REGION 10
SEATTLE, WA 98101

July 26, 2024

Marla Koberstein
Department of Ecology
Water Quality Program
P.O. Box 47696
Olympia, Washington 98504-7696

Dear Ms. Koberstein:

Thank you for the opportunity to provide comments on the Washington State Department of Ecology's proposed amendments and additions to Chapter 173-201A Washington Administrative Code – Water Quality Standards for Surface Waters of the State of Washington, filed on May 10, 2024. Specifically, Ecology proposes revisions to WAC 173-201A-020, WAC 173-201A-200, WAC 173-201A-210, WAC 173-201A-260, and WAC 173-201A-430. In addition, Ecology proposes to adopt a new section at WAC 173-201A-470 that incorporates by reference the adoption of Ecology's publication *A Performance-Based Approach for Developing Site-Specific Natural Conditions Criteria for Aquatic Life in Washington*. [May 2024, Publication 24-10-017].

Pursuant to Clean Water Act section 303(c), the EPA has the duty to review and approve or disapprove new or revised water quality standards submitted by states and authorized Tribes. With respect to water quality criteria, the EPA's implementing regulation at 40 CFR § 131.11(a)(1) requires that "criteria must be based on sound scientific rationale and must contain sufficient parameters or constituents to protect the designated use." In its preamble to the 2000 final rule, *EPA Review and Approval of State and Tribal Water Quality Standards,*[1] the EPA articulated the concept of a "performance-based" approach as one way for states and authorized Tribes to streamline the administrative processes for site-specific criteria. The EPA stated that, "[a] performance-based approach relies on adoption of a process (i.e. a criterion derivation methodology) rather than a specific outcome (i.e. concentration limit for a pollutant) consistent with 40 CFR 131.11 & 131.13. When such a "performance-based" approach is sufficiently detailed and has suitable safeguards to ensure predictable, repeatable outcomes, EPA approval of such an approach can also serve as approval of the outcomes as well." While the EPA did not promulgate regulations specifying the required elements of a performance-based approach, the EPA indicated that such an approach should specify "methodologies, minimum data requirements, and decision thresholds," and should be "binding, clear, predictable, and transparent" to be consistent with 40 CFR § 131.11 requirements.[2]

[1] 65 FR 24641
[2] *Id.* at 24647-48

The EPA has reviewed Ecology's proposed rule revisions, including the proposed performance-based approach incorporated by reference in the rule, Ecology's Technical Support Document, and Implementation Methods. As currently proposed, the EPA is concerned that Ecology's performance-based approach for developing site-specific natural conditions criteria is not sufficiently "binding, clear, predictable, and transparent." Specifically, many decision thresholds in the approach are framed as non-binding considerations. The approach lists the steps of the process but doesn't follow those steps in a clear and predictable sequence. To improve transparency, additional documentation should be included in the approach and not deferred to future site-specific applications. In support of Ecology's efforts, the EPA provides the enclosed comments and suggestions based on our review of the proposed rule and the applicable statutory and regulatory requirements.

The EPA appreciates Ecology's commitment to update Washington's water quality standards. We look forward to continuing to engage with you throughout this process. If you have any questions, please contact Rochelle Labiosa of my staff at (206) 553-1172 or labiosa.rochelle@epa.gov.

Sincerely,

REBECCA GARNETT Digitally signed by REBECCA GARNETT
Date: 2024.07.26 15:25:01 -07'00'

Rebecca Garnett
Manager, Standards and Assessment Section
Water Division

Enclosure

cc: Kalman Bugica, Washington State Dept. of Ecology

EPA Comments on Washington's Natural Conditions Criteria Rulemaking Documents
July 26, 2024

The EPA's comments below reflect the following categories in descending order of importance: (1) consistency with regulations, including missing steps and/or binding language; (2) comments on details; (3) comments on reorganization; and (4) recommendations to improve the document. Each comment is labeled in accordance with this categorization.

1. **WAC 173-201A-310(3)**. Consistency with regulations. The EPA recommends deleting this provision from the Washington WQS to provide consistency with the new revisions contained in the proposed rule. This provision states that "natural conditions constitute the water quality criteria" without any further explanation that the site-specific criteria approaches identified at 173-201A-260 must be followed to establish natural conditions criteria. If this provision is not deleted, please consider revising to include a reference to WAC 173-201A-260(1)(a). If the state opts not to make the suggested revisions, the EPA requests that Ecology provides a clarification to the EPA that this provision will be implemented consistent with WAC 173-201A-260(1)(a).

2. **Proposed Rule Language: AMENDATORY SECTION (Amending WSR 24-01-088, filed 12/18/23, effective 1/18/24).**
    a. WAC 173-201A-02. Definitions
        1. Consistency with regulations. The EPA recommends deleting the second sentence in the definition of natural conditions: "*When estimating natural conditions in the headwaters of a disturbed watershed it may be necessary to use the less disturbed conditions of a neighboring or similar watershed as a reference condition.*" Although this provision is not new or revised, this sentence could be read as a conflicting approach to the state's new and revised procedures for natural conditions at WAC 173-201A-260, -430, and -470 because a "reference condition" may allow some anthropogenic disturbance, which is inconsistent with the concept of a natural conditions approach.

