



Memorandum

To: Steve Mrazik, Watershed Management Section Manager, DEQ
Tyler Dearman, Basin Coordinator, DEQ
Amanda Odrick, Basin Coordinator, DEQ
Erica Figliulo, Agency QA Officer, DEQ

From: Daniel Sobota, TMDL Program, Watershed Management Section

Date: February 2, 2026

Subject: Comments and responses from Technical Advisory Committee review of the Snake River Mercury TMDL Modeling QAPP

DEQ distributed a draft document titled “Modeling Quality Assurance Project Plan for the Snake River Mercury TMDL” in November of 2025 to the Nez Perce Tribe and the Technical Advisory Committee (TAC) as part of the development process for the Snake River Mercury TMDL. The draft version was developed during the spring and summer of 2025 and had undergone review by DEQ technical staff and US EPA Region 10 staff in the fall of 2025 before distribution to the TAC. DEQ received feedback on the November 2025 draft in December of 2025 and January 2026. Specific comments to DEQ were provided by the following organizations and individuals:

- Nez Perce Tribe, received January 8, 2026
- Idaho Power Company, received December 3, 2025
- Oregon Department of Fish and Wildlife, received November 25, 2025
- Dr. Scott Wells, Portland State University, received November 17, 2025

DEQ has compiled the comments and addresses each line-by-line in the following sections. DEQ has produced both a redline and clean version of the document for final review by DEQ management and the agency QA officer.

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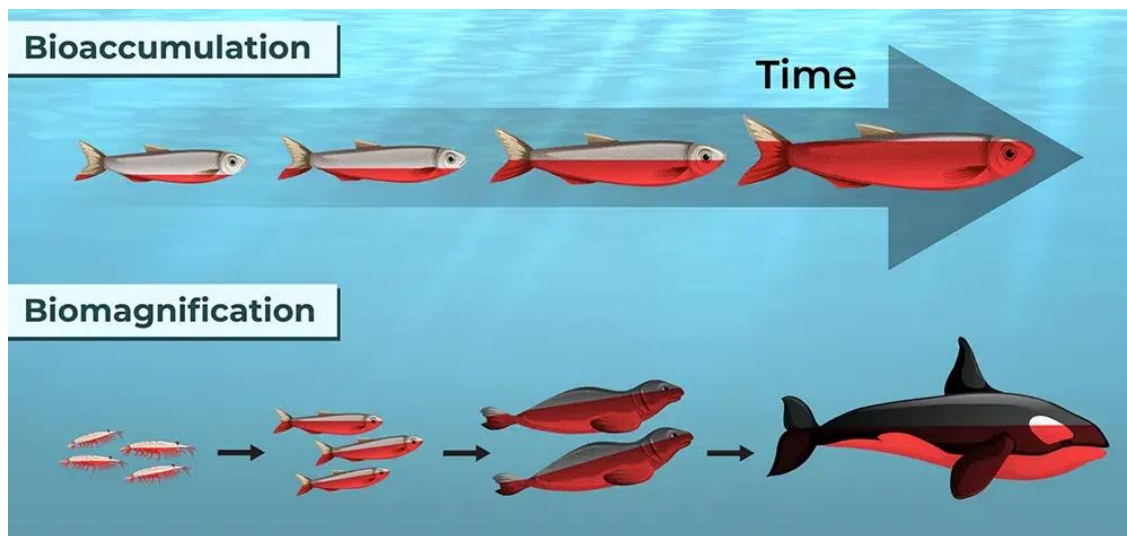




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Comments from ODFW

1. Section 3, page 10 - Several points of the document mention bioaccumulation (amassing greater heavy metals over time). Another concept to mention for White Sturgeon is biomagnification, whereby White Sturgeon are at the top of the food chain and have amassed a lot of heavy metals by consuming lots of prey with heavy metal loads. Bioaccumulation and biomagnification together are an issue for White Sturgeon because they are at the top of the food chain and long-lived, which means they would likely amass a larger heavy metal load over their lifetimes.



DEQ's response: DEQ has modified added language throughout the document to clarify the different concepts as needed.

2. Appendix A, page 9 – Food availability may be an issue in some of these areas of the Snake River, as evidenced by slow growth rates for some size classes of White Sturgeon. I've attached Idaho Power Company's 2024 report that contains some growth information by size class and reservoir.

DEQ's response: DEQ will consider the report as the models are developed, tested, and applied.

