

# King County Department of Natural Resources and Parks



# King County

Department of Natural Resources and Parks

May 21, 2025

Marla Koberstein  
Department of Ecology  
Water Quality Program  
PO Box 47696  
Olympia, WA 98504-7696

RE: King County comments on the Performance-Based Approach for Developing Site-Specific Natural Conditions Criteria for Aquatic Life in Washington

Dear Ms. Koberstein:

Thank you for the opportunity to submit comments on the draft document: *A Performance-Based Approach for Developing Site-Specific Natural Conditions Criteria for Aquatic Life in Washington*. King County appreciates the Department of Ecology's considerable effort to develop the methods document for establishing site-specific natural conditions for marine dissolved oxygen. Attached are specific comments we offer to further improve the Performance Based Approach.

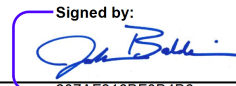
Most importantly, we urge Ecology to include in the dissolved oxygen criteria the full range of natural variability of habitat and species in Puget Sound, as was done in Chesapeake Bay. Ecologists increasingly recognize that habitats are not static or homogeneous. Rather, they are usually dynamic patch 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.

We appreciate your consideration of these comments and would welcome the opportunity to further discuss this important work. If you have questions or need more information, please contact Jacque Klug, Wastewater Treatment Division Nutrient Management Coordinator at [Jacque.Klug@kingcounty.gov](mailto:Jacque.Klug@kingcounty.gov) or (206) 477-4474.

Sincerely,

Signed by:  


Kamaron Gurrol, Division Director  
Wastewater Treatment Division  
Department of Natural Resources and Parks

Signed by:  


Josh Baldi, Division Director  
Water and Land Resources Division  
Department of Natural Resources and Parks

Attachment

Director's Office – Suite 6100 | Wastewater Division – Suite 6200 | Water and Land Division – Suite 6300  
Solid Waste Division – Suite 6400 | Parks Division – Suite 6500

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Page #	Comment	Recommended Action
General	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.
General	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.
General	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.
General	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.
6	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.
8	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.
10	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.
10	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".
11	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.
13	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
16	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.
16	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
16	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.
17	"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.

17	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.
18	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
18	It is unclear what is meant by 'how would the effects of meteorological conditions be changed to account for natural conditions,'	Clarify meaning and importance of this element
18	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
18	How can invasive species be accounted for?	Clarify meaning and importance of this element
18	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)..."
19	"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.
19	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.
20	...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.
20	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.
20	Criteria evaluation and application: The intent of this paragraph 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.