        2. Consistency with regulations. The EPA recommends revising the definition of "performance-based approach" (PBA) to focus on what a PBA is, instead of what it is not, and offers the following revised version: "*Performance-based approach" means a water quality standard that is a transparent process (i.e. methodology) which is sufficiently detailed and has suitable safeguards that ensures predictable and repeatable outcomes, rather than a specific outcome. The outcomes from the performance-based approach are site-specific criteria.*"

            Additionally, the EPA recommends removing the references to the CWA federal implementing regulations at 40 CFR Part 131, as they do not specifically address the requirements of a PBA. In the preamble to the 2000 final rule, *EPA Review and Approval of State and Tribal Water Quality Standards,*[3] the EPA articulated the concept of a "performance-based" approach.

[3] 65 FR 24641

3. Binding language. The EPA recommends adding a definition of "mechanistic models" to provide additional clarity about the type of tool that will be used in the PBA. The EPA's Council for Regulatory Environmental Modeling guidance (2009) defines a mechanistic model as "*a model whose structure explicitly represents an understanding of physical, chemical, and/or biological processes. Mechanistic models quantitatively describe the relationship between some phenomenon and underlying first principles of cause*."

b. **WAC 173-201A-200(1) and WAC 173-201A-210(1).** Consistency with regulations. The EPA recommends adding a sentence to the end of each provision to clarify that human sources of pollution outside of the *de minimis* allowance for the local and regional sources cannot cause any increase in temperature or decrease in dissolved oxygen.
    1. For part (c)(i), please add: "All other sources considered cumulatively may not cause any increase in the natural 7-DADMax temperature."
    2. For part (d)(i), please add: "All other sources considered cumulatively may not cause any decrease in the natural dissolved oxygen concentration."

    The EPA also recommends removing the "local and regional sources" qualifier and describing such a qualifier in guidance or implementation documentation.

    We also recommend adding a reference to WAC 173-201A-260 to each of the cumulative cap provisions to connect the natural conditions procedures to natural conditions provisions.

    It is our understanding that the provisions for dissolved oxygen at (d)(i) are only applicable to the biologically-based numeric criteria in Table 200(1)(d) and not to the saturation state-based criteria. Therefore, we recommend the provision be revised to clarify that point. Additionally, the EPA recommends referring to "D.O." as "D.O. concentration" or "D.O. criteria" depending on the context, such as *"…the D.O. concentration of that waterbody to decrease by more than 10 percent or 0.2 mg/L below the natural conditions-based D.O. criteria, whichever decrease is smaller."*

c. **WAC 173-201A-260(1).** Consistency with regulations. Consideration of attainability per 40 CFR section 131.10 referenced in the state's revised rule is not appropriate for natural conditions criteria or other site-specific criteria statements. Such criteria are established to protect the current designated uses and cannot consider attainability. The EPA suggests the following revisions to clarify the applicable criteria when natural conditions are not applicable (i.e. the biologically-based numeric criteria):

    a) The applicable aquatic life criteria for water bodies in Washington are the biologically-based numeric criteria in [Tables 200(1)(c)…] *unless the application of 260(1)(a)(i)-(ii) results in site-specific numeric aquatic life criteria representing specific conditions unique to a waterbody.*

    (i) Aquatic life criteria for temperature, pH, or dissolved oxygen for freshwaters or dissolved oxygen or temperature for marine waters based on natural conditions will be

derived following either the individual site-specific criteria approach pursuant to WAC 173-201A-430 or the performance-based approach pursuant to WAC 173-201A-470.

(ii) For parameters other than dissolved oxygen, pH, or temperature for freshwaters or dissolved oxygen or temperature for marine waters, aquatic life criteria based on natural conditions will be derived pursuant to WAC 173-201A-430.

(b) When a water body does not meet its assigned criteria due to human structural changes that cannot be effectively remedied (as determined consistent with the federal regulations at 40 C.F.R. 131.10), then alternative estimates of the attainable water quality conditions may be used to establish alternative criteria for the water body (see WAC 173-201A-430 and 173-201A-440).

Note, the EPA's suggested revision to provision "b" deletes the statement about natural conditions. Combining natural conditions and attainability creates ambiguity around how the rules function together.

