Response to Comments: A Performance-Based Approach for Developing Site-Specific Natural Conditions Criteria for Aquatic Life in Washington (Second Draft)

Summary of Action and Response to Comments

Washington State Department of Ecology
Olympia, Washington

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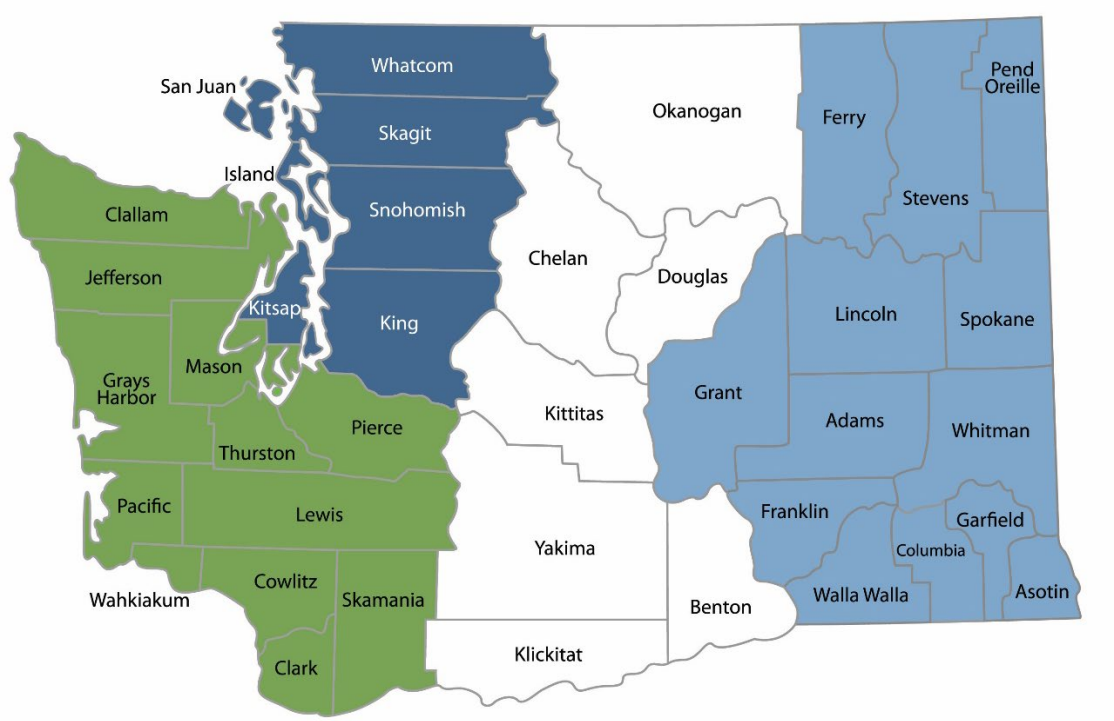

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Response To Comments

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Water Quality Program
Washington State Department of Ecology
Olympia, WA

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DEPARTMENT OF
ECOLOGY
State of Washington

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Introduction

Natural conditions provisions recognize that conditions in some water bodies naturally do not meet biologically-based aquatic life criteria. For example, a naturally low-flowing stream in a natural prairie without human alteration may have seasonally higher temperatures than the limit set to protect fish. These waters may not meet biologically-based aquatic life criteria because of natural processes or seasonal conditions. Natural conditions criteria are protective of aquatic life because they represent water quality conditions before any anthropogenic impacts. Aquatic organisms have adapted over time to these site-specific water quality conditions which support their survival, growth, and reproduction.

Natural conditions criteria have been a core part of Washington's surface water quality standards (WQS) since the first water quality regulations for the state were adopted in 1967. Since then, multiple updates to these criteria, alongside published guidance documents, have ensured continued protection of designated and existing uses when using natural conditions provisions. Washington previously adopted its last major update to natural conditions provisions and related criteria in November 2024. As part of this rulemaking, Washington adopted a performance-based approach for developing site-specific aquatic life criteria based on natural conditions (WAC 173-201A-470). This section references an external methodology document, *A Performance-Based Approach for Developing Site-Specific Natural Conditions Criteria for Aquatic Life in Washington* (the "PBA"), which provides the process that Ecology must follow to develop natural conditions criteria if using the performance-based approach.

We accepted comments on the first draft of the PBA as part of the 2024 natural conditions rulemaking from May 10, 2024, through July 26, 2024. The first draft of the PBA provided the methodology for five parameters: dissolved oxygen in fresh and marine water, pH in fresh water, and temperature in fresh and marine water.

We received comments from interested parties, EPA, Tribes, and the public that requested the PBA methodology include more details on how Ecology would derive protective criteria using the PBA. Due to regulatory deadlines and comments received, Ecology determined that it was necessary to draft a more detailed PBA methodology document that would first only provide the procedures for calculating natural conditions criteria for dissolved oxygen in marine waters.

We edited the draft PBA methodology document after considering comments received during the natural conditions rulemaking and discussion at regular meetings with EPA and other interested parties.

We provided a second draft of the PBA methods document for public comment from March 25, 2025, until May 22, 2025. During this 59-day comment period, we accepted comments by mail, through our online comment form, and orally at a public hearing that was held via webinar on May 15, 2025.

List of Commenters and Response to Comments

Organization of comments and responses

We received 11 comment submissions on this rulemaking. Some of the comment submissions covered multiple topics. Comments and responses are grouped together and organized by topic. We summarized comments when appropriate and responded to comments below each comment or summarized comments. Commenters who provided a comment related to each topic below are listed after each comment. You can see the original comments we received on our online public comments website.[2] Comments are available through this page until two years after the document finalization date.

We grouped comments together by the following topics:

1. Comments on the Performance-Based Approach
   - 1.1. General Comments
   - 1.2. Requirements under the State Administrative Procedures Act
2. Comments on the Performance-Based Approach Methodology Document
   - 2.1. Steps 1, 2, and 3 of the PBA: Site Boundaries, Model Selection, Data Needs, and QAPP
   - 2.2. Steps 4 and 5 of the PBA: Collecting and Evaluating New Data
   - 2.3. Steps 6 and 7 of the PBA: Model Evaluation and Performance
   - 2.4. Steps 8, 9, and 10 of the PBA: Determining Natural Conditions Criteria and Documentation of Process
   - 2.5. Other Comments on the PBA Document
   - 2.6. Implementation
3. Other Comments
   - 3.1. Biologically-Based Marine Dissolved Oxygen Criteria
   - 3.2. Climate Change and Natural Conditions Criteria
   - 3.3. Other Comments

List of commenters

Commenters are listed in Table 1 below in alphabetical order by individual's last name or by affiliation. Comment topics are identified by the section and comment number as they are listed in the following section, Comments and Ecology Responses. Under the column Comment Topic in the table below, comment codes are grouped by comment subtopics.

[2] https://wq.ecology.commentinput.com/comment/extra?id=6EfTCSi5B

Table 1. List of commenters and responses.

Submitted by	**Comment Topic**
City of Bellingham	**Comments on the PBA** 1.1.A **Miscellaneous comments** 3.1.A
City of Everett	**Comments on the PBA** 1.1.A, 1.2.A, 1.2.B **Comments on the methods document** 2.1.A, 2.3.A **Miscellaneous comments** 3.1.B
City of Tacoma Environmental Services	**Comments on the PBA** 1.1.A, 1.1.B, 1.1.C, 1.2.C, 1.2.D, 1.2.E, 1.2.F, 1.2.G, 1.2.H, 1.2.I **Comments on the methods document** 2.1.A, 2.3.A, 2.3.B, 2.5.A **Miscellaneous comments** 3.1.C
U.S. Environmental Protection Agency (EPA)	**Comments on the PBA** 1.1.D, 1.1.E **Comments on the methods document** 2.1.B, 2.1.C, 2.4.A, 2.4.B
King County Department of Natural Resources and Parks	**Comments on the methods document** 2.1.D, 2.1.E, 2.1.F, 2.1.G, 2.1.H, 2.1.I, 2.1.J, 2.3.C, 2.3.D, 2.3.E, 2.4.C, 2.4.D, 2.4.E, 2.4.F, 2.4.G, 2.4.H, 2.4.I, 2.4.J, 2.4.K, 2.5.B, 2.5.C, 2.6.A, 2.6.B **Miscellaneous comments** 3.1.D

Submitted by	Comment Topic
Lincoln Loehr	**Comments on the methods document** 2.3.F, 2.4.L, 2.4.M, 2.4.N, 2.4.O, 2.6.C, 2.6.D **Miscellaneous comments** 3.1.E
Northwest Environmental Advocates	**Comments on the PBA** 1.1.F **Comments on the methods document** 2.1.K, 2.1.L, 2.1.M, 2.1.N, 2.1.O, 2.1.P, 2.1.Q, 2.1.R, 2.2.A, 2.2.B, 2.3.G, 2.3.H, 2.4.P, 2.4.Q, 2.4.R, 2.4.S, 2.4.T, 2.4.U, 2.4.V, 2.5.D, 2.5.E, 2.5.F, 2.5.G, 2.5.H, 2.5.I, 2.5.J, 2.5.K
Paul Pickett	**Comments on the methods document** 2.1.S, 2.1.T, 2.4.W, 2.4.X
Snoqualmie Indian Tribe	**Comments on the PBA** 1.1.G **Comments on the methods document** 2.4.Y
Washington Conservation Action	**Comments on the PBA** 1.1.H, 1.1.I **Comments on the methods document** 2.1.U, 2.1.V, 2.2.C, 2.3.I, 2.3.J, 2.4.Z, 2.4.AA, 2.4.BB, 2.4.CC, 2.5.L, 2.5.M, 2.5.N **Miscellaneous comments** 3.1.F, 3.2.A, 3.3.A
Washington Forest Protection Association	**Comments on the PBA** 1.1.J **Comments on the methods document** 2.1.W, 2.1.X, 2.3.K, 2.4.DD, 2.6.E **Miscellaneous comments** 3.2.B, 3.2.C

Comments and Ecology responses

1. Comments on the Performance-Based Approach

1.1. General Comments

1.1.A Comment summary –

Ecology's performance-based approach is overly complex and based on an entirely hypothetical natural condition that depends upon the assumptions made about pre-anthropogenic conditions, which cannot be known, measured, or verified.

Developing pre-anthropogenic conditions as part of setting natural conditions criteria is unlikely to meet Ecology's objectives that the process should result in predictable and repeatable criteria. This is because developing pre-anthropogenic conditions will require many assumptions in estimating load reductions from land-based sources (including groundwater and river/tributary inputs), atmospheric deposition, and ocean boundary conditions. In addition, human-induced structural changes will need to be estimated to remove impacts associated with shoreline hardening, dredging activities, and river control structures such as dams and diversions.

Most likely a model (e.g., watershed, such as the Salish Sea Model) will need to be used to estimate the natural conditions criteria associated with the pre-anthropogenic conditions, which will have its own set of application assumptions. EPA acknowledges that the performance-based approach that Ecology is proposing has limited application in other States, so an established precedent that the process is predictable and repeatable is also limited and may not exist. This suggests that Ecology's novel application of the performance-based approach may result in unpredictable outcomes when applied to Washington waters. It is unlikely that Ecology's performance-based approach meets Ecology's own stated goal in the proposed rulemaking to "Increase clarity and transparency on the process we use to determine natural conditions in surface waters" given the complexity of the process and challenges in characterizing and accounting for pre-anthropogenic conditions predating European settlement, agricultural development, climate change, etc. The assumptions made to conduct the natural conditions analysis are likely to vary depending upon the individuals or institutions conducting the analysis and their opinions.

It appears that Ecology has introduced an additional level of complexity in the March 2025 Second Draft of the performance-based approach that would require the development of individual natural conditions criteria for each layer of the 10 layers in the marine water column from top to bottom of Puget Sound. This appears complex and Ecology has not provided an explanation for how this will be applied in practice to Puget Sound. The March 2025 Second Draft does reference volume weighting horizontally, but notes that no vertical aggregation is allowed. No explanation is provided in the March 2025 Second Draft for how volume weighted horizontal aggregation of the various layers would be accomplished across the entire geography of Puget Sound, or by subbasin, or by embayment.

Further, the Salish Sea Model includes 10 layers from top to bottom, but water depths vary throughout Puget Sound. So, while the surface layer may be common across Puget Sound,

lower water depth layers at various locations would not align with each other. EPA acknowledges that the performance-based approach Ecology is proposing has limited application in other States, so an established precedent that the process is predictable and repeatable is also limited and may not exist. This suggests that Ecology's novel application of the performance-based approach may result in unpredictable outcomes when applied to Washington waters. It is unlikely that Ecology's performance-based approach meets Ecology's own stated goal to "Increase clarity and transparency on the process we use to determine natural conditions in surface waters" given the complexity of the process and challenges in characterizing and accounting for pre-anthropogenic conditions predating European settlement, agricultural development, climate change, etc. The assumptions made to conduct the natural conditions analysis are likely to vary depending upon the individuals or institutions conducting the analysis and their opinions.

- City of Bellingham
- City of Everett
- City of Tacoma

Response to 1.1.A

While we recognize that this subject and process are complex, a sound, modeling-based approach towards estimating natural conditions is an area where Ecology has decades of expertise, and one which EPA supports and recognizes as a "binding, clear, predictable, and transparent" process.[3] So, while this performance-based approach document may be new, the underlying approach is not.

Regarding models, we recognize that model outputs will have associated ranges and some level of error due to uncertainty within the modeling process and in the underlying dataset. Acceptable model uncertainty and limitations are documented in project QAPPs, which is a requirement of the draft performance-based approach.

For the recent Puget Sound Nutrient Source Reduction Project (PSNSRP) scenario runs, once the model skill is well established and its accuracy found acceptable, the precision error of the difference of two model runs (e.g., an existing scenario and a reference conditions scenario) can be calculated. These are then compared to the human use allowance value. Model skill statistics of existing condition scenarios include measurement errors, and thus, the reference values also include such errors. Comparison with the human use allowance value excludes random measurement errors because of how it is calculated.

Regarding aggregations, we note that our draft performance-based approach limits horizontal aggregations to CWA Section 303(d) assessment units for the purpose of

[3] Shaw, Hanh. 2025. Public comment letter from USEPA Region 10 to Department of Ecology. Seattle, Washington. 22-May-2025. Available at: https://scs-public.s3-us-gov-west-1.amazonaws.com/env_production/oid100/did200008/pid_210822/assets/merged/s60nilfcga9_document.pdf?v=28884.

establishing natural conditions criteria – no broader aggregations will be allowed (such as throughout an embayment). This horizontal volume-weighted aggregation method will be the same as described in Appendix D of Figueroa-Kaminsky et al., 2025.[4] This is done to ensure natural conditions reflect the site and to ensure that we are not over-aggregating, which could lead to dissolved oxygen criteria that is either higher or lower than what is required to protect aquatic life.

For vertical layers (e.g., as seen in the Salish Sea Model), the difference in depth between cell layers is considered. To estimate the DO concentration for each layer in a CWA 303(d) assessment unit, we multiply the DO concentration by the respective volume of each model grid-cell-layer within a particular 303(d) assessment unit, add them together, and then divide by the total volume of all model grid-cell-layers. This results in a volume weighted average DO concentration for that CWA Section 303(d) assessment unit. Further, dividing the cumulative volume of these model layer slices (without the DO concentrations) by the cumulative surface area of the model layer slices results in the average depth of the CWA Section 303(d) assessment unit.

Finally, all assumptions, estimations, and decisions made while we use the performance-based approach will be provided to the public any time we use this process. We want to ensure that the public is aware that our use of the performance-based approach must still be tied to some form of public process. We are fully committed to holding a public review period whenever we use the performance-based approach to develop natural conditions criteria. For example, we may choose to develop natural conditions criteria following the performance-based approach to set criteria for a site during the process of creating a TMDL. When we go out to the public with our draft TMDL for comment and feedback, all the required performance-based approach documentation and criteria values will be included alongside the customary TMDL documentation, and we will accept comment and feedback on the use of the performance-based approach at that time. Regardless of how or when we use the performance-based approach the public will have the opportunity to comment on the developed criteria values.

