPA determined the nutrient targets for the portion of the Deschutes River upstream of Offutt Lake that would result in DO water quality standards being attained." See comments below on Appendix E. The analysis failed to adequately address a reach above Offut Lake where DO deficit exceeded the 0.2 allowable deficit.
8. P. 56, Section 6.4:
   a. "…due to negligible contributions from runoff)." Poor wording, replace with "less runoff in the dry season."
   b. "…critical conditions and seasonal variation in loading is addressed by establishing flow-variable nutrient TMDLs." No evidence is provided to show that a flow-variable nutrient TMDL is protective. More typically in TMDLS, the loading for a critical season is set to critical conditions and seasonal limits established.
   c. In addition, it is not clear what is exactly meant by a "flow-variable TMDL". The values shown in Table 31 appear to be for "flow-variable loading capacity". The TMDL is the sum of allocations, and no explanation is provided for how allocations would be calculated to be flow-variable.
9. P. 59, Section 6.4.4:
   a. The second bullet at the end of this section ("The numeric temperature and DO criteria…") does not make sense and should be deleted. The criteria are based on a daily maximum or minimum, so the statement about "hourly basis" would not apply.
   b. As noted above, the use of a flow-variable allocation may wipe out any benefit from implicit margins of safety. It is a "Margin of Un-safety".
10. P. 60, Section 6.4.5:
   a. "All WLAs except those given to the fish hatcheries vary by stream flow, as explained in Section 6.4.1." No explanation is provided on how flow-variable WLAs are calculated. Section 6.4.1 refers to a "flow-variable TMDL". This apparently is the Loading Capacity in the river itself. The variable flows used for WLAs are not explained.
   b. "Discharges from MS4s and other permitted stormwater entities are negligible…" This is not necessarily true. From direct observation I can attest that a summer storm on impervious surfaces can produce a stormwater discharge in the dry season, at a time when dilution is low and impacts may be greatest.

11. P. 61, Table 33: allocations are set for average daily Streamflow in the river, but no explanation is provided for how flow for each of these sources is determined. The TMDL narrative suggests that the loading is weighted by the river flow. This may be an assumption that is not protective, since some sources may have flows that correlate poorly or are completely independent of river flows. For example, a summer storm in an urban area with impervious surfaces may exhibit high flows while the flows in the river receiving that discharge are still relatively low.
12. Page 69, Table 35: allocations for tributaries are based on a weak analytical method (see comments on Appendix F). Given the importance of reducing loads in the mainstem Deschutes River, Capitol Lake, and Budd Inlet, a more rigorous analysis is needed to assess loading targets.
13. P. 77, Section 7.3.3.2:
    a. The first paragraph refers to "nutrient water quality targets". If these are the targets defined in Appendix, that needs to be stated.
    b. The first sentence of the second paragraph does not make sense. The phrase "there are no point sources permitted to discharge anything other than stormwater" is difficult to decipher, and it's not clear why the absence of storm event makes monitoring data representative.
14. P. 78, Figures 7 and 8: cite appendix F.
15. P. 80, Section 7.4.2: the use of reference values for nutrient targets should not be considered conservative assumptions. No information is available to determine whether these targets are accurate or biased high or low.
16. P. 82, Section 7.4.4.2:
    a. The same concerns about flow-varied loads as expressed for the mainstem DO TMDL apply here – no evidence is provided to show that the approach is protective, and the method of calculating loads is not clear.
    b. Flows used to calculate loads were developed with a weak methodology (see comment below for Appendix F).

<u>Appendix B – Capitol Lake Designated Use Evaluation</u>

17. The retention time determined for Capitol Lake is just below the value for being defined as a "lake". Since the lake is losing volume over time, this approach is conservative in that sense. However, if the lake were dredged, it might have sufficient volume to qualify as a lake. This would make the water quality criteria that apply much more stringent, which also might be considered as conservative. DERT will have to decide which version of "conservative" they prefer. Considering the geophysical, hydraulic, ecological state of the lake, considering it to be a "run of the river reservoir" seems appropriate.
18. It is not clear why this appendix is included, since the TMDL ends before entering the "lake".

<u>Appendix C – Deschutes River Fine Sediment Technical Analysis</u>

19. This appendix would benefit from some basic background information regarding geology and soil types. This context would support and clarify the rest of the analysis.
20. Rainfall-runoff erosivity factor (R) and climate change – increased erosion from more intense winter rainfall not addressed.

21. In general, the method is probably the best that can be used with the spotty and variable data set available. An adaptive management approach should be employed with a rigorous monitoring program to test assumptions and progress in reducing fine sediment.