d. **WAC 173-201A-430.** Consistency with regulations. The EPA recommends the following revisions:
    1. **WAC 173-201A-430(1)** must be revised in accordance with the EPA regulations at 40 CFR section 131.11. Attainability is pertinent to use attainability analyses and establishment of designated uses and should not be included in site-specific criteria statements, where the criteria are to protect the current designated use(s). The EPA suggests the following revisions: *"Where the existing and designated uses for the water body would be fully protected using an alternative criterion, site-specific criteria may be adopted."*
    2. **WAC 173-201A-430(1)(a)** includes references to designating uses and the federal regulations for designating uses. The establishment of site-specific criteria does not pertain to designating uses; therefore, we recommend deleting the phrases "designating and" as well as the reference to 40 CFR 131.10.
    3. The EPA recommends the following revision for **WAC 173-201A-430(3)** to ensure consistency with federal regulations: "*The decision to approve the site-specific criterion must be based on a demonstration that it will protect the existing and designated uses of the water body."*

e. **WAC 173-201A-470.** Consistency with regulations.
    1. Please delete "as revised" language at the end of **WAC 173-201A-470(1)**. The EPA cannot approve language that encompasses future revisions.
    2. Additionally, for clarity and consistency, **WAC 173-201A-470(4)** must reference WAC 173-201A-430 as the only approach to establish natural conditions outside of the PBA. the EPA recommends specific revisions to WAC 173-201A-470(4) to clarify the criteria in place until a natural criteria using the PBA or other site-specific criteria are established. The EPA offers the following

recommended revisions to **WAC 173-201A-470** to address these concerns as well as other rule language improvements:

WAC 173-201A-470 Performance-based approach. This performance-based approach may be used to establish numeric criteria based on natural conditions for a site that are fully protective of existing and designated aquatic life uses.

(1) *Aquatic life water quality criteria must be derived using the procedures referenced in ecology publication 24-10-017,*[add date]*, "A Performance-Based Approach for Developing Site-Specific Natural Conditions Criteria for Aquatic Life in Washington."*

(2) *Application of the performance-based approach for establishing aquatic life water quality criteria is limited to the following:*

(a) *Aquatic life temperature criteria in fresh water;*

(b) *Aquatic life dissolved oxygen criteria in fresh water;*

(c) *Aquatic life pH criteria in fresh water;*

(d) *Aquatic life temperature criteria in marine water;*

(e) *Aquatic life dissolved oxygen criteria in marine water.*

(3) *Aquatic life water quality criteria developed using this approach are applicable to the water body upon derivation.*

(4) *If the requirements set forth in the performance-based approach cannot be met, then site-specific criteria can be established by following the provisions at WAC 173-210A-430. The numeric criteria at XXX* [Ecology to add citations to biologically-based numeric criteria] *are applicable until a new SSC is established.*

3. **A Performance-Based Approach for Developing Site-Specific Natural Conditions Criteria for Aquatic Life in Washington, Publication 24-10-017, adopted by reference into WAC 173-201A-470** requires significant revisions to be sufficiently detailed and have suitable safeguards to ensure predictable, repeatable outcomes to be approved as a PBA since the approval of the approach serves as the approval of the outcomes as well. The PBA should specify methodologies and minimum data requirements and be binding, clear, predictable, and transparent to be consistent with 40 CFR section 131.11. The EPA is providing specific comments that fall under the following categories, with examples of specific issues within the categories:
    - **Missing Steps.** Critical steps in the PBA process are missing (see comment 3.b.4. below). Additionally, critical data and elements requirements are missing from the approach which are described below.
    - **Binding Language.** All steps in the approach must be binding. Several areas need revision to convey that the step is binding and required (i.e. revising “may” or “should” terminology to “must”).
    - **Consistency with Regulations.** The PBA includes anthropogenic impacts into the determination of the natural condition by including reference conditions or irreversible human sources into the approach. All references to any anthropogenic impacts must be revised.
    - **Additional Detail or Prescriptiveness.** Overall, more detail is needed throughout the document to ensure a repeatable and transparent process. The following must be included for each step in the process: binding principle language, procedures for

how specific steps will be executed, and sideboards, such as minimum data requirements, and spatial and temporal resolution requirements.

- **Reorganization.** Reorganization to increase clarity and transparency of the process that will be followed to derive the site-specific criteria based on natural conditions.
- **Recommendations for Improvement.** The EPA offers suggested revisions for areas of improvement.

The specific comments below are grouped section by section, following in order of the PBA, as per the steps identified in EPA's recommended reorganization (11 Steps; see comment b.4, below).

a. Introduction and Background

1. **Binding Language:** This section includes a mix of mandatory binding statements and nonbinding statements. We recommend that the state adds clear distinctions between nonbinding text and the performance-based approach procedures that must be binding.
    i. The "Human Structural Changes" section is not a procedure and should not be a part of the binding PBA portion of this document. The EPA recommends moving it to the Introduction and Background section.
    ii. Additionally, the EPA's recommends revisions to the "Human Structural Changes" section:

    > *The performance-based approach may not be used to derive criteria for specific assessment units of waters that contain human structural changes that cannot be effectively remedied (see WAC 173-201A-260(1)(b)). In these situations, alternative criteria may be developed through adoption of site-specific criteria or by revising the designated use and setting new criteria to support that revised use after completing a use attainability analysis. These alternative approaches require EPA review and action pursuant to CWA section 303(c).*

    Finally, please revise the second paragraph of this section so that it is a part of the procedures for the removal of anthropogenic sources in the PBA and move this paragraph to Step 10 (EPA revised steps) "Model Application."
2. **Consistency with Regulations**: There are several statements throughout the document including in this section to the effect that when portions of water bodies cannot meet the assigned aquatic life criteria due to natural conditions, the natural conditions constitute the water quality criteria. These statements are not accurate unless they are contingent upon the acceptable approaches for deriving natural conditions criteria pursuant to WAC 173-201A-260(1)(a). Therefore, these statements must be revised to include references to WAC 173-201A-260(1)(a) at every mention in the document.

b. Performance-Based Approach Use

1. **Binding Language:** The text in these introductory paragraphs does not include a clear start to the binding procedures. The EPA recommends including the

following suggested language: "*This document serves to meet the recommendations in EPA's 1997 Memorandum that recommends water quality standards include a binding procedure that will be used for determining natural background (Davies, 1997). The approach set forth below constitutes a binding procedure*."