1.1.B Comment summary –

If the Performance-Based Approach is approved by EPA, the criteria derived from the methods in the approach become applicable for CWA purposes and remain the applicable criteria until EPA approves a change, deletion, or until EPA promulgates more stringent criteria if necessary to meet CWA requirements (40 CFR 131.21(c), (e)). The draft Performance-Based Approach states that, “aquatic life water quality criteria values developed using the performance-based approach are applicable to the waterbody immediately following the performance-based approach derivation process.” The City is generally concerned that if the Performance-Based Approach is implemented, there will be a significant lack of transparency and opportunities for independent, scientific peer review and public input as Ecology works to set standards for a

[4] Figueroa-Kaminsky, C. et al. 2025. Puget Sound Nutrient Source Reduction Project Volume 2: Model Updates and Optimization Scenarios, Phase 2. Washington State Department of Ecology, Olympia, Washington. Publication 25-03-003. Available at: https://apps.ecology.wa.gov/publications/SummaryPages/2503003.html.

water body. There is additionally limited opportunity for public comment and transparency regarding the Salish Sea Model. Although Ecology anticipates publishing the model in June, Ecology is not offering any opportunity for public comment at that time. This is a critical point, as Ecology has made clear it intends to use the Salish Sea Model as an integral component of its Performance-Based Approach to set DO standards in Puget Sound; these standards will have a significant impact on municipalities and thus the public deserves an opportunity for input on this part of the approach. This is a theme that is brought up continually in our comments below.

- City of Tacoma

Response to 1.1.B

We are fully committed to holding a public review period whenever we use the performance-based approach to develop natural conditions criteria. For example, we may choose to develop natural conditions criteria following the performance-based approach to set criteria for a site during the process of creating a TMDL. When we go out to the public with our draft TMDL for comment and feedback, all the required performance-based approach documentation and criteria values will be included alongside the customary TMDL documentation, and we will accept comment and feedback on the use of the performance-based approach at that time. That includes review of the model selection and documented performance. Regardless of how or when we use the performance-based approach the public will have the opportunity to comment on the developed criteria values. The Salish Sea Model has undergone extensive peer review since its development began in 2009. Salish Sea Model publications and Ecology's reports have undergone scientific review.

1.1.C Comment summary –

As part of this review, the City referenced the documents attached to this letter. The City requests that Ecology review and consider these reference documents (and recommendations) as part of the proposed Performance-Based Approach revision efforts.

- City of Tacoma

Response to 1.1.C

We appreciate your comment and the referenced and attached documents related to your comment.

1.1.D Comment summary –

Pursuant to Clean Water Act section 303(c), the U.S. Environmental Protection Agency has the duty to review and approve or disapprove new or revised water quality standards submitted by states and authorized Tribes. The EPA notes that the draft methods document references Washington's rule provisions at WAC 173-201A-470, which were recently updated but have not been submitted to the EPA for review and action under CWA section 303(c). The EPA recommends that after finalizing the performance-based approach, Washington submits the

rule language and PBA document together so that the minimum submission requirements at 40 CFR 131.6 are addressed for both documents in a single submittal.

- Environmental Protection Agency

Response to 1.1.D

We appreciate your comment. We plan on submitting the finalized performance-based approach, the 2024 natural conditions rule language updates, and all required documentation to EPA in a single submittal that will meet federal requirements, including those found at 40 CFR 131.6.

1.1.E Comment summary –

The EPA has reviewed Ecology's second draft performance-based approach and finds it to be organized, concise, and clear. The EPA has coordinated closely with Ecology throughout this process and supports the state's efforts to narrow the scope of parameters in the performance-based-approach to establish natural conditions criteria. We believe narrowing of the scope of the second draft performance-based approach to establish dissolved oxygen criteria for marine waters, including referencing existing documentation and guidance for modeling marine dissolved oxygen in Chapter 1, have provided the needed specificity to ensure the performance-based approach is binding, clear, predictable, and transparent. The EPA is encouraged by the state's draft methodology and offers several comments in the enclosure for your consideration. The EPA's comments on the PBA are essential to ensure that the PBA is applied appropriately to reflect natural conditions.

- Environmental Protection Agency

Response to 1.1.E

We appreciate your comment and your continued support as we updated the performance-based approach document following the first public draft in 2024.

1.1.F Comment summary –

Our general observation about this Draft Guidance is that it lacks sufficient details to ensure that it constitutes a transparent, predictable, repeatable, and scientifically defensible procedure from which to derive numeric criteria protective of designated uses, the results of which would not be reviewed or acted upon by EPA, nor would be subject to consultation with the National Marine Fisheries Service and U.S. Fish and Wildlife Service (together "the Services") pursuant to Section 7 of the Endangered Species Act ("ESA"). Instead, the Draft Guidance is more of a superficial checklist of how to build and use a model. For the most part, it is missing the "how" part of guidance.

Another overarching problem is its multiple references to other guidance documents, all of which are subject to Ecology's changing them at any time, thereby changing the meaning of this Guidance, which is supposed to be incorporated into the rule by reference as a binding regulation. And, ultimately, the described process includes no check to ensure the results are

protective of the most sensitive beneficial uses, as required by 40 C.F.R. § 131.11(a)(1), falsely assuming that estimated natural water quality conditions will in all cases protect the designated and existing beneficial uses.

Ecology also states in this same announcement that "we are committed to holding a public review whenever we use the performance-based approach to develop natural conditions criteria. This will most commonly be through the public review process for water cleanup plans." This is a misleading statement. EPA has made abundantly clear that its review of any such clean-up plans will be pursuant to Clean Water Act ("CWA") Section 303(d) and that it will not review a state's derivation of new criteria in that context because that would be an action pursuant to CWA Section 303(c). A public review without EPA oversight is toothless.

- Northwest Environmental Advocates

Response to 1.1.F

We believe that this performance-based approach strikes the necessary balance between a process that is transparent, predictable, repeatable, and scientifically defensible while being flexible and adaptable in response to site- and project-specific factors such as available data or the model selected.

For referenced and footnoted documents in the performance-based approach, we note that in many cases the documents are provided as examples for how we will use the performance-based approach. Neither those referenced documents nor any of the approaches listed within those documents must be used. For instance, Step 6 of the performance-based approach document requires that any chosen model(s) must simulate all key processes and sources affecting marine DO and describe how it does so.. These processes include, but are not limited to, those identified in the referenced QAPP (such as microbial rates and phytoplankton dynamics). The same goes for Step 6's requirement regarding sufficient model resolution. The performance-based approach mandates that the model must have sufficient and documented resolution. The links in the footnote are provided as examples for how cell sizes were determined for the Salish Sea Model and how we supported such determinations. The linked documents do not foreclose determining cell sizes in a different way or using a model other than the Salish Sea Model when implementing the performance-based approach.

Regarding aquatic life protection, when deriving protective water quality criteria values, generally two approaches can be taken by states and tribes:

(1) Use a biologically-based approach (e.g., Stephen et al., 1985[5]), where there is a process to derive protective aquatic life criteria using the results of laboratory studies. These laboratory studies investigate and determine the dissolved oxygen concentrations

[5] https://www.ezview.wa.gov/Portals/_1962/Documents/PSNSRP/Marine%20DO%20Paper%20Guidance%20Updated%20July%202018.pdf

where impacts to lifestyle (e.g., reproduction, growth) or lethality occur to aquatic life; or

(2) Pursue a natural conditions approach, where historical data and models are used to estimate the quality of waters prior to any anthropogenic impacts. Pre-anthropogenic water quality would support the species that exist in those waters, as those species have adapted over time to those natural water qualities. Therefore, any such derived criteria are protective of existing and designated uses.

There is no guidance or recommendations from EPA that asserts one approach is better than or preferred over the other. Therefore, both are equally viable options for developing criteria protective of aquatic life. A site-specific approach may better reflect the needs of the species within a specific site compared to the broader area, as criteria reflect those aquatic organisms which have adapted over time to the unique conditions of that specific waterbody.

We are fully committed to holding a public review period whenever we use the performance-based approach to develop natural conditions criteria. For example, we may choose to develop natural conditions criteria following the performance-based approach to set criteria for a site during the process of creating a TMDL. When we go out to the public with our draft TMDL for comment and feedback, all the required performance-based approach documentation and criteria values will be included alongside the customary TMDL documentation, and we will accept comment and feedback on the use of the performance-based approach at that time. That includes review of the model selection and documented performance. Regardless of how or when we use the performance-based approach the public will have the opportunity to comment on the developed criteria values.

Finally, we note that derivation of new criteria values using an EPA-approved performance-based approach does not require additional rulemaking. EPA states in their framework for developing natural conditions that "[w]hen such a performance-based approach is sufficiently detailed and has suitable safeguards to ensure predictable, repeatable outcomes, EPA approval of such an approach serves as approval of the outcomes as well."[6] We cannot speak further on how EPA will or will not approach or review any developed natural conditions criteria when we go out for public review for our CWA actions (e.g., TMDLs) that use the performance-based approach.

1.1.G Comment Summary –

We question for whom this ruling would create desirable outcomes. It is clear that there are applications in pockets of the Puget Sound in which this framework would be useful, and we can recognize the usefulness to Ecology while attempting to adhere to state water quality standards. However, we are concerned that a rulemaking to define natural conditions for

[6] Environmental Protection Agency. 2015. A Framework for Defining and Documenting Natural Conditions for Development of Site-Specific Natural Background Aquatic Life Criteria for Temperature, Dissolved Oxygen, and pH: Interim Document. Office of Water, Washington, D.C. EPA 820-R-15-001.

dissolved oxygen in Puget Sound will be applied with too broad a brush, to the detriment of overall water quality. Instead of framing these low-oxygen marine systems as beyond our ability to improve, we should shift that framework to think about these systems as sensitive, where even a leaky septic system or small wastewater treatment plan effluent increase can have an outsized effect on the ecosystem. Our concern is that this rulemaking will lead to a culture of apathy, instead of a mindset that prioritizes protection. In future rulemakings, where modeling is a key factor in implementation, Tribes need to be brought into the process much earlier to provide input.

- Snoqualmie Indian Tribe

Response to 1.1.G

We appreciate your comments. We disagree that we are framing these systems as "beyond our ability to improve." Rather, we recognize that the unique characteristics of Puget Sound were not reflected in the biologically-based dissolved oxygen criteria adopted in 1967. Further, a natural conditions component has always been a part of Washington's water quality standards until parts of it were disapproved by EPA in 2021. To protect aquatic life in Puget Sound, we chose to pursue site-specific criteria updates for marine dissolved oxygen to best protect aquatic life, existing uses, and designated uses. Specifically, we chose to pursue a natural conditions approach for criteria development, which includes use of the Salish Sea Model. Ecology believes that this approach best reflects the biological needs of the organisms in the waters while recognizing the unique, natural traits of Puget Sound. We also want to note that this standards process is only one piece of how we are working on improving dissolved oxygen levels in Puget Sound. For example, we recently released our Draft Nutrient Reduction Plan[7] which details the problems, science, and solutions to reduce anthropogenic sources of nutrients.

We also want to note that we provided multiple opportunities for Tribal engagement and consultation on the performance-based approach throughout the natural conditions rulemaking between 2022 and 2024 and during development of the second draft of the methods document in 2025. This included multiple public and Tribal-only informational webinars, a preliminary rule decision webinar, public comment periods and formal hearings, and invitations for formal Tribal consultation at every major stage or decision point. We also responded to requests and met individually with Tribal staff throughout both processes.

1.1.H Comment summary – Ecology should maintain the highest possible standards for waters of the state, and never weaken water quality protections.

This concept is summarized on page 7 of the draft report under the State section, and explicitly stated in Chapter 90.48 of the Revised Code of Washington (RCW):

[7] https://ecology.wa.gov/ecologys-work-near-you/river-basins-groundwater/puget-sound/helping-puget-sound/reducing-puget-sound-nutrients#forum

> *"…it is the public policy of the state of Washington to maintain **the highest possible standards to insure the purity of all waters of the state** consistent with public health and public enjoyment thereof, the propagation and protection of wild life, birds, game, fish and other aquatic life, and the industrial development of the state, and to that end require the use of **all known available and reasonable methods** by industries and others to prevent and control the pollution of the waters of the state of Washington" (Chapter 90.48.010 RCW). **[emphasis added]**.*

Ecology has used the methods described in the draft document being reviewed for decades. The outcomes of those processes maintain the public policy of the state of Washington to maintain the highest possible standards. Dischargers have successfully met permit limits using known available and reasonable methods.

- Washington Conservation Action

Response to 1.1.H

We appreciate your comment. The performance-based approach will allow us to continue to ensure that we maintain the highest possible standards and abide by RCW 90.48.

1.1.I Comment Summary – In summary, we support a pragmatic performance-based approach to establish natural conditions during detailed modeling assessments. EPA identified multiple approaches available to Ecology for addressing the need. It is reasonable that approaches for Washington marine waters differ from the approaches used in San Francisco Bay and the Chesapeake Bay for dissolved oxygen. Finally, it is appropriate that the Puget Sound water quality approach for marine dissolved oxygen may be more stringent than those in the Chesapeake Bay.

- Washington Conservation Action

Response to 1.1.I

We appreciate your support for the performance-based approach.

1.1.J Comment Summary – The PBA process will be quite intricate and time-consuming and has the potential to impact many stakeholders. We believe that Ecology should include more opportunities for public input throughout the process. Following the development of a modeling Quality Assurance Project Plan (QAPP) for a modeling study, the QAPP should be released for public comment prior to Ecology moving forward with the modeling process. It should also be explicitly stated within the PBA that all criteria values and associated documentation will go through public comment prior to use, regardless of the setting in which the PBA was used. Additionally, under the assumption that criteria values will go through public comment prior to use, we ask Ecology to remove the language that criteria are applicable to waterbodies "upon derivation".

- Washington Forest Protection Association

Response to 1.1.J

We are fully committed to holding a public review period whenever we use the performance-based approach to develop natural conditions criteria. For example, we may choose to develop natural conditions criteria following the performance-based approach to set criteria for a site during the process of creating a TMDL. When we go out to the public with our draft TMDL for comment and feedback, all the required performance-based approach documentation and criteria values will be included alongside the customary TMDL documentation, and we will accept comment and feedback on the use of the performance-based approach at that time. That will include review of the QAPP.

We also note that the public review would be of our use of the performance-based approach and whether we developed criteria values that reflect the binding requirements of the approach. The derivation of criteria values using an EPA-approved performance-based approach does not require additional rulemaking, nor are we planning on doing additional water quality standards rulemaking for these values. EPA states in their framework for developing natural conditions that "[w]hen such a performance-based approach is sufficiently detailed and has suitable safeguards to ensure predictable, repeatable outcomes, EPA approval of such an approach serves as approval of the outcomes as well."[8] Therefore, criteria values developed using an EPA-approved performance-based approach are the applicable water quality criteria upon derivation.

[8] Environmental Protection Agency. 2015. A Framework for Defining and Documenting Natural Conditions for Development of Site-Specific Natural Background Aquatic Life Criteria for Temperature, Dissolved Oxygen, and pH: Interim Document. Office of Water, Washington, D.C. EPA 820-R-15-001.

1.2. Requirements under the State Administrative Procedures Act

1.2.A Comment Summary –

Ecology should fully document and assess the likely costs of this rulemaking.

It appears that Ecology is seeking through this rulemaking to reestablish a natural conditions provision in the state water quality standards that will allow Ecology to proceed with its Puget Sound Nutrient Program, including the Puget Sound Nutrient General Permit (PSNGP). Ecology has sufficient information as to its intent in the program to fully assess the costs of this rule, the impact on small businesses, and the impact on already overburdened communities.

Ecology has been clear that it intends to refine the Salish Sea Model to develop final water quality-based effluent limits for Puget Sound wastewater treatment plants for total inorganic nitrogen in the range of 3 mg/L, 5 mg/L, or 8 mg/L. Everett was required under the PSNGP to submit a Nutrient Reduction Evaluation with these values. Ecology has sufficient information to evaluate the costs of treatment technology to achieve these limits and should do so as part of the rulemaking.

- City of Everett

1.2.B Comment Summary –

Ecology should conduct a thorough environmental justice assessment under RCW 70A.02.060.

Ecology requires this analysis under the PSNGP and has now published draft guidance on how to conduct the assessment for the general permit. Since Ecology intends to use the proposed natural condition rule as a basis for the PSNGP, Ecology is obligated to provide this analysis for the draft rule. Ecology has sufficient information regarding the cost of treatment to implement the rule and the potential impact on utility rates to conduct the assessment.

- City of Everett

1.2.C Comment Summary –

Ecology must fully comply with state rulemaking requirements.

The adoption of water quality standards is subject to the significant legislative rule (SLR) requirements of the state Administrative Procedures Act (APA). RCW 34.05.328.

The APA also requires that the Ecology water quality program identify the sources of information reviewed and relied upon by the agency in preparing a SLR. RCW 34.05.272. The APA further requires that a draft rule package include a small business economic impact statement (SBEIS) that complies with RCW 19.85.040. RCW 34.05.320 (1)(j). RCW 34.05.320. The SBEIS must include an evaluation of compliance impacts on small businesses and provide a determination of whether the rule will have a disproportionate cost impact on small businesses.