3. Appendix A, page 12 – White Sturgeon are intermittent spawners, meaning they don't spawn every year, and we have some evidence to suggest that female White Sturgeon spawn every 2-5 years.

DEQ's response: DEQ will consider approaches to model contaminant burdens in relation to spawning cycles. DEQ may choose to set a target size class that would reflect the upper size limit of subadult white sturgeon and thereby eliminate the need to model contaminant burdens during spawning.

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Comments from Dr. Scott Wells, Portland State University

Page 15, v.4.5 with Hg cycling

Page 15, v4.5 with Hg

DEQ's response: DEQ is unclear how to incorporate these comments into the revised QAPP.

Page 16, Not sure what is meant here ... do you mean hydraulic friction? ...need to clarify.

DEQ's response: DEQ has edited the sentence to clarify that hydraulic friction parameters are derived from these data.

Page 17, The cross-section is not well-mixed...perhaps better to just say that the model layers are well-mixed laterally...

DEQ's response: DEQ has made the suggested change to the text.

Page 23, I do not think so. If our initial conditions are from data and the sediments have good initial conditions, then we do not need a spin-up time - or at most it would be the detention time of the system which in the winter could be a couple months. In our model-data comparisons in 2014 we match data very well from the first profiles in March. I would probably just delete this sentence.

DEQ's response: DEQ has made the suggested deletion.

Page 31, 2D

DEQ's response: DEQ has made the correction.

Page 31, and solids

DEQ's response: DEQ has modified the sentence to reflect this comment.

Page 31, Delete highlighted if solids are mentioned in the preceding sentence.

DEQ's response: DEQ has modified the sentence to reflect this comment.

Page 31, We will be adding Fe and Mn also.

DEQ's response: DEQ has inserted a sentence denoting this addition.

Page 44, I would change this from Spring to just 2026 - I am sure it will move to the end of 2026

DEQ's response: DEQ has made the requested change.

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Comments from Idaho Power Company (Jesse Naymik)

Page 11, Including sediment here causes some confusion. Do you mean settling MeHg from the water column to sediment, or production in the sediment, or production in and then flux from the sediment?

DEQ's response: DEQ has rewritten the statement to reflect loading of methylmercury to the Snake River to remove the ambiguity of specific components of the system. We have also altered text to read "methylmercury loads" throughout the document.

Page 14, of a

DEQ's response: DEQ has made the correction.

Page 14, You may want to qualify this statement with something like. "with additional evaluation and improvements....CE-QUAL outputs may be used as inputs for the FWeb4 model

DEQ's response: DEQ has inserted the suggested language.

Page 15, This statement does not agree with FWeb4 capabilities currently. FWeb4 inputs currently include water column filter passing MeHg and MeHg concentrations of lower food web items (e.g., zooplankton, amphipods, and chironomids). FWeb4 does not consider benthic sediment concentrations or water column sediment MeHg (e.g., water column particulate MeHg that is not the lower food web items).

DEQ's response: DEQ has revised this section to reflect the current capabilities of Fweb4 and has inserted an additional line item that specifies that basal food items will be linked to methylmercury in the environment using peer-reviewed literature, including the recent USGS studies that have focused on mercury cycling in the Snake River.

Page 15, We discussed this a bit previously. Reed Harris's specific experience with Hg research and modeling may be a greater benefit to these efforts than is implied in this paragraph

DEQ's response: DEQ has discussed project roles with Reed Harris. DEQ has modified the text to reflect the significant contributions expected from him.

Page 16 (two related comments), There are a number of potential pit-falls with expansion of the CE-QUAL model up and downstream of the HCC for Hg. This highlights one of them. How are irrigation return flows currently handled in the temperature model and will that need to be changed?

For example, irrigation returns are not included here at all. I'm guessing they are handled as a distributed tributary with a "general" temperature condition.

DEQ's response: DEQ recognizes that a number of challenges arise with expanding CE-QUAL-W2 to riverine portions of the Snake River upstream and downstream of the reservoir complex. Technical reports prepared for detailing the modeling work and results will address this question and others in those products.

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Page 18, This statement, specifically minimal atmospheric deposition is not consistent Baldwin et al. (2024). Filter passing Hg was relatively strongly associated with snowmelt (wet deposition).

DEQ's response: Baldwin et al. states that there is much uncertainty surrounding the contribution of current atmospheric deposition (wet and dry) to total mercury loading to tributaries and the mainstem of the Snake River. We have removed language inferring minimal contribution to allow for a full assessment of sources in the analysis.