2. **Recommendations for Improvement**: We recommend replacing the "Process-Based Modeling Approach" heading with "Criteria Derivation Approach" since the only option is Process-Based Modeling.
3. **Binding Language**: The following statement must be revised for clarity since the state's approach solely focuses on mechanistic water quality model applications: "*The process-based modeling approach characterizes the natural water quality for a parameter of interest through application of ~~tools such as a~~ mechanistic water quality models.*"
4. **Reorganization and Missing Steps**: The PBA lists nine steps to be used in this approach; however, some critical steps are missing from the approach and the body of the approach itself does not align with the existing 9 steps. The EPA recommends reorganizing the document using the following steps as a framework for the approach to provide a clear, sequential, and repeatable process:
    1. *Defining where and when (if not year-round) natural conditions will apply (site boundary) and what parameters and types of waters will be simulated.*
    2. *Creating a conceptual model specific to the application.*
    3. *Selecting a Mechanistic Model.*
    a. *Allowed models and model considerations.*
    4. *Developing a Quality Assurance Project Plan (QAPP).*
    5. *Compiling all existing, readily available, and credible current and historical water quality and site data.*
    6. *Obtaining new field data, if necessary to fill datagaps. Specifications provided in the QAPP.*
    7. *Compiling, reviewing, and assessing any new field data to ensure it meets quality assurance (QA)/quality control (QC) goals.*
    8. *Developing and calibrating a predictive model of the existing conditions of the waterbody or watershed, including defining temporal and spatial boundaries.*
    9. *Evaluating model performance.*
    10. *Model Application*
        a. *Determining whether nonattainment of numeric water quality standards is due, in part, to natural processes.*
        b. *Calculating the final natural conditions criteria applicable to the site by removing all known human-caused impacts from the predictive model.*
        c. *Crosswalking criteria to demonstrate protection of designated and existing uses.*
    11. *Model Documentation*

5. **Binding Language**: The steps of the PBA must be binding and each section must be detailed and followed in a stepwise fashion. This provides transparency to the EPA, stakeholders, and the public about how the PBA will be applied since the approval of the PBA serves as the approval of the outcomes as well. It also ensures that the process will be applied consistently from project to project.
6. **Missing Steps:** The procedures must include setting up the model grid and include the principle that the model grid accurately represents the physical characteristics of the waterbody. Procedures for documenting the decisions in translating bathymetric data to the model grid must be included, including identifying data sources, procedures to analyze the data, and procedures for how to link the bathymetry to the model grid. This is an important step for building a water quality model.
7. **Binding Language:** The document must require the use of *all* existing readily available credible data (under Data Sources) to ensure the most accurate range of conditions are simulated. There are several statements with lesser language, such as *should* use all existing data or to use existing and readily available data rather than to use *all* existing and readily available data. We recommend consistent language throughout the document on this point.
8. **Binding procedures/additional details needed**: As written, most sections of the PBA are not sufficiently detailed and lack methods and procedures. The following are examples of additional details that need to be included in steps 1-11 recommended above.
    1. Step I: identified as "Defining site boundaries," should cover additional elements that define the scope of applicability, including parameter(s), waterbody types, bathymetry, and time frames of the PBA assessment. Please identify the typical datasets and resolutions (horizontal and vertical to be sufficient for capturing hydrodynamic/biogeochemical properties for different types of waterbodies), and validation steps that must be applied to complete this step.
    2. Step II: Develop Conceptual Model. For additional transparency, the EPA recommends adding to the PBA a requirement to develop a conceptual model by waterbody type and parameter (or waterbody type and multiple parameters). The state may include language such that the conceptual models can be updated if needed to reflect site-specific conditions. Example: "*For marine waters, we will rely upon the conceptual model from Khangaonkar et al. 2018 - FVCOM-ICM model conceptual model excerpted into Appendix B. All state variables and processes identified in the conceptual models will be represented in the mechanistic models.*"

    3. Step III: Model Selection. This section must include a list of models Ecology intends to use, procedures for identification of the appropriate model for a given application (including model selection criteria),

identifying any model limitations and ways to account for and address limitations. Additional models with a comparable scope, application and level of rigor may be used. Example: "*The list of models Ecology has identified for the purpose of this natural conditions criteria performance based approach includes, but not limited to, CE-QUAL-W2; CE-QUAL-ICM; FVCOM; HSPF; and QUAL2KW …*"

Additional requirements for this section include Ecology's list of peer review requirements and open-source code. This is already reflected in the list of model requirements in the PBA but should reside in this section. In addition, several other requirements for selecting a model must be added, such as sufficient resolution and processes/dynamics to capture all aspects of the interaction between the hydrodynamics/physical dynamics and biogeochemical processes, sources, cycling, and drivers. The resolution and decisions for that resolution must be documented in the project QAPP.