- City of Tacoma

1.2.D Comment Summary –

Ecology has failed to reasonably consider alternatives.

Before adopting a rule, agencies are required to analyze alternative versions of the rule, the consequences of not adopting the rule, and alternatives to rule making. RCW 34.05.328(1). A reasonable consideration of alternatives under the APA is akin to requirements under the State Environmental Policy Act (SEPA). Under SEPA, if an agency proposal may have significant adverse environmental impacts, the agency is required to prepare an Environmental Impact Statement (EIS) that includes an analysis of alternatives. RCW 43.21C.030.

- City of Tacoma

1.2.E Comment Summary –

Ecology failed to conduct an analysis to determine whether its Performance-Based Approach is the least burdensome alternative.

To adopt a significant legislative rule, an agency must determine it is the least burdensome alternative to achieve the goals and objectives of the authorizing statute. RCW 34.05.328(1). Ecology has not published a least burdensome alternatives analysis to conclude its Performance-Based Approach is the least-burdensome alternative to achieve the goal of nutrient reduction in the Puget Sound.

- City of Tacoma

1.2.F Comment Summary –

Ecology has failed to conduct a proper cost-benefit analysis in accordance with the APA.

Ecology cannot adopt a significant legislative rule if it fails to properly conduct the analysis required under RCW 34.05.328. Ecology is required to conduct a preliminary cost-benefit analysis and determine that the probable benefits of the rule are greater than its probable costs, accounting for both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented. RCW 34.05.328(1)(d).

- City of Tacoma

1.2.G Comment Summary –

Ecology has failed to assess compliance costs to small businesses as required under the Regulatory Fairness Act.

Ecology cannot adopt a significant legislative rule if it fails to properly conduct the analysis required under the Regulatory Fairness Act (RFA), Ch. 19.85 RCW.

- City of Tacoma

1.2.H Comment Summary –

Ecology has failed to comply with SEPA.

Ecology has failed to complete a SEPA environmental checklist for its Performance-Based Approach, despite its influence on future regulations.

- City of Tacoma

1.2.I Comment Summary –

Ecology has failed to comply with obligations to conduct an environmental justice assessment in accordance with RCW 70A.02.060.

Ecology has failed to consider the impact its rulemaking will have on vulnerable communities, and it is required to conduct a full environmental justice assessment under RCW 70A.02.060.

- City of Tacoma

Response to 1.2.A through 1.2.I

Ecology is not adopting rule language. The performance-based approach methodology is a legally binding document referenced in WAC 173-201A-470. The first draft of this document was part of the rulemaking for natural conditions revisions[9] adopted into Washington's Water Quality Standards in 2024. During this rulemaking, we provided all required documentation and conducted all required analyses for the rule, including a Final Regulatory Analysis, Concise Explanatory Statement, Rule Implementation Plan, SEPA Checklist and Determination of Non-Significance. We did not conduct an environmental justice assessment in connection with the rulemaking for natural conditions revisions because we filed the preproposal statement of inquiry (CR-101) on September 27th, 2022. The Healthy Environment for All (HEAL) Act (RCW 70A.02.060) applies only to "significant agency action initiated after July 1, 2023." Revisions to this performance-based approach methods document do not change the premises of the analyses that were conducted as part of the rulemaking effort completed in 2024. To redo these analyses would be an unnecessary duplication of efforts and would cause unnecessary delay.

We do note that this document constitutes a water quality standard as defined by the EPA, which requires us to follow all applicable federal laws related to the review and revision of water quality criteria, including the Clean Water Act and its implementing regulations at 40 CFR 131, including 40 CFR 131.20(b) public participation requirements. Our process for updating the draft performance-based approach methods document meets all applicable state and federal requirements.

[9] https://ecology.wa.gov/regulations-permits/laws-rules-rulemaking/closed-rulemaking/wac-173-201a-natural-conditions

2. Comments on the Performance-Based Approach Methodology Document

2.1. Steps 1, 2, and 3 of the PBA: Site Boundaries, Model Selection, Data Needs, and QAPP

2.1.A Comment summary – Ecology has not addressed the spatial and temporal applicability or the frequency of exceedance of the natural conditions criteria in order to establish a transparent process for interpretation of where and when and how often natural conditions apply.

EPA recommends a performance-based approach call for definition of the spatial (e.g., monitoring location, embayment, assessment unit) and temporal (e.g., summer, low flow, diurnal) boundaries of natural conditions criteria. For example, the DO standards in Chesapeake Bay established designated use areas (e.g., open-water fish and shellfish use, deep-water seasonal fish and shellfish use, deep channel seasonal refuge use) with associated temporal, concentration, and duration definitions. In its Performance-Based Approach guidance document, Ecology mentions that "developing and calibrating a model of the existing conditions of the waterbody or watershed, including defining temporal and spatial boundaries" is a step in the process of developing natural conditions criteria, and boundary information used to develop site boundaries must include geospatial information and be documented in the QAPP. However, Ecology provides no further detail on the topic. Ecology also stated in its response to comments on its first draft of the Performance-Based Approach that defining spatial boundaries will be a part of natural conditions criteria development, so the agency is unable to provide an exact timeline of when that step of the process will be undertaken and when the natural conditions criteria will be available.

Further, Ecology has not addressed the allowable exceedance frequency of the natural conditions criteria that would allow a transparent interpretation of the de minimis impact to natural conditions criteria due to anthropogenic sources. For example, the EPA proposed DO rulemaking for the tidal Delaware River and the Florida Department of Environmental Protection DO standards use an acceptable criteria exceedance frequency of 10% (i.e., the DO magnitude can be exceeded 10% of the time in a season). These missing considerations are needed to develop natural conditions criteria that include the required magnitude, duration, and frequency components of water quality standards. These omissions may result in Ecology's additional DO decrease (i.e., 10% or 0.2 mg/L) below the natural conditions criteria due to anthropogenic sources being interpreted as a not to exceed value at any point and at any time, which constitutes an extremely high bar for water quality assessments. It would be inappropriate to consider a numerical value which has simply been selected as a representation of a de minimis impact (i.e., within monitoring measurement error) that is not linked to maintenance of a specific aquatic life beneficial use.

- City of Everett
- City of Tacoma

Response to 2.1.A

The spatial applicability of natural conditions criteria developed using the performance-based approach are the site boundaries (Step 1 in the document). This is project-dependent, and we must define and document site boundaries when we use the performance-based approach methodology for natural conditions criteria determination.

The temporal applicability of the criteria are the periods of the year when natural conditions are estimated (Step 9 in the document). This is also project-dependent, and will depend on factors such as data availability, site dynamics, model selection, and specific model runs.

Regarding the applicable criteria duration and frequency, Step 9 of the document states that the duration and frequency components must match those of the biologically-based numeric marine DO criteria found at WAC 173-201A-210(1)(d). The current EPA-approved duration and frequency for marine DO are 1-day minimum values, with concentrations of DO not to fall below the criteria at a probability frequency of more than once every 10 years on average.

Defining the spatial boundary will be completed at the beginning of criteria development and will be available for review with all other required performance-based approach documentation and criteria values, and we will accept comment and feedback on the use of the performance-based approach.

2.1.B Comment summary – Step 2: Compile data; Table 1. The EPA recommends ensuring that the wording and terms across the table columns for the current and natural conditions scenarios are clear and consistent to reflect what is intended for each scenario. For example, there are instances where the term “As applicable” is used or double dashes (--) are indicated; we recommend providing a definition as to what these depictions mean.

As another example to illustrate inconsistencies in the table, there are conflicting approaches to “Hydrodynamics” and “Other Human Activities” in the natural conditions column.

For the row titled “Hydrodynamics,” the current conditions column includes data requirements and the natural conditions column does not. However, Step 8, Estimating the Natural Conditions, identifies activities affecting hydrodynamics that will be evaluated and removed which should be summarized in the natural conditions column as well. In contrast, the “Other Human Activity” row includes other human activity information in both the current and natural conditions columns.

The EPA recommends clarifying the wording in the natural conditions column to specify that the data needs are for the removal of anthropogenic sources to determine the natural conditions estimates.

- Environmental Protection Agency

Response to 2.1.B

We appreciate the recommendations for improving the table.

We have made edits to Table 1, including:

- We have removed the term "as applicable" in the table.
- For any double dashes, we have provided context to what these depictions mean.
- We have clarified category names throughout the table.
- We have adjusted language throughout the table to fix any inconsistencies or conflicting approaches.

2.1.C Comment summary – Step 2: Compile data; Site characterization data. The EPA recommends folding this section into Table 1, or into a separate table, and describing the current and natural conditions. We also recommend including the following additional data types for completeness, and if necessary, adding a clause describing situations where the data are not relevant for a given simulation:

- Surrounding vegetation and riparian conditions
- Submerged aquatic vegetation
- Atmospheric deposition data (e.g. nutrient deposition)
- Non-numeric data (e.g. GIS data, site survey data, site photographs, records from federal, state, and tribal agencies, and traditional knowledge)

- Environmental Protection Agency

Response to 2.1.C

We have modified the section *Site characterization data* in a few ways. First, we have added some of the recommended additions (atmospheric deposition data, non-numeric data) into Table 1. Further, we moved some of the existing data types from this section into Table 1 (e.g., boundary conditions, meteorology). Finally, we added the remainder of the recommended additions into this section (surrounding vegetation, submerged aquatic vegetation). We believe a bulleted list captures the requirements for this section, and that an additional table or combination into Table 1 is not necessary.

2.1.D Comment summary – Elsewhere, Ecology has argued that model errors between existing and natural condition model runs cancel each other out so the absolute difference between the model runs does not contain any uncertainty. However, this assumption is not explicitly stated in this guidance. If such an assumption is made explicit, the guidance should include documentation or references that support this assumption.

- King County

Response to 2.1.D

This comment does not adequately reflect Ecology's assertions regarding modeling uncertainty. Uncertainty, or error, is inherent in every modeling system. Nonetheless, after documenting and accepting the level of model accuracy, we can obtain a precise result for

the difference between two model runs. The variance of differences computation has been documented previously and most recently in Figueroa-Kaminsky et al., 2025[10] for the Puget Sound Nutrient Source Reduction Project.

The determination of whether this approach is used is project-specific, as different projects may have different attributes and assumptions. As such, it would not be appropriate to include such a statement in this methods document.

2.1.E Comment summary – There are no stipulations about the timeliness of the model. All available data must be used (presumably up through the present day) but no provision is made to ensure that models are representative of current conditions. Is a model run from 2004 representative of current conditions in 2025? Add model timeframe in addition to data timeframe.

- King County

Response to 2.1.E

A model year or set of years will be identified for existing conditions for comparative purposes. This will be addressed in the project-specific QAPP rather than established *a priori* in the methods document.

Modification of input files for those year(s) to reflect natural conditions would occur based on existing, readily available, and credible data. If a year or set of years is determined to be appropriate for use, the following must be done per the methods document: "If combining data across multiple time frames to estimate natural conditions, the methodology used in combining data sets must be documented and must be appropriately conservative to capture the range of conditions that protect existing and designated aquatic life uses across the scales of aggregation."

2.1.F Comment summary – The document describes the development of a single model. However, there are multiple models that can model marine dissolved oxygen in Puget Sound and it may be beneficial to use multiple models in natural conditions assessments. We recommend that the document include the possibility of incorporating multiple models into the assessment as a way of developing a more robust assessment.

- King County

Response to 2.1.F

While generally we anticipate using a robust single-mechanistic model approach to estimate natural conditions, we do not believe anything in the performance-based approach methods document would preclude selection of multiple models if that were the

[10] Figueroa-Kaminsky, C. et al. 2025. Puget Sound Nutrient Source Reduction Project Volume 2: Model Updates and Optimization Scenarios, Phase 2. Washington State Department of Ecology, Olympia, Washington. Publication 25-03-003. Available at: https://apps.ecology.wa.gov/publications/SummaryPages/2503003.html.

best approach for a specific site. For instance, Step 6 (Develop and calibrate the model) has language stating that "[a]ny *model(s)* used must follow the requirements…"

2.1.G Comment summary – The guidance articulates concern for spatial resolution related to temporal resolution, but does not acknowledge the effect of cell resolution itself. For example, finer and finer vertical grid resolution might result in lower and lower resolved oxygen concentrations near the bottom. Provide some guidance text regarding the need to be thoughtful regarding vertical model resolution at least.

- King County

Response to 2.1.G

The methods document states that "for cell resolution, it must be sufficient to predict horizontal and vertical variations in water quality on at least an hourly basis." Furthermore, the choice of vertical resolution, as part of the process of model grid selection, needs to be "documented in the respective project QAPP and/or other documentation."

The adequacy of grid selection, along with the whole modeling system, needs to be demonstrated in Step 7 of the methodology. Following the example provided, model skill in reproducing bottom measurements is key to demonstrating that the model captures impacts to all designated uses, including near the bottom, which would be accomplished during the model performance evaluation in Step 7.

2.1.H Comment summary – Last paragraph: How can one know if the data encompass the natural variability of a site if the natural variability is not known? Change "natural" to "variability in space and time".

- King County

Response to 2.1.H

While natural variability may not be fully known for all parameters, historical records and observational data sets can be used to estimate natural variability. Nonetheless, the suggested language works in this context, and we have made edits based on your suggestion.

2.1.I Comment summary – Water quality observations (marine water), hydrodynamics, and oceanic boundary conditions are identified in Table 1 as not having any data needs for natural conditions. This seems to be in conflict with the need to account for human-caused impacts. This could include things like climate change, boundary condition changes caused by human impacts beyond WA/OR/ID, and "global ocean circulation changes" (identified as a need on page 18). This document should be more specific in how such human impacts will be included in the natural conditions determination, and where information about those impacts will come from.

- King County

Response to 2.1.I

We have made edits to Table 1, including clarifying why there are no potential data needs for marine water quality (previously titled water quality observations, marine water) under natural conditions. Table 1 is specific to potential data needs for model inputs, and these data needs include items such as oceanic boundary conditions and changes to air temperature. As is now noted in the table, quantitative, high resolution, existing, credible data for marine water quality under natural conditions is generally not available. Further, this table is not exhaustive, and additional data needs may be identified on a project-by-project basis.

The project-specific QAPP must document all data compiled, including data sources. In addition, the project QAPP and performance-based approach report will document how human impacts are accounted for and removed in determining natural conditions. As these items may vary between uses of the PBA methodology, it would not be appropriate to include such specificity within the performance-based methods document itself.

2.1.J Comment summary – Data gaps must be identified but it is not clear what constitutes a data gap either spatially or temporally. Define objective thresholds for data gaps.

- King County

Response to 2.1.J

Data gaps will be identified, including any objective thresholds, on a project-specific basis as they relate to estimating natural conditions model inputs to develop natural conditions criteria, and they will be included in documentation when we use the performance-based approach methodology.

2.1.K Comment summary – Step 1: Define site boundaries and model domain – Page 9. For this Guidance to be intelligible to the public, the terms should be defined, but there is no glossary nor are the terms defined in the text. For example, the very first sentence in this section contains three terms that one could assume would be unclear to the average reader: "site boundaries, model domain, and model cell resolution." Id. at 9. In any event, nothing in this section explains how defining the site boundaries and model domain will ensure that only purely natural conditions will be derived. Instead, this section consists of mere observations about the importance of defining site boundaries, model domain, and model cell resolution and that they "must be defined and documented."

- Northwest Environmental Advocates

Response to 2.1.K

Defining the site boundaries and model domain are important first steps in establishing where we are developing natural conditions criteria (i.e., site boundary), and where we will need to model conditions (i.e., model domain) to estimate natural conditions, and what model resolution is needed to do so. These steps are needed to establish a model that can

be used for current conditions and then estimate natural conditions. We have added some definitions in the methodology document to improve readability.

2.1.L Comment summary – Step 2: Compile data – Page 10. Ecology begins this section by stating that "[a]ll existing, readily available, and credible data and information to characterize the site of interest and waters that affect the site of interest must be considered to model current and natural conditions." Presumably the use of the phrase "credible data" means its meaning in RCW 90.48.585. If so, Ecology should say so. But then it should also explain its policies on how its interpreted those regulations. For example, it should explain whether and how its guidance Ecology, Water Quality Policy 1-11 Chapter 2, Ensuring Credible Data for Water Quality Management (Sept. 2006, revised July 2021) and Ecology, Water Quality Program Policy 1-11 Chapter 1, Washington's Water Quality Assessment Listing Methodology to Meet Clean Water Act Requirements (July 2018, revised March 2023) apply here.

- Northwest Environmental Advocates

Response to 2.1.L

We note that in the last paragraph of the sub-section "Existing, readily available, and credible data", we reference RCW 90.48.585 as well as Chapter 2 of Ecology's Water Quality Policy 1-11. We have also revised page 10 of the document to be more explicit about credible data.