Page 18, Relative to my previous comment, this statement does seem consistent with Baldwin et al. 2024.

DEQ's response: This sentence directly reflects the following statement from Baldwin et al. (2024): "Unfortunately, we were unable to obtain Hg isotope samples from irrigation drains, but these data would be necessary to more accurately assign the contributions of Hg from geologic, industrial sources, and atmospheric Hg in the main stem of the Snake River."

DEQ has chosen to leave the current sentence as is to remain consistent with Baldwin et al. (2024).

Page 19, Needs clarification. Are you referencing high-water years compared to low-water years? Filter-passing MeHg loads at the outflow of Brownlee can be higher in some years but this appears to be related to extent and duration of anoxia, accumulated MeHg in the hypolimnion, and destratification timing (as you cover in subsequent sentence) and not variations in the annual flow regime.

DEQ's response: DEQ's intent was to include all of the factors mentioned in the comment under the term "annual flow regime". DEQ has modified the sentence to reflect variation in these factors.

Page 38, As we've discussed previously, modifications of reservoir operations, in particular vertical location of facility discharges, does not seem necessary to develop TMDL responsibilities. If anything, this is an implementation question after allocations etc. are determined.

DEQ's response: DEQ concurs that investigation of alternative management prescriptions to achieve required methylmercury loads does not need to be included in the modeling/TMDL development phase and will be moved to the Water Quality Management Plan.

Comments from the Nez Perce Tribe (Jay Hesse and Ken Clark)

Page 7, Expand to ensure inclusion of any aquatic species sturgeon and crayfish.

DEQ's response: this sentence provides an example of bioaccumulation and biomagnification relevant to human health. Details for other species are provided in subsequent sections. DEQ has modified this sentence to include "shellfish" and has inserted similar language as appropriate throughout the QAPP.

Page 7, suggested insertion: Ensuring attainment of Oregon's protective fish tissue criterion is particularly important in reaches where Tribal treaty-reserved fisheries occur

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DEQ's response: Achieving the fish tissue criterion is required in all state waters. DEQ recognizes the significance of restoring Tribal treaty-reserved fisheries; but not think it would be appropriate to insert this statement here.

Page 7, suggested insertion: This moratorium underscores that current fish tissue concentrations downstream of the Hells Canyon Complex do not attain Oregon's protective criterion in areas of Tribal subsistence and cultural use.

DEQ's response: DEQ has inserted a modified version of this suggestion: This moratorium underscores that current fish tissue concentrations downstream of the Hells Canyon Complex do not attain Oregon's protective criterion in areas of Tribal subsistence and cultural use.

Page 7, suggested insertion: In the Snake River system, hydropower operations substantially influence stratification, anoxia, and methylmercury production and export; these operational drivers will be represented in model setup and considered in scenario evaluation where feasible.

DEQ's response: DEQ does not agree that the insertion is appropriate at this location in text.

Page 9, I thought tribal ICC boundaries were going to be shown in addition to the state boundaries.

DEQ's response: DEQ will include the ICC boundaries in the interactive web map for the project and documents produced for the TMDL, WQMP, and other communications. For the purposes of setting up the technical work, DEQ will keep the current map as is.

Page 11, Should the timeline for meeting the consumption criteria be added here? At least a footnote?

DEQ's response: DEQ has inserted the date of 2045 to reflect terms of the settlement agreement.

Page 11, suggested insertion: Achieving this objective requires that modeled fish tissue concentrations are demonstrated to be consistent with the protective threshold throughout the Snake River AUs, including reservoir and riverine segments downstream of Hells Canyon Dam.

DEQ's response: We have included a modified version of the suggested addition in the revised version: "Achieving this objective requires an empirical demonstration that fish tissue methylmercury concentrations remain below the human health criterion throughout riverine and reservoir AUs on the Snake River, including those downstream of Hells Canyon Dam."

Page 11, suggested insertion: ... including those related to reservoir stratification, hypolimnetic anoxia, and other processes that may influence in-reservoir methylmercury production and export.

DEQ's response: DEQ has chosen to omit this suggested addition because effects of reservoir conditions are detailed in Section 5.3 and Section 9.9.

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Page 11, Can ODEQ clarify how upstream boundary-condition loads originating in Idaho will be represented? Will you use static concentration inputs, flow-normalized relationships, or existing watershed loading datasets?

DEQ's response: DEQ has provided details on how sources in Idaho will be evaluated in Section 9.7. DEQ has also added the following to the flagged sentence "..., including those originating on the Idaho side of the border and upstream in Idaho."