The model requirements review must include review of the following:

- Prediction of the horizontal and vertical transport and other physical dynamics for complex topography.
- Biogeochemical model predictions that can be generated on least an hourly or finer temporal resolution.
- Predictions that can capture changes in all state variables for the model and processes.
- Prediction sufficient to capture the impacts to all designated and existing uses, including the most sensitive use(s).

The model domain and complexity must be able to be large enough to encompass the entire system of interest while sufficiently accounting for boundary conditions and all anthropogenic sources (see Step I, above).

The model must be able to be set up to simulate all key processes relevant to the current and natural condition of the parameter, site, and waterbody that is the focus of the application.

The PBA procedures must include a list of the state variables for the model that are required to be simulated, and what sources and drivers are included in both the hydrodynamic and biogeochemical simulations (processes). Assumptions and decisions must be documented in the QAPP or final report.

For all listed models, the strengths and limitations of each model and procedures to address or compensate for those limitations must be identified, which could include adding a margin of safety to the outcomes/criteria derived. Ifa model with comparable rigor is used, all of

the above information including rationale for level of rigor must be documented in the model selection section of the project QAPP .

4. Step IV: Project Quality Assurance Project Plan requirements. The EPA recommends that Ecology identifies the sections of the QAPP document available at https://apps.ecology.wa.gov/publications/documents/1703107.pdf for and notes the requirements that are binding.
    a. **Reorganization**: QAPP development must come before the compiling data step if the QAPP is to cover data compilation and analysis. However, if there will be a separate data QAPP and a separate modeling QAPP, then each QAPP step must be added prior to the target of interest (compiling and analyzing data or setting up and applying the model, respectively).
    b. **Binding Language**: Step 4.4 of the current QAPP plan should be edited further to add the word "all" because it must include all key processes, not just a subset. Recommended revision: "*Model capability descriptions or references, including ability to simulate all natural and anthropogenic drivers and all key processes that impact water quality.*"
    c. **Binding Language**: Step 4.7 must be made binding, by switching "may" to "must" as well as adding "including but not limited to" language since there is a limited list as written. Suggested revision with EPA additions in italics: "Model approaches and key assumptions, which *must include but are* not limited to boundary conditions and associated determinations, initial or existing conditions, model resolution, inflow loads, and watershed inputs."
    d. **Missing Step:** Step 4.9 must include an additional step for model quality objectives including "reasonable best fit" information, i.e. determination that adequate data is available for calibration which is essential for model preparation.
5. Step V: Compiling Data and Identifying Data Gaps.
    a. **Reorganization:** It is unclear how the data described in this section relate to the model simulations. Certain data are needed to set up the model (e.g. boundary condition data, calibration data, rate data for current conditions estimates) and other data to apply the model for the natural conditions estimates. The section must be reorganized to better explain what data are needed and for what purpose (e.g. sensitivity testing), as well as the sources of those data and procedures for incorporating the data into the model. There is a mention of contributing waters but the state must include all watershed contributions as well.
    b. **Recommendations for Improvement**: Please resolve the overlap between this section (Step V) and the "required elements" sections of the document. The required elements include data

needs which belong in Step V. Other aspects of the required elements, e.g. process steps and sources, should be moved to the model set up and application steps.

c. **Additional Detail**: For each data section, waterbody type, and parameter, Ecology must add the types of data/information to populate, establish, and run the model, including the list of state variables for the model, for both current and natural conditions.
d. **Additional Detail**: All data for state variables for the model to be simulated in the model of interest must be included as a list in model set up and calibration. For example, for dissolved oxygen simulations, please include, at a minimum, the relevant state variables for light, temperature, algae, dissolved oxygen, nutrients, and carbon and any others deemed essential.
e. **Missing Steps:** Ecology must ensure that the site characterization is comprehensive as well as the characterization of sources and drivers of pollution. Step V.A. *Site characterization data* is missing the requirement to evaluate legacy effects resulting from past silviculture, agriculture, mining, and development. These activities influence channel form and thus, light, substrate, riparian growth, in-stream cover, sediment transport/turbidity and productivity. The EPA recommends including this information as a data requirement and evaluating the impact from these activities when establishing the natural conditions estimate.
f. **Binding Language**: The PBA states that all site characterization data must be considered in the determination of the natural pH, DO, and temperature at a site (required unless marked as optional). However, subsequent sections use non-binding language such as “should” or “may” where binding language such as “must” is needed throughout the PBA. The EPA recommends revising the PBA to use binding language throughout including for the full range of conditions. For example, the introduction to the site characterization section states, “These data may be necessary to characterize the site of interest and the application of the model.” In addition, all site characterization data types must be labeled “including but not limited to” since the descriptors include few aspects that could influence a simulation and others may exist.