2.1.M Comment summary – Table 1. Data needs for modeling current and natural conditions. – page 11. Please explain if anything on this table is different from what Ecology would have used under its previously existing NCC criterion from which it would derive superseding criteria. This is nothing more than a partial list of items that would be input into a model on marine dissolved oxygen and, as such, is not helpful information.

- Northwest Environmental Advocates

Response to 2.1.M

We have made edits to Table 1 based on comments received, including:

- Provided additional context for some categories.
- Clarified category names throughout the table.
- Adjusted language throughout the table to fix any inconsistencies or conflicting approaches.

We do note that this table reflects potential data needs and uses the same principles in determining and developing natural conditions criteria as Ecology has previously used. Actual data needs for modeling current conditions and estimating natural conditions are project-specific and will be documented in the project QAPP for each use of the performance-based approach.

2.1.N Comment summary – Existing, readily available, and credible data – page 12. This section is nothing more than a list of possible data sources, some of which Ecology will use and some of which "may include," leaving their use up to Ecology staff to decide.

- Northwest Environmental Advocates

Response to 2.1.N

Use of the performance-based approach requires *all* existing, readily available, and credible data to be considered in the process (Step 2). These data sources are ones that Ecology typically and historically have used; however, we did not want to preclude the use of other sources that meet credible data requirements for a specific site.

2.1.O Comment summary – Site characterization data – page 13. A mere list, which is what Ecology presents here, is not information from which EPA, the Services, or the public could deduce that the results of choosing site characterization data will be transparent, predictable, repeatable, and scientifically defensible because it does not explain how Ecology will use these data and this information.

- Northwest Environmental Advocates

Response to 2.1.O

We have made updates to this section based on comments received. This includes moving some items to Table 1 and adding additional data types. We note that this list is not exhaustive, and use of these types of data will be project specific. How they will be used will be documented in the project QAPP and/or project documentation associated with each use of the performance-based approach.

2.1.P Comment summary – Data timeframe and metadata requirements – page 13. Why be entirely vague if the point of this process is to be transparent, predictable, repeatable, and scientifically defensible?

- Northwest Environmental Advocates

Response to 2.1.P

We note that this section places boundaries around what data must be obtained and considered in the use of the performance-based approach. For example, metadata information must be captured and documented. The process to combine datasets, if done in a project, must be documented. These details will be provided in documentation with the use of the performance-based approach, as they are project-specific.

2.1.Q Comment summary – Data gaps – pages 13–14. Ecology states that "[i]f data gaps are filled using estimates, the process for doing so must be documented and justified," and it mentions some methods by which these gaps could be estimated. Id. at 13. Ecology does not explain how any kind of data estimated can be said to be predictable and repeatable.

- Northwest Environmental Advocates

Response to 2.1.Q

Data estimates will be done in a repeatable and predictable manner. Further, data estimates are project-specific, and we encourage the public to comment on how we estimated data, if applicable, after we use the performance-based approach and provide criteria values and documentation for public review.

We are fully committed to holding a public review period whenever we use the performance-based approach to develop natural conditions criteria. For example, we may choose to develop natural conditions criteria following the performance-based approach to set criteria for a site during the process of creating a TMDL. When we go out to the public with our draft TMDL for comment and feedback, all the required performance-based approach documentation and criteria values would be included alongside the customary TMDL documentation, and we would accept comment and feedback on the use of the performance-based approach at that time.

2.1.R Comment summary – Step 3: Develop A Project Quality Assurance Project Plan – page 14. How does this description of a QAPP provide any more assurance than any QAPP done in previous decades for the development of models to generate purportedly natural conditions pursuant to the NCC for use in TMDLs? It is merely a list that states what the table of contents should be. See id. at 14.

- Northwest Environmental Advocates

Response to 2.1.R

Ecology routinely produces high quality QAPPs for monitoring and modeling projects and the same will be required to develop natural conditions criteria. The list includes requirements that must be included in any project QAPP associated with the performance-based approach. Many of these items are standard inclusions when dealing with water quality models, and therefore, they may have appeared in past Ecology project QAPPs. A QAPP that includes these elements can successfully guide the project toward achieving its stated goal(s).

2.1.S Comment summary – Step 1: Some discussion is needed regarding the seasonal variation in conditions and whether certain seasons represent critical conditions for the parameter of interest. In other words, the temporal boundaries and domain should also be considered.

- Paul Pickett

Response to 2.1.S

The temporal applicability of the criteria are the periods of the year when natural conditions were estimated (Step 9 in the document). This is also project-dependent, and will depend on factors such as data availability, site dynamics, model selection, and specific model runs.

2.1.T Comment summary – Table 1 comments.

a. Water Quality Observations, Marine Water: Natural Conditions could include data from reference areas with little human impact

b. Water Quality Observations, Fresh Water: Natural Conditions could include data from reference areas with little human impact. Also, modeling of the quality of freshwater inputs may need to be done to determine natural conditions for that input.

c. Hydrodynamics: Natural conditions should consider hydrodynamics absent changes from human activities, such as dredging, dredge disposal, bridges, infill of estuary areas, etc.

d. Other Observational Data: Natural Conditions could include data from reference areas with little human impact. These data should include nutrient flux between the sediment to the water column. Better yet, a separate row for sediment conditions should be added.

e. Freshwater Nutrient Inputs: it's not clear why this is a separate line – it seems to already be addressed in the second row.

f. Point-Source Marine Discharges: Natural conditions should be no point source discharge. The statement "point source discharges reflective of no anthropogenic influence" makes little sense. If you are referring to stormwater runoff from a natural watershed absent urbanization and a conveyance system, you should specify that.

g. Meteorology: Mention should be made of microclimates and thermal refugia

h. Hydrology: Natural Conditions should specify flow regimes absent human impacts, with may require modeling or other analyses to determine changes in freshwater inflow volumes.

i. Oceanic Boundary Conditions: are boundary conditions always the open ocean? Some discussion should be made of marine boundary conditions that may not be natural due to human impacts outside the analysis domain. Budd Inlet TMDL is a good example.

j. Morphology: see comments about Hydrodynamics. These two items should be combined, since they address fundamentally the same issue.

- Paul Pickett

Response to 2.1.T

We have made edits to Table 1, including:

- Provided context for certain categories.
- Clarified category names throughout the table.
- Adjusted language throughout the table to fix any inconsistencies or conflicting approaches.

For water quality observations, due to variability in environmental systems, it is possible that there may be some overlap between reference and natural conditions. That said, Washington's definition of natural conditions refers to surface water quality present before *any* human-caused pollution.

For hydrodynamics, we have moved this category to the section on *Site characterization data*. In addition, this item is also included in the list of anthropogenic impacts in Step 8. We agree that natural conditions must consider water quality conditions before any human impact.

We have re-worked "Other Observational Data" but have decided to keep sediment oxygen demand contained within this row.

For point source marine discharges, we have clarified that this refers to nutrient loadings specifically. Further, we have also updated the freshwater hydrology row.

For oceanic boundary conditions, this may refer to a marine water boundary that is not outside the continental shelf; therefore, we do not use "open ocean" in the table.

Finally, we want to reiterate that this table represents potential data needs, but it is not exhaustive. Items identified in this comment that are not included in this table are not precluded from being included when the performance-based approach is used to develop site-specific criteria.

2.1.U Comment summary – In Step 1, we agree with adding model domain and cell resolution explicitly in the approach. We also agree with clarifying that Step 2 involves compiling existing data, rather than the previous version that identified a Quality Assurance Project Plan, which is now Step 3.

- Washington Conservation Action

Response to 2.1.U

We appreciate your comment and support.

2.1.V Comment summary – The second paragraph of page 12 states that "[a]ny data obtained from academic and literature works (e.g., research journals) must be from published and reputable sources." While this is necessary, it is not sufficient. We suggest that Ecology clearly state that "[a]ny data obtained from academic and literature works (e.g., research journals) must be from published and reputable sources, and must comply with all credible data regulations, rules, and guidance that Ecology must comply with itself." As pointed out in the paragraphs below, Ecology must comply with state credible data laws that require extraordinary documentation. Just because an academic institution collects data, it does not mean that the data complies with state credible data laws. It is unclear as written whether Ecology must also determine compliance by academic institutions or if the institutions themselves could self-evaluate. This fine point could simply be due to academic data described prior to the discussion of the Water Quality Data Act in this section.

- Washington Conservation Action

Response to 2.1.V

We have clarified in the document that credible data must follow Washington's Water Quality Data Act (RCW 90.48.585). Thus, data obtained from academic and literature works

from published and reputable sources must meet the requirements of this act for Ecology to consider those data credible and able to be used in this process.

Ecology's Water Quality Policy 1-11 Chapter 2[11] is Ecology's policy to ensure credible data for water quality management. This document includes how Ecology determines data credibility, including data audits (Section 8 of the policy document).

2.1.W Comment summary – The current draft of the PBA does not provide sufficient guidance in the evaluation of available data. The PBA document states that all existing, readily available, and credible data must be considered for use in modeling current and natural conditions but does not define the circumstances in which data might be used or dismissed after consideration. We request that Ecology clarify within the document that all existing, readily available, credible, and relevant data will be used, or provide specific descriptions of why data would be dismissed.

- Washington Forest Protection Association

Response to 2.1.W

We note that all existing, readily available, and credible data must be considered. Excluded data could be data that is not readily available, not applicable or relevant, or data that are not credible per RCW 90.48.585. We discuss our policy to help ensure credibility of data used in agency actions in Ecology's Water Quality Policy 1-11 Chapter 2.[12] Both the RCW and Policy 1-11 document are referenced in the PBA methodology, which will guide our decisions on whether data are credible.

2.1.X Comment summary – Models created following the PBA should be third-party peer reviewed. Upon receipt of reviews, Ecology should respond to comments, revise models, explain changes made, and make records of such reviews publicly available.

- Washington Forest Protection Association

Response to 2.1.X

We note that Step 3 requires specifying the model peer-review approach in the project QAPP, and Step 6 requires the model code to be open source and input and output files, including data sources, to be made available to the public. Further, Step 6 requires the model framework, including code, to have undergone a formal peer-review process before application or be recognized as widely-use code in published literature and fully documented.

[11] https://apps.ecology.wa.gov/publications/SummaryPages/2110032.html
[12] https://apps.ecology.wa.gov/publications/SummaryPages/2110032.html

2.2. Steps 4 and 5 of the PBA: Collecting and Evaluating New Data

2.2.A Comment summary – Step 4: Collect new data – pages 14–15. This section is premised on the following finding by Ecology: "If Ecology determines that existing, readily available, and credible data are insufficient and will impede estimating natural conditions and the ability to proceed with the performance-based approach[.]" Id. at 14. It is not clear how Ecology will make that determination and especially how that determination will be predictable and repeatable.

- Northwest Environmental Advocates

Response to 2.2.A

Each time Ecology uses the performance-based approach, a QAPP is developed which includes data needs and requirements. Further, during data collection, model selection, and model performance evaluation, we would determine whether we are meeting the metrics established in the QAPP (e.g., model performance), or whether estimating natural conditions values are impeded.

We note that all existing, readily available, and credible data must be considered. Excluded data could be data that is not readily available, relevant, or not credible per RCW 90.48.585. We discuss our policy to help ensure credibility of data used in agency actions in Ecology's Water Quality Policy 1-11 Chapter 2.[13]

We are fully committed to holding a public review period whenever we use the performance-based approach to develop natural conditions criteria. For example, we may choose to develop natural conditions criteria following the performance-based approach to set criteria for a site during the process of creating a TMDL. When we go out to the public with our draft TMDL for comment and feedback, all the required performance-based approach documentation and criteria values will be included alongside the customary TMDL documentation, and we will accept comment and feedback on the use of the performance-based approach at that time.

2.2.B Comment summary – Step 4 apparently applies only to "new field data." Id. at 15.

- Northwest Environmental Advocates

Response to 2.2.B

Correct. Step 4 and Step 5 apply only when new data are collected after we start the performance-based approach process and after a QAPP has been developed. Prior to that, Step 2 of the document provides the process for how existing, readily available, and credible data are obtained.

[13]https://apps.ecology.wa.gov/publications/SummaryPages/2110032.html

2.2.C Comment summary – Clarifying that Step 4 involves any new data collection needed is helpful, as is Step 5 on data quality.

- Washington Conservation Action

Response to 2.2.C

We appreciate your support for our additions of Step 4 and Step 5.

2.3. Steps 6 and 7 of the PBA: Model Evaluation and Performance

2.3.A Comment summary – Further, it would be inconsistent with the level of accuracy of water quality model predictions with and without anthropogenic sources when model skill assessment results exceed the selected *de minimis* DO decrease of 0.2 mg/L. Model skill assessment of the Salish Sea Model presented in the Journal of Geophysical Research and in Ecology's Model Updates and Bounding Scenarios report indicate overall Sound wide mean error (bias) ranging for DO from -0.7 to 1.0 mg/L and root mean square error (RMSE) ranging from 0.6 to 1.6 mg/L. These two statistics measure the difference between observed data and the model predictions with the model performance varying in the different regions of the Sound (i.e., Bellingham, Samish and Padilla Bays, Whidbey Basin, Admiralty Inlet, Main Basin, Hood Canal, South Sound). Although these model statistics results are similar to other complex marine DO modeling studies, the accuracy of the model needs to be accounted for when evaluating natural conditions DO criteria and the allowable DO decrease associated with anthropogenic sources.

It appears that the Salish Sea Model will need to be revised to estimate the natural conditions criteria associated with the pre-anthropogenic conditions, according to Ecology's performance-based approach. In Step 8 Estimating Natural Conditions of the March 2025 Second Draft, Ecology states that "All human-caused impacts must be accounted for and removed using all existing, readily available, and credible information to develop the natural conditions scenarios." The approach taken to the use of the Salish Sea Model for natural conditions does not appear to conform with this performance-based approach because the SSM Reference Condition Scenario still includes Canadian nutrient sources, Canadian rivers, and industrial treatment plant discharges.

- City of Everett
- City of Tacoma

2.3.B Comment summary – The “Salish Sea Model Evaluation and Proposed Actions to Improve Confidence in Model Application” memorandum by University of Washington Puget Sound Institute (PSI) includes a general discussion of continued Salish Sea Model (SSM) improvements, as well as better communications with the public, stakeholders, and decision makers to gain broader acceptance of the Salish Sea Model. The following comments are focused on dissolved oxygen in context of the proposed Department of Ecology Performance-Based Approach.

One reference argued that the model accuracy between the 2 runs could cancel each other out and, therefore, the delta results are accurate. The Memorandum cautions that this is only one approach to the assessment and the topic should be explored further. The Memorandum also addresses the sediment flux model and calculation of sediment oxygen demand (SOD) and nutrient fluxes. The SSM seems to calculate lower SOD than observed data.

Further, the model calculation of gross primary production was also less than observed. There are some issues with the data and model years that don’t overlap. SSM Natural Conditions Scenario A question that may require further research into Ecology’s Bounding Scenarios Report and examination of the SSM is whether the Natural Conditions scenario used in the SSM model is consistent with what Ecology is now proposing for its Performance-Based Approach.

The Memorandum reports the Reference Condition Scenario as making changes to wastewater treatment plants and rivers. It has been understood that the municipal WWTP point source nutrient discharges to Puget Sound were removed from the Reference Condition in the SSM. However, the Memorandum notes that nutrients from Canadian sources and industrial treatment plants that not included in the Puget Sound Nutrient General Permit (PSNGP) are kept the same in the Reference Condition Scenario (see Figure 2 for insert from Memorandum below). This is inconsistent with Ecology's proposed Performance-Based Approach.

- City of Tacoma

Response to 2.3.A and 2.3.B

As in past applications, model accuracy, with respect to available observations, will continue to be quantified and accounted for in this process. For instance, Salish Sea Model accuracy is described in multiple publications, including most recently in Figueroa-Kaminsky et al., 2025[14] in the sections that address comparisons with dissolved oxygen criteria and decreases or depletions from a baseline: *Uncertainty in comparison with DO numeric criteria* and *Uncertainty in DO depletion estimates*. The model's accuracy is acceptable for regulatory purposes and the difference between two runs provides precise results needed to determine whether dissolved oxygen depletion is greater than or less than 0.2 mg/L.

The Salish Sea Model is broadly accepted as a robust scientific tool for our region. Model results and files have been widely and consistently shared for years with stakeholders and the public. For links and information on historical and most current Salish Sea Model data products (reports, web maps, downloadable input and output files), please see the Reducing nutrients in Puget Sound webpage.[15] We have and continue to respond to specific requests and questions received.