Page 11, suggested insertion: ... under a range of hydrologic and thermal conditions representative of the Snake River system.

DEQ's response: DEQ has included a modified version of the suggested insertion: "...under a range of climatic, hydrologic, and thermal conditions characteristic of the Snake River system."

Page 12, suggested insertion: , including processes within stratified reservoirs where hypolimnetic low-oxygen conditions may influence methylmercury production and export.

DEQ's response: DEQ details these processes and potential effects in Section 5.3 and does not believe inclusion of this statement is necessary for the introduction section.

Page 14, suggested insertion: , although no quantitative mercury loading targets were established at that time.

DEQ's response: DEQ has included in the suggested insert in the revised version.

Page 15, I assume these models differ in spatial extent, calibration periods, and the way key processes are represented. Can you describe how these differences will be reconciled when you integrate the two models into a single, system-side framework for the TMDL?

DEQ's response: the two models arise the same spatial and temporal data (including calibration period). DEQ has inserted this language into the sentence to clarify the relationship among the two models.

Page 15, suggested insertion: but will require further refinement and validation for TMDL purposes. If this is true, do you want to describe the additional refinement or validation steps expected for this submodel before it is used in TMDL scenario development?

DEQ's response: DEQ has inserted a modified version of the suggestion into the revised version. Additional steps and refinements are described in Section 5.9.1.

Page 17, This section describes who will participate in software development, but doesn't describe the methods, procedures, or QA/QC steps that will be used to expand, modify, calibrate, or validate the models. Because EPA QAPP guidance often looks for this type of methodological detail, it would be helpful to clarify whether this information will be added here or in a later section or technical document.

DEQ's response: DEQ has inserted a sentence stating that specific methods related to QAQC, calibration, model expansion, testing will be detailed in modeling reports and appendices.

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Page 17, Because the TMDL reach integrates mercury loads from a very large upstream basin, it may be helpful to clarify at a high level how upstream mainstem and tributary loads are treated as boundary conditions in the model, and how that treatment affects the attainability of meaningful reductions in methylmercury exposure through in-reach management actions.

*DEQ's response: DEQ has inserted the following sentence to address this comment:
"Contributions of flow, mercury, methylmercury, and other pollutants from major and minor tributaries and irrigation return flows will be estimated from observed data or estimated using methods listed in **Error! Reference source not found.**"*

Page 17, Given that the selected spatial and temporal resolution is intended to support identification of seasonal variability and critical conditions relevant to methylmercury bioaccumulation, it may be helpful to briefly describe how DEQ will confirm that the chosen resolution is adequate for these purposes.

DEQ's response: DEQ has already included this information in Section 5.2.

Page 19, Because a substantial portion of mercury and MeHg loading originates upstream and outside OR's jurisdiction, it would be helpful for the QAPP to clarify whether upstream loads will be treated as fixed background conditions or as dynamic, quantified inputs whose influence on downstream conditions will be evaluated through sensitivity or scenario analyses.

In addition, clarification on how upstream nutrient and organic matter loads will be represented would be useful, given their role in driving reservoir stratification and anoxia that facilitate MeHg production.

DEQ's response: DEQ has addressed how inputs from upstream and tributaries from Idaho, as well as how they will be represented, in Sections 5.1 and 9.7. Although DEQ recognizes the importance of inputs from Idaho for modeling outputs, DEQ views these inputs as "background" as they originate outside Oregon's jurisdictional boundaries. Therefore, DEQ may examine reduction scenarios on the border with Oregon but will not examine specific dynamics in Idaho.

Page 20, The QAPP appropriately identifies the HCC reservoirs as a dominant influence on mercury cycling, including stratification, anoxia, and downstream transport of MeHg. It would be helpful to clarify whether reservoir operations are treated solely as environmental conditions in the modeling framework or whether operational scenarios will be explicitly evaluated as potential management levers during scenario analysis.

DEQ's response: DEQ has designated influence of reservoirs as one of the management scenarios to be evaluated in Section 9.9. For the purposes of model development, DEQ will not specify specific operation scenarios; only reductions needed to achieve required load allocations. Specific operational scenario alternatives fall within the category of implementation plans submitted by Designated Management Agencies.

Page 21, suggested insertion: but not limited to

DEQ's response: DEQ has inserted a modified version of the suggestion.