g. **Reorganization**: While the required elements section includes a list of elements that need to be evaluated by the model, it does not include the methods to do those evaluations or how they will

be accounted for when modeling the natural condition. The EPA recommends a substantial rewrite for the required elements section accordingly and we recommend moving this section to EPA's suggested process Step VIII. for clarity.

h. **Additional Prescriptiveness**: For all elements (marine and fresh) in this section, Ecology must include all procedures for establishing and running the model, including how sources and impacts will be removed. This section is a mixture of processes, data, and sources as written. For clarity, the EPA recommends revising this section to specify a logical process for establishing and then applying the model. Our recommendation is to add Appendices C and D with the state variables and equations/solutions that will be included in the model simulation (or references to that information), as well as a more complete list of sources and drivers for each model listed.

i. **Additional Prescriptiveness**: The point source discharges element in the required elements section appropriately includes removal of point source discharges (and other discharges) of pollutants that impact DO, pH, and temperature. However, the procedures do not indicate the data needs and how these sources will be removed. The PBA must specify *how* these sources will be removed in step-by-step procedures. Then, for the natural condition simulation, these discharge flows all would be set to zero (i.e. turned off).

j. **Additional Details and Consistency with Regulations:** The nonpoint source discharges element in the required elements section includes one bullet and footnote 8 that states "reference natural conditions." The EPA recommends providing more detail to clarify this reference condition is consistent with the definition of natural conditions in the state regulations to be used in the PBA.

k. **Additional Prescriptiveness**: For each *Element*, Ecology must add procedures for acquiring/populating the model data. For example, for the "light" element, please define what data will be used, such as Kd estimates, secchi, or PAR sensors. Please also specify the other data types that are acceptable and what range of data is needed to populate the model(s) in the PBA as well.

l. **Recommendations for Improvement**: There is a section called, "Types of data" but includes datasets that may overlap with the previous section. We recommend changing the title to "Additional Types of Data for Site Characterization."

m. **Additional Prescriptiveness**:
    i. Throughout Step V, the datasets and types are not all specifically identified. For clarity, each subtype of data should be revised to specify the type of data and add

"including but not limited to" since the list only includes some of the data.

ii. Under the "Data Gaps" element, conservative assumptions must be made where there are major data gaps or other uncertainties. Please include statements/procedures to reflect this with citation to approaches and procedures to fill data gaps in the PBA. Include a section on filling data gaps in the QAPP and include these methods for peer review.

6. Step VI: **Missing Step:** The EPA recommends that Ecology adds a step titled "Step VI. Acquiring New Field Data," for acquiring new field data when needed. This section should include a discussion of when new field data will be needed and references to the procedures that will be used to collect that data (e.g. reference SOPs for field collection).
7. Step VII: **Missing Step:** The EPA recommends that Ecology adds a step titled "Step VII. QA/QC of New Field Data" for what quality assurance and quality control measures will be undertaken for the collection of new field data. This section should include the procedures for QA/QC or references to appropriate state SOPs.
8. Step VIII: Model development and calibration (the EPA-recommended title for this necessary step).
    a. **Reorganization:** We recommend pulling several aspects from other parts of the PBA into this section and adding missing subsections. This section must cover all steps needed in model development and calibration. Suggested introductory text for this section: "*The process-based modeling approach uses a mechanistic model(s) to estimate the current conditions for the waterbody of interest. Once this is established, this model will be used to simulate the natural conditions of a system by removing all anthropogenic sources that influence the parameter of interest at the site of interest (completed in Step IX).*"
    b. **Recommendations for Improvement**: The following statement: "*The model or models chosen must be able to simulate all key processes and sources affecting the parameters of interest."* must be revised to "*The model(s) will simulate all key processes and sources affecting the parameters of interest.*" The model(s) will already have been selected in the model selection step, so this section should describe what the model will do.
    c. **Missing Step**: The first substep after identifying the model is creating the model grid, which is currently missing from the PBA.
        i. The model grid must be consistent with the bathymetric data. Minimum horizontal and vertical resolutions for different types of waterbodies must be included or the state could include decision rules for determining the appropriate resolution. The level of vertical and horizontal

differentiation is important for capturing biogeochemical and density-driven processes. Initial hydrodynamic simulations and sensitivity testing should be used to further inform the resolution and configuration needed to represent all key processes in the model.