In addition, the 2025 report from Figueroa-Kaminsky referenced above shows that:

- Model skill statistics for shallow embayments and open channel locations are similar.
- Predicted sediment oxygen demand is within the observational ranges.
- Predicted productivity is within observational ranges.

Further, the Salish Sea Model was originally developed while the prior EPA-approved natural conditions provisions were effective. The "reference condition" model runs that we have done to date were to estimate the impact of local and regional sources of nutrients and not used to estimate natural conditions. Therefore, it is correct that currently available

[14] Figueroa-Kaminsky, C. et al. 2025. Puget Sound Nutrient Source Reduction Project Volume 2: Model Updates and Optimization Scenarios, Phase 2. Washington State Department of Ecology, Olympia, Washington. Publication 25-03-003. Available at: https://apps.ecology.wa.gov/publications/SummaryPages/2503003.html.
[15] https://ecology.wa.gov/ecologys-work-near-you/river-basins-groundwater/puget-sound/helping-puget-sound/reducing-puget-sound-nutrients.

Salish Sea Model input files do not account for removal of human activity outside of Washington borders. We recognize that updates to input files will need to be made based on updated 2024 rule language (pending EPA approval) and the finalized performance-based approach methods document. These changes will include modifying our input files to remove anthropogenic nutrient loads from Canadian marine point sources and watershed sources.

2.3.C Comment summary – A sufficient number..." How will "sufficient" be determined? Insert an objective statement regarding what might be considered sufficient. Here and elsewhere in the document where the term "sufficient" is used but not defined.

- King County

Response to 2.3.C

We appreciate your comment. Determining sufficiency will be project-specific. Regarding the example in Step 6 of the document in the bullet regarding calibration, if the model skill goals outlined in the QAPP are met, the number of calibration locations are sufficient.

2.3.D Comment summary – The model must "reflect available bathymetry information" but we know that there are parts of Puget Sound (e.g., Port Susan) where the model depths are not realistic. This seems important to reconcile particularly since areas like Port Susan are shown to be particularly sensitive to nutrients, and it's not clear how the difference between modeled and real water depth might impact things like sediment processes and nutrient cycling. Define allowable bounds for bathymetry and include information about how mismatches between modeled and actual bathymetry could impact model outputs.

- King County

Response to 2.3.D

Port Susan is an example of a location where we do not use the Salish Sea Model results in specific areas because of model limitations within intertidal and very shallow subtidal locations. These limitations have been documented in our publications, and this area is excluded (masked) when we evaluate model outputs. Specific requirements regarding how model bathymetry reflects observational bathymetry for the natural conditions criteria analysis will be detailed in the project-specific QAPP.

2.3.E Comment summary – Sensitivity testing must be conducted... on selected key parameters. How are these key parameters chosen? Include information about how to objectively determine which parameters are chosen for sensitivity analysis.

- King County

Response to 2.3.E

Sensitivity analysis will be conducted on parameters that could influence natural conditions outcomes, as written in Step 6 of the methodology document. The project-specific QAPP will detail the approach for selecting those parameters.

2.3.F Comment summary – On Page 16 of the PBA draft it says that the model must have sufficient resolution to….Capture the impacts to all designated uses, including the most sensitive designated use… I am concerned that the Salish Sea model is a primary productivity only model, so it is incapable of evaluating food web impacts. I reject the notion that any nutrients added by humans must only be detrimental to the biota because of effects on DO. Some added nutrients must have beneficial effects up the food chain that will be more significant than harmful effects on DO. The quest for reducing primary productivity may have a net impact on the biota overall that may be greater than the benefit from DO changes.

- Lincoln Loehr

Response to 2.3.F

Criteria developed using this approach must be protective of all designated and existing uses, including the most sensitive use. This includes providing for the protection and propagation of aquatic life (per both state and federal law). As such, it would not be appropriate, nor would it meet the requirements of state and federal laws and regulations, to allow harmful levels of DO in a system to persist even if the added nutrients that cause low DO levels may provide some benefits to other species in the food web. Further, current dissolved oxygen impairments in Puget Sound demonstrate that excess nutrients are impacting the waters and nutrient reduction is needed.

2.3.G Comment summary – Step 6: Develop and calibrate the model – pages 15–17. Nothing in this section provides any description of how the model will ensure the results are transparent, predictable, repeatable, and scientifically defensible.

- Northwest Environmental Advocates

Response to 2.3.G

The process will be transparent and predictable because it will be specified in detail in a project-specific QAPP that the public can review. For instance, an approach using the Salish Sea Model, which has included extensive scientific peer review, has produced repeatable and defensible results. Scientists unaffiliated with Ecology have reviewed and/or reproduced Salish Sea Model results or have conducted new measurements that confirm low dissolved oxygen in locations where the model predicts low dissolved oxygen, such as Penn Cove.

Whether the methods used to develop natural conditions criteria ensure transparent, predictable, repeatable, and scientifically defensible results can be evaluated after the criteria have been developed and supporting documents are available for public review.

We are fully committed to holding a public review period whenever we use the performance-based approach to develop natural conditions criteria. For example, we may choose to develop natural conditions criteria following the performance-based approach to set criteria for a site during the process of creating a TMDL. When we go out to the public with our draft TMDL for comment and feedback, all the required performance-based approach documentation and criteria values would be included alongside the customary TMDL documentation, and we would accept comment and feedback on the use of the performance-based approach at that time.

2.3.H Comment summary – Step 7: Evaluating model performance – page 17. The Guidance states that "[m]odel evaluation includes, but is not limited to: sensitivity tests; uncertainty analyses; and evaluation of observed water quality conditions during specified years and simulating the effects of various, alternative nutrient-loading scenarios." But this does not address inputs, assumptions, and how outputs will be handled and therefore does not provide any assurance that the resulting supplanting criteria would be transparent, predictable, repeatable, and scientifically defensible.

- Northwest Environmental Advocates

Response to 2.3.H

We note that model selection and use will be project specific. Model quality objectives, including how this will occur, is a requirement in each project QAPP (Step 3, Bullet 9). Whether the methods used to develop natural conditions criteria ensure transparent, predictable, repeatable, and scientifically defensible results can be evaluated after the criteria have been developed and supporting documents are available for public review.

We are fully committed to holding a public review period whenever we use the performance-based approach to develop natural conditions criteria. For example, we may choose to develop natural conditions criteria following the performance-based approach to set criteria for a site during the process of creating a TMDL. When we go out to the public with our draft TMDL for comment and feedback, all the required performance-based approach documentation and criteria values would be included alongside the customary TMDL documentation, and we would accept comment and feedback on the use of the performance-based approach at that time.

2.3.I Comment summary – Step 6 describes the process to develop and calibrate the model. We suggest making the section title plural as "models" given that water quality modeling can involve multiple models together. Model(s) is used on the second line. We concur with including only a summary of the Site Characterization Data, as compared with the detail presented in the previous version of this report.

- Washington Conservation Action

Response to 2.3.I

We have edited the section title to be more inclusive of the possibility of using multiple models, and we appreciate your support for our approach in the *Site characterization data* section.

2.3.J Comment Summary – Under the third bullet, Ecology refers to the Salish Sea Model among those reflecting best available modeling tools. Because the City of Tacoma and others are actively modifying the Salish Sea Model, we suggest adding a clarification: "This includes, but is not limited to, the version of the Salish Sea Model and other models of comparable rigor that have been developed and approved by the Department of Ecology." We fear that the City of Tacoma and the efforts it funds are seeking to weaken the Salish Sea Model in its favor. We want to be clear that it is the Ecology-approved version that represents rigorous modeling appropriate for regulatory approaches. We concur with referencing Ecology's 2009 QAPP and related publications in Step 6.

- Washington Conservation Action

Response to 2.3.J

Model code and input files will be subject to scrutiny as established in the performance-based approach methods document. Ecology will also specify model code version in the project-specific QAPP. We concur that the Salish Sea Model used by Ecology is currently the best available model appropriate for regulatory evaluation in the Salish Sea.

2.3.K Comment Summary – Extracting numeric criteria from a model may demand a lot of precision from the model, and not all models are capable of this level of precision. We ask that Ecology expand the PBA document to describe how they plan to account for model uncertainty within the results and final criteria values.

- Washington Forest Protection Association

Response to 2.3.K

Any model uncertainty analysis will be model- and project-specific. Model performance is a requirement of the project QAPP (Step 3). The QAPP will also address how the final criteria values will be established.

2.4. Steps 8, 9, and 10 of the PBA: Determining Natural Conditions Criteria and Documentation of Process

2.4.A Comment summary – Step 8: Estimating Natural Conditions; Other Considerations. Please revise the first sentence to make it clear that the freshwater hydrology will reflect natural conditions.

- Environmental Protection Agency

Response to 2.4.A

We have edited this section to indicate that freshwater hydrology must fall within the expected natural condition variability. We note that, as a result of natural variability, a hindcast model year, depending on which year, may represent freshwater hydrology reflective of natural conditions.

2.4.B Comment summary – Step 9: Determining natural conditions criteria values; Criteria magnitude. Please revise the first two sentences to read as follows: “Step 8 estimates the natural conditions of marine DO at a site. These model outputs are then used to determine natural conditions criteria for the site.” The suggested revisions ensure that determining the applicable criteria is part of the PBA.

- Environmental Protection Agency

Response to 2.4.B

We have edited the first two sentences in Step 9 to reflect your suggested revisions.

2.4.C Comment summary – "All feasible and practicable steps to improve model performance and representativeness of the model must be take prior to model acceptance..." This seems to imply that the model will always be accepted at some point once all allocated resources are exhausted. Revise to add that minimum skill requirements and peer-review approval have to be met before the model is accepted.

- King County

Response to 2.4.C

We note that model performance is defined in the project QAPP (Step 3). This includes meeting minimum skill requirements before accepting the model. Likewise, conducting and documenting scientific peer review is an essential part of the modeling project and will be explicitly discussed in the QAPP.

2.4.D Comment summary – Third paragraph, define "these requirements." What requirements beyond steps to improve model performance and subjective assessment of model representativeness? Peer review is mentioned in the document but it is unclear when this takes place during the approach and how it is used to determine model acceptability (beyond mention of evaluating the model framework, code, and selection of calibration parameters in various places throughout the document). Add explicit minimum model performance criteria

and describe the peer review process steps and how it is used in decision making more explicitly within the document.

- King County

Response to 2.4.D

As model performance criteria and peer-reviews of models are model- and project-specific and will be addressed in the QAPP, we do not agree with their inclusions in this water quality standards document. For the model framework (including model code), a peer-review process must be done prior to use of the model. The exception to this requirement would be model frameworks that are recognized as widely-used in published literature and are fully documented (*See* Step 6).

2.4.E Comment summary – It's unclear what is meant by "must account for and remove human activities that may affect regional hydrodynamics." What would these activities be? Clarify meaning and importance of this element.

- King County

Response to 2.4.E

When establishing the freshwater input loads that enter the marine water, we must consider how human actions may have impacted attributes of that freshwater input, such as water quality (e.g., nutrient concentrations) or flow rate. Therefore, the PBA methodology requires us to determine the freshwater input loads that align with what the system would have been pre-human activity or action. These activities include changes by humans to the natural hydrodynamics of a freshwater system, such as dams or channel dredging, unless they fall under the human structural change provision (WAC 173-201A-260(1)(b)), in which case changes will not be made.

2.4.F Comment summary – It is unclear what is meant by "how would the effects of meteorological conditions be changed to account for natural conditions." Is this referring to climate change? How can invasive species be accounted for? Clarify meaning and importance of this element.

- King County

Response to 2.4.F

We have clarified Step 8 to note that these anthropogenic impacts must be considered, accounted for, and removed (if feasible and practicable) in the estimation of natural conditions. We have also clarified the language on developing the natural conditions scenario, including how we account for those impacts that are not feasible or practicable to model, but where there are impacts on dissolved oxygen and we have sufficient, existing, readily available, and credible information.

We do note that in the anthropogenic impacts section of Step 8, climate change is part of meteorological conditions. Regarding invasive species, if credible data exists for invasive species' impact to site DO, and meets the other requirements specified in the methodology, then such data must be used to account for and remove such impacts when determining natural conditions. The specific mechanism for doing so would be documented in the project-specific QAPP and/or report.

2.4.G Comment summary – Model outputs wouldn't include a description of short-term variability especially considering the requirement that the model produce output at an hourly time step? Add "...and short-term (sub-daily)...".

- King County

Response to 2.4.G

We have made edits to this section that address this comment.

2.4.H Comment summary – "Freshwater hydrology as it was reflected in a hindcast year modeled may be used." What does this mean? Is this a way of getting around a data gap? Clarify what is meant by "hindcast year modeled" and explain why this is not a data gap that needs to be addressed.

- King County

Response to 2.4.H

We have edited this section to state that freshwater hydrology must fall within the expected natural condition variability. We note that, as a result of natural variability, a hindcast model year, depending on which year, may represent freshwater hydrology reflective of natural conditions. This information is not a data gap; rather, freshwater hydrology data of a site is a potential data need for estimating natural conditions (Step 2, Table 1).

2.4.I Comment summary – More specifics would be helpful on how is the appropriate aggregation scale determined and what is meant by under-aggregation. Omit this paragraph or provide some explicit criteria or examples that would allow an assessment of whether or not the appropriate aggregations were made.

- King County

Response to 2.4.I

We have removed reference to under-aggregation in this section and have clarified what we mean by vertical aggregation.

To clarify how we chose the aggregation scales:

- For vertical aggregations, there is no vertical aggregation of model layers allowed.

- For horizontal aggregations, we have chosen to use Washington's CWA Section 303(d) assessment units as these are defined areas when we assess water bodies.
- For temporal aggregations, we chose daily minimum DO values to match the duration requirements of the biologically-based numeric marine DO criteria at WAC 173-201A-210(1)(d).

2.4.J Comment summary – ...must reflect Washington's CWA Section 303(d) assessment units... This is where the largest disconnect occurs between the intent of the Federal Clean Water Act and Ecology's implementation of natural conditions standards. Clearly, there are areas of the Salish Sea with very low oxygen concentrations in the absence of human influence. Ecology's assessment units are arbitrary and do not reflect the vertical or horizontal distribution of marine habitats that are adapted to their seasonal and long-term oxygen conditions. An example of how to better match assessments with different marine habitats can be found in Zhang et al. (2025) where oxygen criteria were applied to open water, deep water, and deep channel habitats and habitat specific criteria recognizing the needs of the aquatic life specific to those habitats. Change the guidance to aggregate based on appropriate diverse habitats with differing oxygen requirements. Develop habitat specific DO criteria with appropriate seasonal and temporal resolution to protect diverse aquatic communities specific to those habitats.

- King County

Response to 2.4.J

We note that aggregation by Section 303(d) assessment units provides consistency on how we develop natural conditions criteria across all marine waters in Washington. The horizontal aggregation by 303(d) grids provides for aquatic habitats in marine waters to be examined at a scale that is slightly under a square kilometer (1130 meters long and 790 meters wide). This allows for localized analysis at the sub-embayment scale. The vertical scale allows for bathymetric, stratification, and circulation characteristics of the Salish Sea. The vertical scale varies with depth so that the model predicts oxygen concentrations over relevant depth ranges from shallow to deep waters. With this choice of scales, we are ensuring that the Puget Sound's complex fjordal system with distinct, localized aquatic habitats is comprehensively analyzed.

2.4.K Comment summary –The intent of [the Criteria evaluation and application] paragraph [under Step 9] is unclear. Perhaps this is addressing an issue that is commonly understood in the context of the current process but not to an outsider? Clarify what is meant to be communicated in this paragraph.

- King County

Response to 2.4.K

This paragraph sets the limits for when natural conditions criteria apply on a temporal scale. For example, if the data used in a project are just from a critical period during the summer, and these data are what are used to calibrate and perform model runs for current

conditions and estimate natural conditions, then any natural conditions criteria determined through this process would only be applicable to the same critical summer period. We would not apply those criteria during the winter months, for example. Instead, outside that critical summer period, the existing and applicable biologically-based numeric criteria would continue to apply (i.e., those criteria for marine DO listed under WAC 173-201A-210).

2.4.L Comment summary – In Step 8 on page 18 the required elements that must be accounted for and removed when estimating natural conditions include submerged aquatic vegetation and invasive species. It should also include the food web components including zooplankton, forage fish, larger fish, marine birds, marine mammals and benthic organisms.

- Lincoln Loehr

Response to 2.4.L

We note that these impacts are ones that Ecology has identified in past natural conditions work, and we note that other impacts not in this list may also be considered, as this list is not exhaustive. For instance, phytoplankton and zooplankton predation (in a simplified manner) are included in the Salish Sea Model.