Appendix E – Deschutes River Mainstem Dissolved Oxygen TMDLs Technical Analysis

22. General comment: The discussion in this appendix is confusing because it's not clear which work Ecology did and which work EPA has done to supplement their work. The report should be rewritten to make it very clear which parts are from the original Ecology work, and what EPA is adding to the report.
23. Page 1, 1.0 Introduction:
    a. Review for grammar – many errors. For example, "sources of dissolved oxygen (DO)" and redundant sentences near the end of the paragraph.
    b. Clarify the boundaries of the model. Figure 1 shows Capitol Lake as part of the basin, but the narrative suggests that modeling ends where the river enters the lake backwater (foot of Tumwater Falls).
24. Page 3, Table 2: explain the caption. Is this the entire drainage from the downstream end of each impaired reach? "Cumulative" means each upstream reach is included in the downstream reach?
25. Page 4, Flow and Water Chemistry Data: include a paragraph about seepage runs and gaining/losing reaches.
26. Page 7, Table 4 and 5:
    a. List the number of non-detects and explain how non-detects were handled when calculating the mean.
    b. It would be better to show min, mean and max on these tables.
27. P 10, Section 3.0
    a. First paragraph: This paragraph is not accurate and should be deleted. DO is affected far field by pollutants. Pollutants entering the Deschutes River from above Offut Lake could impair the river below Offut Lake even if the DO criteria are being met above Offut Lake. Likewise, even if the Deschutes River above Capitol Lake is meeting criteria, pollutants from the river could impair Capitol Lake.
    b. In general, Section 3.0 is difficult to understand. Is the report presenting results before it presents the analysis to achieve them? This section needs to be rewritten to be comprehensible.
28. P 41, Section 5.3:
    a. The report should avoid using the term "natural conditions". State standards define "natural conditions" as absent human-caused pollution. Many human impacts have changed conditions and may be impacting DO. In particular, changes in the hydrology of the basin may be having a large impact on river flows and DO. Some discussion should be provided about what factors were estimated for natural conditions, and what factors may affect DO but were not addressed in this report.
    b. The reference to Table 23 here appears to be an error.
29. P 42, Figure 17: red shading appears to be in the wrong locations.
30. Pp 44-46, Tables 19-21: label CBOD as 5-day or ultimate.
31. P 45, Table 20: "natural" ground water CBOD and TP seem rather high. TP is not very mobile in ground water, and CBOD is likely to be less than detection as background, and mostly dissolved. In addition, these

values are surprisingly higher than the headwaters, that are presumably background groundwater-derived baseflow. The ground water data used should be reviewed. The median reference condition may not be appropriate, depending on the sources and distribution of the data set.

32. P 49, Section 5.4.
    a. This section is interesting. Explain how it factors into determining the TMDL.
    b. Conduct a stressor assessment of summer low flow. What would the effect be of increased flow in the Deschutes River. A recent Masters thesis from TESC sheds light on the loss of flow and could be the basis of choosing the amount and locations of flow impacts. The effect of increasing flow in gaining reaches and reducing the loss of flow in losing reaches should both explored.
33. P 52, Section 5.5
    a. "There is no need to require nutrient load reductions downstream of Offutt Lake because the numeric Water Quality (WQ) criterion is met with a wide margin of error under existing nutrient levels": Since the analysis did not include modeling of impacts on Capitol Lake, this statement seems unsupported. There is no need to reduce nutrients below Offut Lake to meet the criteria between Offut Lake and Capitol Lake, but the analysis has not been determined if nutrients need to be reduced to allow Capitol Lake to meet DO criteria and address its listing for TP, or to allow Budd Inlet to meet DO standards.
    b. "…there is small section of the river about five kilometers upstream of Offutt Lake that is slightly below the target, by <0.05 m/L. For the TMDL evaluation, results are aggregated to sections of the river spanning a few kilometers in length. Overall, this segment (Silver Spring to Tempo Lake Outlet) achieves the target concentration for the TMDL.": Simply aggregating the reach so the problem "goes away" is not appropriate – 0.2 mg/L has already been allowed, and allowing more is not in compliance with the standards.
    c. Since the TMDL was aggregated by river sections, show those sections in Figure 25, explain how those sections were chosen, and explain how DO results were "aggregated".
    d. More analysis of DO results for each reach should be provided. What is the physical driver of lower DO in these reaches? How do gaining and losing reaches affect DO concentrations?
34. P 56, Section 6.0
    a. "…there are no reductions in existing nutrient loads required because the thermal loads assigned in Ecology's Deschutes River temperature TMDL are shown to result in the achievement of the applicable DO criteria.": As mentioned in a previous comment, this statement is not accurate because the downstream standards and the TP 303d listing for Capitol Lake and the protection of Budd Inlet are not addressed in this TMDL.
    b. "TMDLs are expressed as flow-varied loads based on the TN and TP concentration targets …" and "Thus, the nutrient loads downstream of Offutt Lake are established based on existing average ambient concentrations…": No explanation is provided for why the concentration is the target and loads can increase with flow. Has this assumption been tested with scenarios at higher flow? If so, this analysis should be shown. If not, this approach has no basis. In past TMDLs, a load was set at critical conditions to ensure a margin of safety. No evidence is provided that a flow-varied load provides a margin of safety. Alternatives should be explored, such as seasonal loading limits.

35. P. 23, Section 3.4:
    a. The use of “nutrient targets” based on ecoregion value seems like a very weak way to protect DO and pH. No analysis has been provided to link DO and pH response to nutrient loads. As a result, no margin of safety can be determined, and reasonable assurance seems impossible to certify.
    b. On top of the weakness of this surrogate approach, these targets are not evaluated to determine if Black Lake Ditch and Percival Creek nutrient levels will be protective of Capitol Lake and Budd Inlet.
    c. TMDLs should not be established for these creeks without a more rigorous analysis that quantitatively links nutrient levels to DO and the trophic status of the creeks.
    d. At best, these targets should be left as targets to drive implementation of BMPs. Future monitoring should determine if nutrient reductions are resulting in DO improvements.
36. P. 25, Section 3.5:
    a. No analysis is provided to show that flow-varied loads are protective of DO.
    b. The use of a relative drainage area to estimate creek flows is the weakest method available. The watershed areas used are not described, which is particularly worrisome for Percival Creek and Black Ditch, whose source watershed surrounding Black Lake is shown as excluded from analysis. Flows in these creeks may be affected by local rainfall amounts, impervious surface, ground water interactions, soil types, terrain aspect and slope.