d. **Recommendations for Improvement:** There is overlap between the "Data" listed in Step V and the "Required Elements" listed in the suggested reorganized Step VIII. Please differentiate which procedures and minimum data requirements for any model in each section. The sections must state that all impacts by humans on boundary conditions of the site must be accounted for and removed in the natural conditions estimation.
e. **Additional Prescriptiveness**: The PBA currently includes a sparse list of required elements. The EPA recommends expanding the list of required elements. Additionally, all methods and procedures to characterize how anthropogenic sources will be accounted for and removed need to be included in the "Required Elements" section of the PBA. When documenting the PBA, details on decision points should be included in the documentation of the application of the PBA.
f. **Missing steps**: The EPA recommends a second sub-step added to the Model Development and Calibration step for input files to be developed for the initial conditions, boundary conditions, discrete point sources, nonpoint sources, and rate constants. The PBA should specify that all input files, which could be referenced from the applicable manuals or included in a reference for clarity, will be populated using the range of all existing and readily available credible data from Step V. All state variables for the model, equations, solutions, and processes simulated by each model must be identified in model documentation and the PBA must include decision rules if there are choices to be made among the equations/solutions, variables, and processes.
g. **Missing Steps and Additional Detail**:
    i. Data selected for populating boundary conditions must represent seasonal variability that impacts the waterbody and parameter of interest.
    ii. Currently the PBA contains no bounds on calibration provided or certainty that model performance will be adequate for the purpose of establishing current conditions and the natural conditions. Ecology must add text to the effect that models must only be calibrated to reflect the expected range in variability of conditions at a site.[4]

[4] EPA R10's 2016 QAPP for modeling guidance - https://19january2021snapshot.epa.gov/sites/static/files/2020-02/documents/wq_modeling_qapp_guidance_region_10_dec_2016.pdf.

h. **Consistency with Regulations and Binding Language:** The phrase stating that calibration can be done *"…by comparing to documented model fit statistics from other similar applications using the same model."* could be interpreted broadly in terms of accepting any application calibration no matter how good and therefore must be revised. This calibration section must state that the model must be able to simulate current and natural conditions. As this current phrase in the PBA could allow inappropriate model calibration, this language does not meet the federal requirement for a sound scientific rationale (40 CFR section 131.11(a)(1)).

i. **Additional Prescriptiveness**: The "required elements" section of the PBA is incomplete and does not cover all processes, sources, and drivers that impact the parameters identified. Ecology must include all sources and impacts to be removed from the current condition estimation to determine the natural condition estimation. Additionally, procedures and methods must also be added for each type of process. For example, for riparian shade, it is unclear what and how the state intends to estimate the impact of current shade on waterbodies of different types, and then secondly how they intend to estimate natural shade determinations.

9. Step IX: Model application.
    a. **Additional Prescriptiveness:** Procedures must be added or minimum requirements included regarding how the model will be applied so that the PBA is transparent and repeatable. After the model has been developed, calibrated, and verified to accurately recreate the current conditions (over the range of spatial and temporal variability), the model will be applied to estimate the natural condition. The EPA recommends adding this step, Step IX, to capture all of the needed details on model application.
    b. **Binding Language and Additional Details:** The following details need to be included in the model application section. Please indicate clearly in Step IX that all anthropogenic sources must be removed in the natural condition mechanistic model to determine the natural conditions. This includes accounting for all known sources of heat, oxygen-demanding pollutants, and pH-altering pollutants. Suggested revisions to address this comment are identified below:

    The removal of nonpoint sources and point sources must be accomplished in two ways for different anthropogenic stressors. For nonpoint sources, fluxes for all stressors, e.g. nutrient concentrations from anthropogenic sources, must be zeroed out or water concentrations set to natural estimates. For all contributing waters to the domain of the model, flow magnitude and timing must be restored to natural.

    For point source dischargers that contribute to the domain, all

discharges will be turned off (e.g. set to zero flow).

c. **Missing Step:** Sensitivity testing must be conducted over representative conditions for the parameters which affect the natural condition outcome. This must be added to the document.

10. Step X: Removal of anthropogenic sources that cannot be explicitly simulated with the mechanistic model and determining the final set of natural conditions criteria applicable to the waterbody.
    a. **Additional Prescriptiveness**: Ecology must describe the methods and procedures for removal of anthropogenic sources that it is not technically feasible to simulate in the model. The EPA recommends that the PBA include lists of sources that will be removed and the typical procedures that will be used. For example, if natural boundary fluxes from Canada are to be established and are not part of the model, Ecology should specify how will this be accounted for outside of the model.
    b. Derivation Natural Conditions Criteria- change to criteria derivation.
        i. **Consistency with regulations**: The modeling timeperiod must include the conditions that affect the sources and cycling impacting a parameter, i.e. the waterbody conditions that affect designated uses. The EPA recommends making clear that an annual simulation is required, or if a shorter timeperiod is used, then a justification must be provided.
        ii. **Additional Detail**: Ecology has not clearly identified that the durations and frequencies for the BBNC will be the applicable durations and frequencies for the natural conditions criteria. Please include the BBNC durations and frequencies in the appropriate places so that those durations and frequencies will be applicable to the natural conditions criteria and indicate that no alternate durations and frequencies will be used.
        iii. **Additional Prescriptiveness**: Additional procedures must be added to clarify the results of the criteria derivation. Example language to meet this level or detail: "*To establish protective criteria at all times and locations, the most protective natural condition after removal of all anthropogenic sources will be applied as the final criteria from the range of conditions simulated, or the time varying full range of conditions will be applied in accordance with appropriate flow-load assumptions, after removal of all anthropogenic sources. Natural conditions criteria for each assessment unit will be outputted at the resolution of the model nodes or cells/segments corresponding to at least the resolution of each assessment unit and will reflect the*

duration and frequency components of the biologically-based criteria in [cite WA's biologically-based numeric criteria]."