2.4.M Comment summary – In Step 8 on page 19, the model outputs of a site must protect designated and existing aquatic life uses by removing all human-caused impacts and pollution to the water of interest. The designated uses in our standards include a range of aquatic species well beyond the phytoplankton (and actually do not include phytoplankton). In order to protect designated uses, the model needs to address key elements of the food chain. The output could well show food chain benefits that would be lost by removing all human nutrient sources. Perhaps it would also show an optimal range of nutrient loading.

- Lincoln Loehr

Response to 2.4.M

We note that natural conditions are defined in our water quality standards at WAC 173-201A-020 as "surface water quality that was present before any human-caused pollution." This is also consistent with EPA's national policy on natural conditions. Therefore, any developed natural conditions criteria must reflect these requirements and policy decisions, and these criteria cannot be adjusted through the performance-based approach process to allow for consideration of human-caused nutrient loading into the system. If alternative criteria are determined to be appropriate or necessary for a site, then site-specific criteria would need to be developed following all applicable state and federal requirements, including but not limited to WAC 173-201A-430, and would involve a formal rulemaking process. Finally, natural conditions criteria are protective of all aquatic life in a system because they represent water quality conditions before any anthropogenic impacts. Aquatic organisms have adapted over time to these site-specific water quality conditions which support their survival, growth, and reproduction.

2.4.N Comment summary – Step 9, determining natural condition values. This identifies how in each assessment unit, there would be ten separate natural condition criteria values for each day. This is mind-boggling. I think the model has been working with three different years, none of which are the current year. Natural processes such as river flows, climate, and coastal upwelling vary, and would result in different natural condition criteria for each of the years the model has run. It seems like to evaluate compliance in current years with the criteria it would be necessary to be running the model for the current year(s), which just doesn't seem practical.

I propose a way to implement the natural condition based criteria in a way that may simplify evaluation and implementation. For each assessment unit, take the lowest 5th percentile DO natural condition value and use that as your natural condition criteria. Values above that would meet the criteria. Then, on an annual basis, the DO values should not be less than the criteria more than 5% of the time. It could also incorporate in the human caused allowance (0.2 mg/L) to the 5th percentile value and that would be a level that the DO should not be lower than more than 5% of the time. If you use the 10th percentile value, then that works too, with DO values not to be lower more than 10% of the time. The idea is to implement the criteria in a manner comparable to the derivation of the criteria.

- Lincoln Loehr

Response to 2.4.N

We appreciate your suggested method for evaluation and implementation.

Multiple criteria values per day may exist if the model has multiple vertical layers. We do not think a simpler value is appropriate, as such a process could either lead to criteria values that are not sufficient for protection or criteria values that are not obtainable naturally.

Regarding model runs, this would be project-specific. A typical year might be used to model current conditions and then estimate natural conditions. From there, natural conditions criteria could be determined.

2.4.O Comment summary – For Step 9, page 20, in the short paragraph on Criteria frequency it refers to the frequency from WAC 173-201A-210(1)(d), which in turn says that values lower than the criteria should not occur more than once in ten years. There is no biological basis for that number. The history is that in 2003 Ecology submitted to EPA for approval revisions to the water quality standards focused on changing from a class based system to a use-based system, and also focused on temperature requirements in freshwater for salmonids. As those salmonid uses were identified, the existing freshwater dissolved oxygen criteria were just applied to the salmonid uses. EPA came back and said you need to have a frequency component to the criteria, and Ecology went with once every ten years because that was similar to how they used 7Q10 river flows in NPDES permitting to determine conservative mixing zone benefits. 7Q10 stands for seven-day low flow occurring once in ten years. In that rulemaking, there was never an opportunity to comment on the once in 10 years frequency. This frequency could be dropped if the implementation method described in my previous paragraph is implemented, since it has frequency considerations built into it.

- Lincoln Loehr

Response to 2.4.O

We appreciate your comment and the history of the one in ten-year frequency component from WAC 173-201A-210(1)(d). We note that changes or edits to the frequency component in the WAC were not a part of this comment period, and that any changes to the frequency component at WAC 173-201A-210(1)(d) would require a formal rulemaking process, including an opportunity for public comment, and would require EPA review and approval before use in Clean Water Act actions.

In addition, the performance-based approach methods document is for determining protective criteria values, or criteria magnitudes. For the duration and frequency components of criteria, we chose not to deviate from the duration and frequency components listed at WAC 173-201A-210(1)(d) that have previously been approved by EPA and are in effect for Clean Water Act actions.

2.4.P Comment summary – Step 8: Estimating Natural Conditions Introduction – page 17. This subsection does not ensure that the resulting supplanting criteria would be predictable, repeatable, and scientifically defensible, only that they would be documented.

- Northwest Environmental Advocates

Response to 2.4.P

We believe, and EPA supports, that this methodology constitutes a "binding, clear, predictable, and transparent" process.[16] Whether the methods used to develop natural conditions criteria ensure transparent, predictable, repeatable, and scientifically defensible results can be further evaluated after the criteria have been developed and supporting documents are available for public review.

We are fully committed to holding a public review period whenever we use the performance-based approach to develop natural conditions criteria. For example, we may choose to develop natural conditions criteria following the performance-based approach to set criteria for a site during the process of creating a TMDL. When we go out to the public with our draft TMDL for comment and feedback, all the required performance-based approach documentation and criteria values would be included alongside the customary TMDL documentation, and we would accept comment and feedback on the use of the performance-based approach at that time.

[16] Shaw, Hanh. 2025. Public comment letter from USEPA Region 10 to Department of Ecology. Seattle, Washington. 22-May-2025. Available at: https://scs-public.s3-us-gov-west-1.amazonaws.com/env_production/oid100/did200008/pid_210822/assets/merged/s60nilfcga9_document.pdf?v=28884.

2.4.Q Comment summary – Developing a scenario without human-caused impacts and pollution – pages 17–18. The reader is left without any clear understanding of what, precisely, Ecology will do to address human-caused impacts that are not as clear as zeroing out the discharge of a point source discharging into marine waters, the only example discussed.

- Northwest Environmental Advocates

Response to 2.4.Q

Anthropogenic impacts to waters are project-specific, and the methods for accounting for and removing those impacts must be documented when we use the performance-based approach.

2.4.R Comment summary – Human structural changes – page 18. This subsection merely parrots the existing rules. It does not explain the meaning of "human structural changes that cannot be effectively remedied" that would put the use of performance-based supplanting criteria off-limits, leaving that to the reader's imagination. The result is that its use or prohibition is not transparent, predictable, repeatable, or scientifically defensible.

- Northwest Environmental Advocates

Response to 2.4.R

We have updated this section to be more consistent with the language in Washington's Water Quality Standards.

2.4.S Comment summary – Required elements – page 18. This subsection lists inputs that "must be accounted for and removed when estimating natural conditions." When Guidance purporting to ensure that a process is transparent, predictable, repeatable, or scientifically defensible does not mention much in the way of details, the value of that guidance is seriously questionable. A list of ill-described items without any direction cannot ensure results that are transparent, predictable, repeatable, and therefore scientifically defensible.

- Northwest Environmental Advocates

Response to 2.4.S

This methodology provides all the elements that must be accounted for and removed in order to develop natural conditions criteria. However, anthropogenic impacts to waters are project-specific, and the methods for accounting for and removing those impacts must be documented when we use the performance-based approach to develop site-specific criteria.

2.4.T Comment summary – Model outputs – page 19. It is unclear how the model outputs of the site must:

- Abide by the data and modeling requirements in this performance-based approach chapter, and

- Protect designated and existing aquatic life uses by removing all human-caused impacts and pollution to the water of interest.

First, there is little in the way of data and modeling "requirements" in this chapter. Mostly there are lists and vague statements. Second, this subsection, while paying lip service to the idea that the resulting criteria must protect designated and existing aquatic life uses, does not state how this will occur.

- Northwest Environmental Advocates

Response to 2.4.T

The PBA outlines the process required to develop site-specific natural conditions criteria but does not detail project specific requirements because each project is unique. Additional requirements for model performance will be found in the required project QAPP when we use the performance-based approach, as they are model- and project-specific.

Regarding aquatic life protection, when deriving protective water quality criteria values, generally two approaches can be taken by states and tribes:

(1) Use a biologically-based approach (e.g., Stephen et al., 1985[17]), where there is a process to derive protective aquatic life criteria using the results of laboratory studies. These laboratory studies investigate and determine the dissolved oxygen concentrations where impacts to lifestyle (e.g., reproduction, growth) or lethality occur to aquatic life; or

(2) Pursue a natural conditions approach, where historical data and models are used to estimate the quality of waters prior to any anthropogenic impacts. Pre-anthropogenic water quality would support the species that exist in those waters, as those species have adapted over time to those natural water qualities. Therefore, any such derived criteria are protective of existing and designated uses.

There is no guidance or recommendations from EPA that asserts one approach is better than or preferred over the other. Therefore, both are equally viable options for developing criteria protective of aquatic life. A site-specific approach may better reflect the needs of the species within a specific site compared to the broader area, as criteria reflect those aquatic organisms which have adapted over time to the unique conditions of that specific waterbody.

2.4.U Comment summary – Step 9: Determining natural conditions criteria values Criteria duration and frequency – page 20. This is a nice subsection in that it contains something specific, namely that the duration and frequency must match those for the biologically-based criteria.

[17] https://www.ezview.wa.gov/Portals/_1962/Documents/PSNSRP/Marine%20DO%20Paper%20Guidance%20Updated%20July%202018.pdf

- Northwest Environmental Advocates

Response to 2.4.U

We appreciate your comment and support.

2.4.V Comment summary – Step 10: Documentation and use – pages 20-21. The reference to documentation should ensure that treatment of natural conditions is not hidden away in appendixes.

- Northwest Environmental Advocates

Response to 2.4.V

We appreciate your suggestion.

2.4.W Comment summary – Step 6: some discussion is needed regarding the potential need to use modeling of sources, such as sediment or freshwater inputs, as inputs to the marine model. The marine model may need more than just data collected by field measurements or lab sampling. In fact, the concept of "input data" should be expanded to include modeling and other analyses used to develop model inputs.

- Paul Pickett

Response to 2.4.W

We note that Step 2's subsection on data gaps discusses the requirements for additional data needs for estimating natural conditions.

2.4.X Comment summary – Step 8: a. "All human-caused impacts must be accounted for and removed using all existing, readily available, and credible information to develop the natural conditions scenarios."

This statement somewhat contradicts the following statement "by removing all anthropogenic sources from the model simulation for those sources where it is feasible and practicable to model, and then estimating and removing the remaining anthropogenic sources where it is not feasible or practicable to model where existing and credible data are readily available". Some discussion should be included about the need to fully document the potential human impacts, the methods of addressing impacts, and any impacts that are infeasible to address, such as due to project scope.

- Paul Pickett

Response to 2.4.X

To clarify, all anthropogenic impacts must be accounted for and removed using all existing, readily available, and credible data (Step 2). When possible, this is done in the modeling process when estimating natural conditions. However, we recognize that certain sources of human impacts are not feasible or practicable to incorporate into the model for natural

condition estimations. Thus, where there are impacts to dissolved oxygen and we have sufficient, existing, readily available, and credible information, these impacts would be accounted for and removed following the outputs of the model run. This process will be documented each time we use the performance-based approach. We have edited Step 8, including the sub-section "Developing a scenario without human-caused impacts and pollution", to better explain this process.

2.4.Y Comment summary – It is unclear if natural conditions can truly be measured with the data available to the Department of Ecology. It is unlikely that any western science dataset existing goes far enough back to take into account conditions in the region before the era of colonialism, in which case the term "natural conditions" is misleading.

- Snoqualmie Indian Tribe

Response to 2.4.Y

We concur that calculating natural conditions is a difficult task and that current scientific tools will provide a quantitative estimate which cannot be directly measured as it occurred in past centuries. We note that the reason for pursuing a mechanistic model-based approach for estimating natural conditions is to account for the fact that there may not be credible or even existing empirical water quality data prior to anthropogenic impact. That said, this process is conducted to best estimate the natural conditions of a water body through mechanistic modeling and because we are removing all known sources of human impact, is consistent both with our definition of natural conditions in Washington's Water Quality Standards (WAC 173-201A-020) and consistent with EPA's national policy on natural conditions. In addition to a quantitative analysis, it may be possible to supplement this work with qualitative information to help produce a fuller picture with additional evidence, if available.

2.4.Z Comment summary – We concur with adding Step 10, documentation, and the subsequent clarification that Ecology may need to loop back to earlier steps.

- Washington Conservation Action

Response to 2.4.Z

We appreciate your comment.

2.4.AA Comment summary – Under Step 8, we agree with the detail that describes how Ecology will develop a scenario without human-caused impacts. We expect comment letters from organizations and individuals who want to slow down Ecology's regulation of sewage to exploit this section and attempt to force Ecology to outline today the details encompassing all human-caused changes. This is impractical, and a more beneficial approach is to outline the process that Ecology will use. The draft document clarifies that this performance-based

approach will not be used for waters where human structural changes cannot be effectively remedied.

- Washington Conservation Action

Response to 2.4.AA

We appreciate your comment.

2.4.BB Comment summary – On page 18, Ecology outlines Required Elements to include invasive species and submerged aquatic vegetation. We anticipate that while there may be some species and vegetation that influence marine dissolved oxygen in some places and at some times, these may not be needed for every marine dissolved oxygen analysis. The sentence above the bulleted list appears to include both submerged aquatic vegetation and also invasive species as required to include in models and then remove for natural conditions. Ecology should consider deleting the two bullets and instead combine as one final bullet along the lines of "Submerged aquatic vegetation and/or invasive species, if these are critical to marine dissolved oxygen patterns in the areas of interest."

- Washington Conservation Action

Response to 2.4.BB

We note that this list of required elements must be considered, but such elements might not exist for a specific project or site and therefore may not be included in the final estimation of natural conditions. For instance, there may be no data on invasive species' impacts to water body DO, or studies might show there is no impact from such species. This will be determined on a project-specific basis. In addition, as submerged aquatic vegetation and invasive species are considered separately and one may be present while the other absent, we have kept them as separate bullets.

2.4.CC Comment summary – Step 9 describes aggregating model output data for natural conditions based on Step 8 work. However, Ecology should reiterate that model output for natural conditions should not be aggregated spatially or temporally in a way that masks high or low human impacts when compared with other model scenarios. The goal would be to fairly compare natural conditions with current conditions to characterize existing human impacts. The first line of page 20 has a typographical error in "Horiziontal."

- Washington Conservation Action

Response to 2.4.CC

We appreciate your suggested revisions. We have corrected the typo identified. We have edited and simplified Step 9 regarding the aggregation process, focusing on providing the exact steps we will take to determine natural conditions criteria values for marine DO. Specifically, horizontal aggregations must reflect CWA Section 303(d) assessment units for Washington, no vertical aggregation of model layers is allowed, and temporal aggregation

is daily minimum dissolved oxygen, which matches the duration component of the marine DO criteria at WAC 173-201A-210(1)(d).

2.4.DD Comment summary – The PBA describes that "freshwater hydrology as it was reflected in a hindcast year modeled may be used". This is a cause for concern that resulting criteria values could be based on non-representative data. We ask that, as part of the PBA methodology, Ecology demonstrates that freshwater hydrology and meteorology are representative with respect to a minimum of 10 years of data in the tributaries being considered, or reasonably similar tributaries.

- Washington Forest Protection Association

Response to 2.4.DD

We want to reiterate that we are committed to providing the opportunity for public comment when we use the performance-based approach methodology, and we would welcome comments asking about data representativeness on a project-specific basis.

2.5. Other Comments on the PBA Document

2.5.A Comment summary – The Proposed Performance-Based Approach Lacks Necessary Detail to Ensure Predictable, Repeatable Outcomes.

Tacoma echoes the concerns EPA voiced in its comments on the previous iteration of the Performance-Based Approach; many of these concerns are still apparent in the currently proposed draft. There are numerous steps and important details missing from the proposed Performance-Based Approach; as written, most sections lack necessary explanation of certain methods and procedures to implement the approach. Without such detail, the Performance-Based Approach lacks suitable safeguards to ensure predictable, repeatable outcomes.

First, the Performance-Based Approach includes a step to "Define site boundaries and model domain" but does not include sufficient detail on the parameters of such. The Performance-Based Approach currently contains no bounds on calibration or certainty that the model performance will be adequate for the purpose of establishing current conditions and natural conditions

Additionally, the Performance-Based Approach does not include a step to create a conceptual model specific to model application. Further, the Performance-Based Approach fails to include necessary additional information on selection of a mechanistic model.

The Performance-Based Approach includes some criteria for model selection, but not nearly the amount of detail requested by EPA. There is also insufficient detail in the Performance-Based Approach section on site characterization data, which currently lacks the requirement to evaluate legacy effects resulting from past silviculture, agriculture, mining, and development.