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Page 21, Because this uncertainty affects Tribal fisheries downstream of the TMDL area, it would be helpful for the QAPP to clarify how this uncertainty will be addressed in the TMDL framework. It would be helpful to clarify whether this data gap will be accounted for through conservative modeling assumptions or an explicit margin of safety applied to modeled outputs within the TMDL area (e.g., at outflows), or through a defined post-TMDL monitoring and adaptive management approach.

DEQ's response: DEQ explains how contributions from in-river, riparian, and tributaries downstream of Hells Canyon Dam in Sections 9.6-8. Explanations of the approaches to derive TMDL components (Load Allocations, Wasteload Allocations, Margin of Safety, and Reserve Capacity) will be explained during the Rules Advisory Committee process.

Page 21, The QAPP could potentially benefit from a brief statement clarifying whether these point sources are expected to be minor or significant contributors relative to upstream tributary inputs and reservoir-driven MeHg production.

DEQ's response: DEQ has elected to leave the current statement on point sources unaltered to allow for an unbiased assessment of point source influences in the modeling framework.

Page 24, Because mercury stored in sediments can continue to influence MeHg levels over long time periods, it would be helpful to clarify whether the spin-up period is intended to stabilize only water movement and basic water-quality conditions, or whether it also accounts for stabilization of sediment mercury contributions prior to evaluating load-response relationships used to establish TMDL allocations.

DEQ's response: This sentence has been deleted based on the recommendation of Scott Wells, who will lead the CE-QUAL-W2 modeling effort at Portland State University.

Page 25, It would be helpful to clarify how the use of professional judgment will be documented and how associated uncertainty will be evaluated and reflected in model outputs or margin of safety considerations.

DEQ's response: DEQ has inserted the following sentence: "Best professional judgement will include a written rationale for the derivation of the estimates and may include multiple estimates to assess sensitivity of model outputs."

Page 27, It would be helpful to clarify which modeling assumptions are expected to have the greatest influence on load-response relationships used to establish TMDL allocations, particularly those affecting MeHg production, transport, and bioaccumulation in downstream Tribal fishing reaches.

DEQ's response: DEQ does not have expectations on which assumptions may have the greatest influences on model outputs and prefers to conduct an objective analysis to determine those that need additional refinement and study.

Page 27, Sensitivity analysis will evaluate the influence of assumptions. It would be useful to clarify how uncertainty associated with key assumptions will be reflected in the TMDL framework (e.g., through conservative assumptions, sensitivity-informed allocation decisions, or MOS considerations).

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DEQ's response: DEQ details how uncertainty parameter estimates will be examined in Section 6.1. Explanation how uncertainty in the TMDL process will be explained in documents developed for the Rules Advisory Committee.

Page 28, You describe a weight of evidence approach to model calibration but don't specify how "sufficient" calibration will be determined. It would strengthen the document to clarify, at a high level, how calibration performance will be evaluated across key variables (e.g., temp, DO, mercury species) and how tradeoffs among competing fits will be considered when assessing overall model adequacy.

DEQ's response: DEQ has already provided this information in the preceding paragraphs.

Page 30, Macrophytes and periphyton at least from list are subject to downstream transport.

DEQ's response: Transport of macrophytes and periphyton downstream in CE-QUAL-W2 is represented to be conversion into organic matter components before downstream transport.

Page 37, It may be helpful to clarify whether the existing conditions scenario represents average conditions over the 2014-2018 period or a range of observed conditions, and how this baseline will be used in relation to the critical conditions scenario when determining required reductions.

*DEQ's response: DEQ has provided information detailing the date range of the calibration period and how the existing conditions scenario will be used in evaluating critical conditions in Section 9.1 and 9.2. DEQ has modified the following sentence to further clarify the period of interest: "This scenario will rely on the time series of flow and water quality conditions measured from 2014-2018 and data generated from methods in **Error! Reference source not found.**"*

Page 37, It may be helpful to briefly clarify how these critical conditions will be defined, specifically whether they represent conservative bounding conditions (e.g., worst-case but plausible combinations of flow, temperature, stratification, and loading) or are based on representative historical periods. This would improve transparency regarding how protective the resulting targets and allocations are intended to be.

DEQ's response: DEQ has added more detail about how critical conditions in the previous sentence, which now reads:

"Critical conditions evaluated include those that may result from individual or combined effects of extreme low flows (7Q10), extreme high flows based on historical data, high rates of pollutant loads observed or expected based on literature reviews, expected or observed extremes of river and reservoir temperature regimes, and extreme scenarios of food web structure and composition based on observed or expected changes in biological communities."

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