11. Step XI: Model Documentation
    a. **Reorganization**: The EPA recommends including all information about model documentation in this section.
    b. **Additional Prescriptiveness**: Ecology notes in the documentation section of the PBA that the report on the natural conditions estimate must include any changes from the project QAPP. The EPA is concerned that this indicates that the methodology specified in the PBA may not be followed for criteria derivation and may not meet the requirements of a PBA being transparent and repeatable. Please specify that only minor modifications may be made to improve the model.

4. Proposed Updates to Natural Conditions Provisions in Chapter 173-201A WAC, Technical Support Document, Publication 24-10-015

a. General Provision. Please delete "*When this occurs, the natural conditions constitute the water quality criteria*" from the opening paragraph. Additionally, there are several statements that refer to natural conditions constituting the water quality criteria. As noted in the EPA's comments on the draft rule and PBA documents, we recommend that the state link similar statements throughout the document to the approaches for establishing natural conditions at WAC 173-201A-260(1)(a) or delete those statements.

b. The Services finalized a new rule on April 5, 2024, that revises portions of the ESA implementation regulations, including portions of the regulations summarized in the TSD. The new rule became effective May 6, 2024, and can be found at https://www.federalregister.gov/documents/2024/04/05/2024-06902/endangered-and-threatened-wildlife-and-plants-regulations-for-interagency-cooperation. The EPA recommends referencing the changes in the new rule.

c. The Davies 1997 memorandum is guidance, not regulation. Therefore, EPA recommends changing the "minimum requirements" and "must include" language to recommendations.

d. Page 31 includes references to "statistical modeling" approaches as well as mechanistic modeling approaches; however the PBA is only focused on mechanistic modeling approaches. While the statements are factual, the EPA recommends providing more context for when a statistical modeling approach might be used (e.g. currently only allowable under WAC 173-201A-430 for site-specific criteria development).

e. Appendix B: The EPA's comments on the Elements Section of the draft PBA document apply to this appendix.

f. When referring to the document, *EPA workgroup report on principles to consider when using natural conditions provisions 2005*, please note that this was an informal EPA discussion group and not a formal workgroup. The resulting document was developed to provide clarity but does not represent a formally issued guidance.

5. Rule Implementation Plan, Publication 24-10-016

a. The EPA comments on the rule language and on the PBA should be cross walked and reflected in updates to this document.

b. Page 9. Please clarify the following:
    1. Opening sentence: What is meant by the "current rule." Is it the currently effective rule, or the revised rule amendments and updates?
    2. Human Action Allowance Considerations. Recommend revising to reflect that the allowances are also "within" a certain amount of each criterion.
    3. The revised rules are paraphrased, and some of the qualifying language is not included. Recommend including the draft rules verbatim for clarity.

c. Page 11
    1. Use of the Performance Based Approach. Consistent with the comments above, please reference WAC 173-201A-260(1)(a) when developing natural conditions criteria.
    2. This statement about establishing natural conditions lacks detail, *"…so long as the regional natural condition values with an underlying scientific basis defined in the project-specific QAPP…*" Please also reference the appropriate approaches that are allowed under WAC 173-201A-260(1)(a)4.
    3. The EPA recommends adding clarifications to the permitting and TMDL implementation sections to clearly identify when in each process a criteria will be derived using the PBA. For example, some statements are confusing, such as on page 15, TMDL status #4, there is a statement to "*Include new criteria in study design and sampling and drop old criteria*" but the criteria may not have been developed yet if they are via the PBA.

d. Page 15, Using the Performance Based Approach. This section has some unclear language, including "subtracting" anthropogenic impacts, rather than removing all impacts. In addition, there is mention that "extra jurisdictional sources" will be accounted for from a reference condition. However, such sources should be included in the current conditions simulations and then removed to do the natural conditions simulations under the PBA if technically feasible. Where it is not technically feasible to model extra jurisdictional sources and remove them, it may be possible for the state to account for and remove those separately to establish natural conditions criteria free from anthropogenic pollutants.

e. Page 16
    1. Please clarify that the biologically-based numeric criteria duration and frequencies are applicable to the following statement, "*These estimates, alongside the applicable and protective duration and frequency components, represent the natural conditions criteria for that water quality parameter."*
    2. Natural Conditions General Provision. If Ecology intends to develop PBA-based criteria during the TMDL process, as described in Ecology's rulemaking presentations and in other documents, it is unclear when that would be triggered unless the state had first listed those waters as impaired pursuant to the biologically based numeric criteria. The EPA recommends revising the following statement since it appears contrary to the intended approach,

"*Therefore, determination of the natural conditions criteria that constitute the water quality criteria must be done before deciding whether to place waterbody segments into impaired categories when the nonattainment of a standard is only due to natural conditions, and not as result of human-caused pollution*."

3. 401 Certifications. Similar to the comment above, the EPA recommends clarifying when/what is applicable under this implementation scenario to reflect the state's intended approach.