Another concern shared between EPA and Tacoma is that the required elements section of the Performance-Based Approach includes a list of elements that need to be evaluated by the model but does not include the methods to do those evaluations or how they will be accounted for when modeling the natural conditions.

The Performance-Based Approach as it is drafted does not address the myriad of EPA concerns, which are shared by the City, and thus is not sufficient to produce predictable, repeatable outcomes. Ecology must address these concerns before moving forward with the approach.

- City of Tacoma

Response to 2.5.A

We believe that this performance-based approach strikes the necessary balance between a process that is transparent, predictable, repeatable, and scientifically defensible while recognizing that use of this approach may differ in each use due to factors such as available data or model selected.

As part of our public process, we hosted a public hearing[18] for this second draft of the performance-based approach on May 15, 2025. We noted during that hearing that we

[18] https://fortress.wa.gov/ecy/ezshare/wq/standards/2025_05_NCC_PBA_Public_Webinar.pdf

regularly coordinated with EPA since the adoption of the natural conditions rulemaking in 2024, and EPA has clarified to us their July 2024 public comments. We note that this second public draft is one that EPA supports and recognizes as a "binding, clear, predictable, and transparent" process.[19]

2.5.B Comment summary – The reference to WAC 173-201A-260(1)(a)(i) seems circular. This section identifies the two alternatives, performance based and site specific. Reference 173-201A-430 instead.

- King County

Response to 2.5.B

We have clarified in our introductory sections the references to -260(1)(a)(i) and -430.

2.5.C Comment summary – The second sentence in the Overview omits "scientifically defensible. Add "scientifically defensible" to the second sentence or rewrite paragraphs since the second sentence mostly repeats all of the first to connect those methods to EPA approval as a approval which seems circular.

- King County

Response to 2.5.C

We appreciate your suggested edit. We kept the language mostly as-is, as this language is adapted from EPA's 2015 framework document on natural conditions.[20]

To provide context for this updated paragraph, the first sentence defines a performance-based approach. The second sentence states that the approach must be submitted to EPA for review and action pursuant to CWA Section 303(c). The third sentence says that if EPA determines that the state-submitted PBA approach meets these requirements, then their approval of the approach also serves as an approval of the outputs when using the approach (i.e., criteria value determination).

2.5.D Comment summary – Introduction and purpose – page 6. The title of this Draft Guidance and the description in this section allude to a number of fresh and marine water parameters to which the rule and Guidance might apply, despite that the Guidance contains only one chapter, for marine dissolved oxygen. To ensure complete clarity, the Guidance should be properly titled as pertaining to only marine dissolved oxygen, and the material in the introduction pertaining to all other water and parameter types should be stricken. This material should be replaced

[19] Shaw, Hanh. 2025. Public comment letter from USEPA Region 10 to Department of Ecology. Seattle, Washington. 22-May-2025. Available at: https://scs-public.s3-us-gov-west-1.amazonaws.com/env_production/oid100/did200008/pid_210822/assets/merged/s60nilfcga9_document.pdf?v=28884.

[20] Environmental Protection Agency. 2015. A Framework for Defining and Documenting Natural Conditions for Development of Site-Specific Natural Background Aquatic Life Criteria for Temperature, Dissolved Oxygen, and pH: Interim Document. Office of Water, Washington, D.C. EPA 820-R-15-001.

with a clear statement that the Ecology finalization and EPA approval of this document, following EPA consultation pursuant to the ESA, will render only WAC 173-201A-470(e) valid for CWA purposes and that the other provisions of the rule will remain null and void. Moreover, it is not clear why WAC 173-201A-430(4) makes explicit that "[s]ite-specific criteria are not in effect until they have been incorporated into this chapter and approved by the USEPA," whereas WAC 173-201A-470 makes no reference whatsoever to EPA approval even where, as here, Ecology intends to handle portions of the necessary Guidance in a piecemeal fashion. It's inconsistent, illogical, and unclear.

- Northwest Environmental Advocates

Response to 2.5.D

This guidance document was developed and structured to allow for future chapters for additional parameters listed under WAC 173-201A-470(2) (e.g., freshwater temperature). We have communicated the structure of the PBA through public forums and have indicated that future chapters may be developed in the future. If chapters are not included in the PBA, then it is assumed that a process for a given parameter has not been developed.

Further, we note that derivation of new criteria values using an EPA-approved performance-based approach does not require additional rulemaking or approval by EPA. EPA states in their framework for developing natural conditions that "[w]hen such a performance-based approach is sufficiently detailed and has suitable safeguards to ensure predictable, repeatable outcomes, EPA approval of such an approach serves as approval of the outcomes as well."[21] This is different from site-specific criteria developed following the process listed in -430, which *does* require rulemaking consistent with state and federal requirements, including EPA review and approval, before use in CWA actions.

2.5.E Comment summary – Regulatory information – page 7. Bizarrely, Ecology explains the role of the EPA approval of criteria and makes zero reference to the concept of "performance-based standards." Why would Ecology not explain that such standards would not undergo the EPA approval process described in the Draft Guidance? Why would Ecology not describe the EPA's rationale for by-passing the requirements of the federal regulations that are set out in the preamble of the "Alaska rule"? 65 Fed. Reg. 24641, 24648 (April 27, 2000). This is utterly mystifying and unhelpful.

- Northwest Environmental Advocates

Response to 2.5.E

We note that derivation of new criteria values using an EPA-approved performance-based approach does not require additional rulemaking or EPA approval. EPA states in their

[21] Environmental Protection Agency. 2015. A Framework for Defining and Documenting Natural Conditions for Development of Site-Specific Natural Background Aquatic Life Criteria for Temperature, Dissolved Oxygen, and pH: Interim Document. Office of Water, Washington, D.C. EPA 820-R-15-001.

framework for developing natural conditions that "[w]hen such a performance-based approach is sufficiently detailed and has suitable safeguards to ensure predictable, repeatable outcomes, EPA approval of such an approach serves as approval of the outcomes as well."[22] However, the performance-based approach methods document *is* a water quality standard, and therefore must receive EPA review and approval before we use the approach for our CWA actions.

We have added additional information in the introductory sections that more clearly defines the applicability of this document and the requirement that a performance-based approach, and any updates to the performance-based approach, must be submitted to EPA for review and action pursuant to CWA Section 303(c).

2.5.F Comment summary – Overview – page 8. Having failed to explain the regulatory method by which EPA and states can skirt the criteria and standards adoption process described on the previous page of its Guidance, Ecology merely asserts that they can do so. This is certainly unhelpful to any reader not already familiar with the concept of a "performance-based approach." In fact, the reader would be hard pressed to understand such contradictory information. Ecology then goes on to say that Aquatic life water quality criteria values developed using the performance-based approach are applicable to the waterbody upon derivation, so long as all requirements set forth in this document are met. Draft Guidance at 8. This statement lacks clarity. What does "upon derivation" mean? Who determines that "all requirements set forth in this document are met"? How is all this announced?

- Northwest Environmental Advocates

Response to 2.5.F

EPA states in their framework for developing natural conditions that "[w]hen such a performance-based approach is sufficiently detailed and has suitable safeguards to ensure predictable, repeatable outcomes, EPA approval of such an approach serves as approval of the outcomes as well."[23] This statement was included in the *Overview* section of the performance-based approach methods document.

We have clarified during the 2024 rulemaking and in this 2025 second draft of the performance-based approach that we are committed to providing the public an opportunity to review our use of the performance-based approach for each project, and we will provide this information publicly.

For example, we may choose to develop natural conditions criteria following the performance-based approach to set criteria for a site during the process of creating a

[22] Environmental Protection Agency. 2015. A Framework for Defining and Documenting Natural Conditions for Development of Site-Specific Natural Background Aquatic Life Criteria for Temperature, Dissolved Oxygen, and pH: Interim Document. Office of Water, Washington, D.C. EPA 820-R-15-001.
[23] Environmental Protection Agency. 2015. A Framework for Defining and Documenting Natural Conditions for Development of Site-Specific Natural Background Aquatic Life Criteria for Temperature, Dissolved Oxygen, and pH: Interim Document. Office of Water, Washington, D.C. EPA 820-R-15-001.

TMDL. When we go out to the public with our draft TMDL for comment and feedback, all the required performance-based approach documentation and criteria values would be included alongside the customary TMDL documentation, and we would accept comment and feedback on the use of the performance-based approach at that time.

2.5.G Comment summary – Applicability – page 8. Here Ecology observes that the development of so-called natural conditions aquatic life criteria for "other water quality parameters . . . must follow all state and federal rulemaking regulations prior to becoming effective for state and federal CWA actions." Draft Guidance at 8. This implies that the derivation of criteria using the performance-based approach does not need to meet "all state and federal rulemaking regulations prior to becoming effective for state and federal CWA actions." It would be useful for Ecology to enumerate which specific regulations do not apply to such performance-based criteria.

- Northwest Environmental Advocates

Response to 2.5.G

We disagree that this statement asserts derivation of criteria within the performance-based approach process does not need to meet applicable regulations. The PBA is an EPA approved process that is vetted for compliance with state and federal regulations. Rather, if natural conditions criteria are developed for parameters not listed in -470(2), then we must follow all applicable state and federal regulations to incorporate those natural conditions criteria into our water quality standards, including but not limited to a public review period and EPA approval before implementation in CWA programs.

2.5.H Comment summary – Introduction – page 9. The bald statement that "[w]ater quality models determine the water quality dynamics for marine DO observed at the site of interest under current and natural conditions" is untrue. Water quality models do their best to attempt to identify any parameter or pollutant under natural conditions but, by definition, they cannot entirely succeed in this task because they are models constrained by limited inputs and unable to model the effect of every human impact. Ecology misleads the reader by asserting that the results are "natural" and that anything is "determine[d]," as opposed to estimated. The remainder of the Draft Guidance describes a ten-step procedure. Ecology fails to explain how this vaguely-defined procedure differs from the one it has used for decades to derive NCC-based purportedly natural superseding criteria in TMDLs, with the possible exception of the comment in the text that "the criteria values must be accessible to the public." Draft Guidance at 9. Please do.

- Northwest Environmental Advocates

Response to 2.5.H

We note that Ecology has decades of experience in deriving natural conditions criteria, and as such, there is overlap between what Ecology historically has done under previously-approved water quality standards and what we have outlined in the 2025 second draft performance-based approach methodology and the natural conditions rulemaking adopted

in 2024. We support our previous determinations of natural conditions and continue to rely on those same principles in the PBA process. The PBA document now offers a structured framework that is available for interested parties to review and understand the nuances that are involved in a natural conditions determination and derivation. Differences between waterbodies in the state make it difficult to provide details that encapsulate unique water body qualities and datasets.

2.5.I Comment summary –There is no Step 11: to determine that the purported natural condition protects the existing and designated beneficial uses. There is very little reference to protecting uses in this guidance and what is there merely assumes that the removal of all human impacts will result in protective criteria. The guidance does not provide that protection. Therefore, there must also be a step in which the results are tested against the hypothesis that natural conditions are acceptable.

- Northwest Environmental Advocates

Response to 2.5.I

We disagree that a Step 11 as described is needed, as natural conditions by definition reflect water quality that exists naturally pre-anthropogenic impact, and therefore would support and protect the species that have existed in those waters.

Regarding aquatic life protection, when deriving protective water quality criteria values, generally two approaches can be taken by states and tribes:

(1) Use a biologically-based approach (e.g., Stephen et al., 1985[24]), where there is a process to derive protective aquatic life criteria using the results of laboratory studies. These laboratory studies investigate and determine the dissolved oxygen concentrations where impacts to lifestyle (e.g., reproduction, growth) or lethality occur to aquatic life; or

(2) Pursue a natural conditions approach, where historical data and models are used to estimate the quality of waters prior to any anthropogenic impacts. Pre-anthropogenic water quality would support the species that exist in those waters, as those species have adapted over time to those natural water qualities. Therefore, any such derived criteria are protective of existing and designated uses.

There is no guidance or recommendations from EPA that asserts one approach is better than or preferred over the other. Therefore, both are equally viable options for developing criteria protective of aquatic life. A site-specific approach may better reflect the needs of the species within a specific site compared to the broader area, as criteria reflect those aquatic organisms which have adapted over time to the unique conditions of that specific waterbody.

[24] https://www.ezview.wa.gov/Portals/_1962/Documents/PSNSRP/Marine%20DO%20Paper%20Guidance%20Updated%20July%202018.pdf

2.5.J Comment summary – Not only has Ecology not tried hard enough to elucidate a procedure that would produce transparent, predictable, repeatable, and therefore scientifically defensible results for dissolved oxygen in marine water, but it proposes that it will use a similar procedure to address other parameters in fresh water. We strongly recommend that Ecology cease its effort to adopt performance-based criteria rules for either marine or fresh water parameters until such time as it is prepared to do much more than write lists of items that might be used in the derivation of such criteria.

- Northwest Environmental Advocates

Response to 2.5.J

When we develop natural conditions criteria, applicable elements listed in the PBA process will be described and elaborated on to provide a robust analysis of whether natural conditions determination is appropriate. This PBA process provides the framework for completing a project- or site-specific analysis. The PBA process should not and cannot be so prescriptive that it precludes its application simply because waterbodies have unique qualities or datasets.

2.5.K Comment summary – Finally, and significantly, we observe that Ecology has disregarded much of the EPA's comments on the rule and draft guidance dated July 26, 2024, demonstrating that it would likely not be fruitful for us to provide a more detailed analysis of what we find missing or incorrect in this Draft Guidance.

- Northwest Environmental Advocates

Response to 2.5.K

As part of our public process, we hosted a public hearing[25] for this second draft of the performance-based approach on May 15, 2025. We noted during that hearing that we have coordinated with EPA regularly since our 2024 natural conditions rulemaking and have received clarification on EPA's July 2024 public comments. We note that this second public draft is one that EPA supports and recognizes as a "binding, clear, predictable, and transparent" process.[26]

2.5.L Comment summary – In its 2021 reconsideration letter, EPA outlined that "[a] performance-based approach is a binding methodology that provides a transparent, predictable, repeatable, and scientifically defensible procedure to derive numeric criteria or to translate a narrative criterion into quantifiable measures that are protective of designated uses… (Apr. 27, 2000)."

[25] https://fortress.wa.gov/ecy/ezshare/wq/standards/2025_05_NCC_PBA_Public_Webinar.pdf
[26] Shaw, Hanh. 2025. Public comment letter from USEPA Region 10 to Department of Ecology. Seattle, Washington. 22-May-2025. Available at: https://scs-public.s3-us-gov-west-1.amazonaws.com/env_production/oid100/did200008/pid_210822/assets/merged/s60nilfcga9_document.pdf?v=28884.

Ecology's proposed approach appears consistent with the methodology that EPA outlined, administratively efficient, and would be least disruptive to water quality management throughout the state. Further, the approach in *A Performance-Based Approach for Developing Site-Specific Natural Conditions Criteria for Aquatic Life in Washington (Second Draft)* (Ecology Publication No. 25-10-022) outlines a repeatable scientific method. Finally, the approach requires Quality Assurance Project Plans with data quality objectives and model calibration and evaluation approaches, plus established approaches for agency peer review, to ensure consistency of processes applied to different water bodies.

- Washington Conservation Action

Response to 2.5.L

We appreciate your comment and support.

2.5.M Comment Summary – Determining natural conditions requires modeling or statistical approaches because high quality, site-specific, representative data do not exist for historical conditions prior to human activities. These assessments must be tailored to individual water bodies and conditions and cannot be broadly extrapolated. As such, these assessments may need to occur when site-specific regulatory management decisions arise, such as NPDES permitting and TMDLs. We concur with the approach identified to establish natural conditions for marine dissolved oxygen. The 10-step approach outlined on page 9 of the revised draft document clarified language beyond that presented in the previous version (ECY Publication No. 24-10-017) yet maintained overall content and sequencing.

- Washington Conservation Action

Response to 2.5.M

We appreciate your comment and support.

2.5.N Comment Summary –

Ecology must determine natural conditions itself

Page 6 includes the phrase "When the performance-based approach is used by Ecology to establish natural condition aquatic life water quality criteria…" and we wanted to emphasize that only Ecology should be developing natural conditions, and that regulatory step cannot and should not be delegated to another entity. We note a typographical error on line 3 referring to "perrformance-based."

- Washington Conservation Action

Response to 2.5.N

We appreciate the typographical catch and have corrected this error. We confirm that this performance-based approach is a tool for Ecology and Ecology alone to use in its CWA actions, as Ecology is the state agency tasked with adopting water quality standards and criteria.

2.6. Implementation

2.6.A Comment Summary – The document describes the development of the "natural condition" DO concentrations within each Ecology assessment unit, but not how it is applied in a formal water quality assessment. Include the process by which the "natural condition" values will be applied in practice.

- King County

2.6.B Comment summary – Paragraph beginning with "The results of this aggregation..." this documentation does not address how the criteria developed will be used in an assessment. For example, how will model error or uncertainty be incorporated into a comparison of model runs? How will these comparisons be presented (spatial extent?, volume extent?, temporal extent?). Add a section to provide explicit guidance regarding how the natural condition criteria values will be used to assess exceedance of the human allowance standard.

- King County

Response to 2.6.A and 2.6.B

Ecology will update *Water Quality Program Policy 1-11 Chapter 1: Washington's Water Quality Assessment Listing Methodology to Meet Clean Water Act Requirements*[27] if and when EPA takes action on Ecology's adopted natural condition provisions from the 2024 rulemaking process. This document is used to describe how we assess water quality criteria and will outline how criteria values developed using the performance-based approach will be considered in the Water Quality Assessment.

We also want to clarify that the performance-based approach does not consider nor mention the human-use allowance standard in WAC 173-201A-210 for marine DO.

2.6.C Comment Summary – I noted earlier on the first draft that the procedure seems to be very complicated and I questioned whether the procedure ensures predictable and repeatable outcomes. How does Ecology know it does? A test of two different groups to run the process for an area to see if they got the same results would be useful.

- Lincoln Loehr

Response to 2.6.C

We recognize that this subject and process is complex. Based on the public comments and feedback during the natural conditions rulemaking in 2024 (when the performance-based approach was first released in draft form), comments from this second draft review of the performance-based approach, and work and communication between Ecology and EPA, Tribes, and other interested parties, we believe that the performance-based approach methods document outlines a repeatable and predictable process. Natural conditions work

[27] https://apps.ecology.wa.gov/publications/SummaryPages/1810035.html

is not a new endeavor for Ecology, and the performance-based approach methods document memorializes a process that Ecology has used multiple times historically.

2.6.D Comment Summary – I understand that the existing Salish Sea Model does not work for shallow areas and numeric criteria. I suggest that such areas would naturally be subject to large swings in DO within a 24-hour period and that the biota there are adapted to such swings. I think there should be no criteria for such areas, and the state's numeric criteria should not be applied there. I recognize that would probably require a rulemaking.

- Lincoln Loehr

Response to 2.6.D

The performance-based approach is a process for us to develop water quality criteria values using a model-based approach. If we are unable to use model results to develop natural conditions criteria for certain areas within the defined site (e.g., such as for shallow and/or intertidal areas), then the applicable criteria for those sites would still be the biologically-based water quality criteria in our water quality standards (WAC 173-201A-210). If we wanted to update those specific areas with site-specific criteria that reflected natural conditions but did not use the performance-based approach, it is correct that such a process would require formal rulemaking by the state.

2.6.E Comment Summary – The aggregation method described in the PBA would result in "criteria values for marine DO for each day within the temporal window of the model, each assessment unit, and each depth layer within each assessment unit". We ask that Ecology add additional details describing how the resulting criteria values would be compared to water quality data, especially if the available water quality data did not include depth, location, or date information.

- Washington Forest Protection Association

Response to 2.6.E

Ecology will update *Water Quality Program Policy 1-11 Chapter 1: Washington's Water Quality Assessment Listing Methodology to Meet Clean Water Act Requirements*[28] if and when EPA takes action on Ecology's adopted natural condition provisions from the 2024 rulemaking process. This document is used to describe how we assess water quality criteria, which would include how we would evaluate existing water quality data that is missing certain metadata, such as depth. Location and collection date are standard requirements for data reporting, and any data missing this information would not meet Ecology's credible data requirements.

[28] https://apps.ecology.wa.gov/publications/SummaryPages/1810035.html

3. Other Comments

3.1. Biologically-Based Marine Dissolved Oxygen Criteria

3.1.A Comment summary – Ecology's proposed method does not support a strong linkage between water quality investments and tangible ecological outcomes. By targeting limited departures from a theoretical natural condition, huge expenditures are likely to be driven by very small changes in dissolved oxygen that provide no meaningful shifts in living resources. We urge Ecology to consider fundamentally different approaches for managing dissolved oxygen, such as those applied to the Chesapeake Bay. Under that approach, USEPA and states refined both dissolved oxygen criteria and aquatic life uses of the Bay to reflect meaningful ecological zones, considering both controllable and non-controllable factors. The resulting dissolved oxygen targets reflect actual organism needs of those zones rather than a relative difference from an uncertain natural condition. This approach provided stakeholders with much more confidence that environmental investments were tied to ecological outcomes.

- City of Bellingham

3.1.B Comment summary – Ecology should consider new biologically based marine dissolved oxygen standards as an alternative or significant component of this rulemaking.

The current dissolved oxygen standards were adopted by a predecessor agency to Ecology. They are not biologically based and there is no record as to the basis for the development of the standards. While Ecology may deem the standards "protective," they are not based on sound science and certainly do not reflect the need to have standards that are consistent with the highly variable temporal and spatial conditions in Puget Sound.

- City of Everett

3.1.C Comment Summary – Ecology has failed to issue an alternatives analysis for its Performance-Based Approach. Importantly, by not issuing the required analysis, Ecology fails to consider one essential alternative: developing a biologically-based and site-specific marine DO criteria to replace the current DO criteria (WAC 173-201A-210) or a Puget Sound biologically-based and site-specific marine DO criteria. Ecology has ignored inputs from EPA, multiple municipalities, Tribes, and other parties urging the adoption of such a standard.

The current DO water quality standard is outdated (over 55 years old) and fails to consider the geography and hydrology of the Puget Sound. Puget Sound is comprised of multiple deep-water basins separated by shallow sills, and many basins terminate in shallow inlets; the current marine DO standards are neither reasonable nor realistic in many locations due to these physical factors. The state has identified waters not meeting the DO standard, but that determination does not confirm the waters are truly impaired. Currently, marine waters with 5 mg/L DO in many deep-water basins are considered non-compliant, when in fact this oxygen level poses no threat to affected organisms. A DO concentration of 5 mg/L is identified as protective for most uses, included fish migration, rearing, and spawning; however, the proposed rule may trigger natural conditions criteria if a sector of water is below even 6 or 7 mg/L. One cannot justifiably assert there is impairment when DO is less than 6 or 7 mg/L but still meets the 5 mg/L level.

- City of Tacoma

3.1.D Comment summary – Most importantly, we urge Ecology to include in the dissolved oxygen criteria the full range of natural variability of habitat and species in Puget Sound, as was done in Chesapeake Bay. Ecologists increasingly recognize that habitats are not static or homogeneous. Rather, they are usually dynamic patch mosaics that vary across space and time, and habitat variability can be as important as their average or mean condition. Incorporating natural variability would significantly improve the approach to the water quality standards and better ensure that subsequent regulatory requirements and management actions will yield better environmental outcomes.

- King County Department of Natural Resources and Parks

3.1.E Comment summary – I note that the state's existing numeric marine DO criteria lack any identifiable scientific basis that was presented and defended at any time in the 58 years since the criteria were adopted. Ecology did prepare a marine DO paper in May of 2018 and presented it to the Nutrient Forum on May 30, 2018. That paper had asserted a false basis for the numeric values and was subsequently revised in August of 2018. The revision was called an update, and made no mention of what it was correcting. It was never presented to the Nutrient Forum or through any rulemaking process and it has several other highly misleading and/or false statements.

There might not be a need for natural condition criteria if we had criteria similar to the criteria for Chesapeake Bay.

- Lincoln Loehr

3.1.F Comment summary – We anticipate that some commenters will ask Ecology to forego the performance-based approach and to develop site-specific standards such as for the Chesapeake Bay. However, these would require years to decades to identify representative aquatic species, conduct controlled laboratory experiments to determine how much decreases in oxygen various species and life stages of species could endure without harm to their survival, decisions on what tests to use, experiments that target the antagonistic effects of dissolved oxygen concomitant with other parameters such as temperature, acidification, expert review, policy decisions on the levels to be used, federal Endangered Species Act Section 7 consultations, and litigation before moving ahead.

The state cannot wait years to decades to act on dissolved oxygen, particularly in a changing climate and facing extraordinary population increases with associated development. We support the balanced approach Ecology proposes in *A Performance-Based Approach for Developing Site-Specific Natural Conditions Criteria for Aquatic Life in Washington (Second Draft)* (Ecology Publication No. 25-10-022). The performance-based methodology is an expedient and repeatable approach to natural conditions determinations.

- Washington Conservation Action

Response to 3.1.A through 3.1.F

Ecology adopted biologically-based marine dissolved oxygen criteria into our state's water quality standards in 1967. While no definitive records were found that confirmed the origin of these standards, it is likely that the criteria were based upon a Department of Interior (DOI) federal report released in 1968, "Water Quality Criteria Report of the National Technical Advisory Committee to the Secretary of the Interior".[29] This document provides recommendations while noting that "these requirements are tentative and should be changed when additional data indicate that they are inadequate."

In 2018, Ecology published a document that describes the purpose and application of marine dissolved oxygen criteria.[30] In discussing the history and rationale of Washington's marine DO criteria, Ecology reviewed updated science regarding minimum DO requirements, which included a review article that looked at 872 published experiments across 206 species.[31] These studies generally align with the 1968 DOI recommendations of marine DO concentrations of 5 to 8 mg/L for the protection of fish. Therefore, our previous review of the criteria did not lead us to any new information that would suggest these criteria are not protective, or that they are "inadequate" for providing protection for aquatic life in our marine waters.

In addition, we note that there have not been any further recommendations from EPA on marine DO criteria applicable to Washington State, as criteria recommendations for marine DO have been limited to either the waters from Cape Cod to Cape Hatteras[32] or site-specific applications like Chesapeake Bay.[33] Should EPA publish updated CWA Section 304(a) recommended criteria for marine DO, we would be required under the CWA to consider these criteria for Washington.

Regarding aquatic life protection, when deriving protective water quality criteria values, generally two approaches can be taken by states and tribes:

(1) Use a biologically-based approach (e.g., Stephen et al., 1985), where there is a process to derive protective aquatic life criteria using the results of laboratory studies. These laboratory studies investigate and determine the dissolved oxygen concentrations where impacts to lifestyle (e.g., reproduction, growth) or lethality occur to aquatic life; or

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[29] Federal Water Pollution Control Administration (FWPCA). 1968. Water Quality Criteria Report of the National Technical Advisory Committee to the Secretary of the Interior. Washington, D.C. 800R68900.

[30] Washington Department of Ecology. 2018. Washington State's Marine Dissolved Oxygen Criteria: Application to Nutrients. Lacey, Washington.

[31] Vaquer-Sunyer, Raquel and Carlos M. Durate. 2008. Thresholds of hypoxia for marine biodiversity. Proceedings of the National Academy of Sciences. Volume 105(4):15452-15457.

[32] Environmental Protection Agency (EPA). 2000. Ambient Aquatic Life Water Quality Criteria for Dissolved Oxygen (Saltwater): Cape Cod to Cape Hatteras. Office of Water, Washington, D.C. EPA-822-R-00-012.

[33] EPA. 2003. Ambient Water Quality Criteria for Dissolved Oxygen, Water Clarity and Chlorophyll *a* for the Chesapeake Bay and Its Tidal Tributaries. Region III Chesapeake Bay Program Office, Annapolis, Maryland. EPA 903-R-03-002.

(2) Pursue a natural conditions approach, where historical data and models are used to estimate the quality of waters prior to any anthropogenic impacts. Pre-anthropogenic water quality would support the species that exist in those waters, as those species have adapted over time to those natural water qualities. Therefore, any such derived criteria are protective of existing and designated uses.

There is no guidance or recommendation from EPA that asserts one approach is better than or preferred over the other. Therefore, both are equally viable options for developing criteria protective of aquatic life. A site-specific approach may better reflect the needs of the species within a specific site compared to the broader area, as criteria reflect those aquatic organisms which have adapted over time to the unique conditions of that specific waterbody.

To protect aquatic life in Puget Sound, we have chosen to pursue site-specific criteria for marine dissolved oxygen to best protect aquatic life, existing uses, and designated uses. Specifically, Ecology has chosen to pursue a natural conditions approach for criteria development. Ecology believes that this approach best reflects the biological needs of the organisms in the waters while recognizing the unique, natural traits of Puget Sound.

Finally, we note that even if biologically-based marine DO criteria (i.e., derived via method (1) from above) were changed, site-specific natural conditions criteria may still need to be developed for Puget Sound, as waters naturally might still not be able to meet the biologically-based criteria.

3.2. Climate Change and Natural Conditions Criteria

3.2.A Comment summary – Climate change should be included in the human allowances

We concur that Ecology must factor in climate change into the human allowances and development of natural conditions. This means there is less capacity for impacts from current human activities, which will result in more stringent regulatory requirements.

- Washington Conservation Action

Response to 3.2.A

We want to clarify that human-use allowances are part of our water quality standards (WAC 173-201A) and were recently updated in 2024. The second draft of the performance-based approach methods document provides a binding methodology for Ecology to use when developing natural conditions criteria. The methods document does not reference or include human-use allowances in the performance-based approach methodology. Further, when estimating natural conditions (Step 8), all anthropogenic impacts must be accounted for and removed, which includes but is not limited to meteorological conditions (e.g., climate change). Natural conditions represent water quality present before any human-caused pollution, including climate change. This definition of natural conditions is consistent with Washington's Water Quality Standards (WAC 173-201A-020) and EPA's national policy on natural conditions.

3.2.B Comment summary – The performance-based approach (PBA) document needs to include more detail describing how Ecology will approach quantifying climate change within their models. This topic is complex and deserves its own section within the PBA. The method used to quantify climate change should be peer-reviewed by climate scientists.

- Washington Forest Protection Association

Response to 3.2.B

We note that quantifying climate change to estimate natural conditions will be done either by incorporating credible, relevant data in the modeling process itself or by removing those anthropogenic impacts outside and after the modeling process, as this process is project-dependent. We note that the performance-based approach methods document requires all existing, readily available, and credible data and information to be considered when modeling both current and natural conditions.

Finally, we are fully committed to holding a public review period whenever we use the performance-based approach to develop natural conditions criteria. For example, we may choose to develop natural conditions criteria following the performance-based approach to set criteria for a site during the process of creating a TMDL. When we go out to the public with our draft TMDL for comment and feedback, all the required performance-based approach documentation and criteria values would be included alongside the customary TMDL documentation, and we would accept comment and feedback on the use of the

performance-based approach at that time. That would include review of how we estimated and removed climatic impacts when deriving natural conditions criteria.

3.2.C Comment summary – Additionally, it isn't appropriate to remove climate change from models created to assess natural conditions. Regardless of historic conditions, climate change is an undeniable aspect of current water quality conditions. Establishing criteria values based on models which have removed the impact of climate change is unrealistic. It can lead to criteria that are unattainable. At a minimum, we ask Ecology to address climate change separately from other anthropogenic impacts such that members of the public can clearly see how it was accounted for and comment on this issue individually. Additionally, climate change should only be assessed in long-term models (i.e., 10-20 years or more). Ideally, Ecology will create a strategy for regulation in a world of changing climate and leave climate impacts out of the performance-based approach. As written, the performance-based approach could easily burden the agency and the regulated community with numerous future use attainability analyses.

- Washington Forest Protection Association

Response to 3.2.C

Washington's water quality standards define natural conditions as "surface water quality that was present before any human-caused pollution" (WAC 173-201A-020). This definition is consistent with EPA's current national policy on natural conditions and natural background. Therefore, we must account for and remove all sources of anthropogenic impacts when developing natural conditions criteria, which includes climate change.

In addition, the purpose of the federal Clean Water Act and implementing regulations is to provide protection and propagation of fish, shellfish, and wildlife as well as recreation (40 CFR 131.2). Washington's Water Pollution Control Act also states that it is public policy to maintain the highest possible standards to ensure the purity of all waters consistent with public health, public enjoyment, and protection and propagation of wildlife, birds, game, fish, and other aquatic life (RCW 90.48.010).

In other words, water quality criteria values must meet state and federal requirements by protecting designated and existing uses of the waters. Water quality criteria are *not* developed to what is attainable. State and federal programs and implementation tools can be used to evaluate whether water quality criteria are being attained (e.g., Water Quality Assessment), attain water quality if not currently meeting (e.g., TMDLs), and help reach water quality goals (e.g., variances, compliance schedules for permits).

3.3. Other Comments

3.3.A Comment summary – While not part of this comment period, we urge Ecology and sewage dischargers to collaborate with Tribes and environmental organizations and work with our federal and state elected officials to figure out how to pay for needed modernization.

- Washington Conservation Action

Response to 3.3.A

We appreciate your comment.