

Snohomish County

Dissolved Oxygen Criteria

1) Snohomish County is concerned about the credibility of studies used to support the dissolved oxygen depression values and the lack of specificity around instrument measurement, field, and analytical methods proposed for % saturation and intragravel dissolved oxygen (IGDO) which are influenced greatly by biotic and abiotic factors as described by Fellmen et.al., (2019).

The County encourages Ecology to document how studies referenced in the preliminary technical support document for dissolved oxygen depression values meet credible data requirements for rulemaking outlined by RCW 90.48.580-585.

Additionally, we do not recommend that IDGO be calculated using a spatial median. A spatial median provides a measurement for a point in time which underrepresents oxygen depletion and impacts to salmon redds. Given spatial and temporal variability of IDGO, the County suggests Ecology consider duration of exposure to dissolved oxygen below criteria as the most appropriate metric. Questions remain about the acceptable duration of exposure below criteria and whether depth and spatial extent of measurements should be factors to consider.

Given concerns described, we request that updates to Water Quality Policy 1-11 contains clear expectations and definitions for each dissolved oxygen measurement method to maintain consistency with requirements found in Chapter 2 of Water Quality Policy 1-11. This includes, but is not limited to:

- * allowable measurement methods consistent with Ecology, EPA, USGS, APHA, USACOE, ASTM or the Code of Federal Regulations,
- * location and size of habitat reaches where measurements for each method should and should not be collected,
- * specific timeframes for measurements relative to life stages of salmonid,
- * the number of measurements or duration and spatial extent of exposure necessary for each method,
- * statistical tests used to determine impairment,
- * methods for determining placement of an assessment unit within water quality assessment categories 1-5 both in and outside of TMDL areas and,
- * a description of how quality assessment listing decisions will be made where different measurement methods were used within the same unit but yielded both compliance and non-compliance.

Providing this information in a summary table within Water Quality Policy 1-11 is encouraged.

Fine Sediment

1) Snohomish County is concerned that Ecology is rushing rulemaking for fine sediment criteria. Ecology has indicated that EPA does not have criteria for fine sediment and that relationships between fine sediment and impacts to aquatic life are not well established or understood. Further, the County is concerned about the inherent subjectivity of visual assessments for fine sediment, the weight of evidence approach, and technical merit of use of relative bed stability (RBS) as a direct measure of fine sediment.

Ecology indicates that draft guidance for assessment of fine sediment found in Appendix A of the implementation plan is subject to change based upon further technical and public review during updates to Water Quality Policy 1-11. Updates to Water Quality Policy 1-11 are outside the rule-making process. Establishing criteria, which result in regulatory requirements, outside of rulemaking conflicts with the Administrative Procedures Act - Chapter 34.05 RCW.

Should rule be established under these conditions, it's likely that stream segments will be listed as impaired for fine sediment, using less than credible methods or data. Ecology is obligated to act on impaired waters through development of costly Total Maximum Daily Load ♦ Water Clean-Up Plans (TMDLs). Programmatic actions in TMDLs have been included as regulatory requirements in stormwater permits issued to municipalities state-wide, without reasonable assurance that actions will result in clean water.

The County recommends that Ecology take the time necessary to ensure criteria are established under rulemaking using credible methods that show clear relationships between fine sediment and impacts to aquatic life such that public resources spent on clean-up actions are protective of aquatic life.

2) Snohomish County is concerned about the temporal and spatial disconnect between fine sediment sampling and characterization of risk of impairment to the spawning and incubation IDGO environment.

The Implementation Plan recommends the 11-transect reach-wide approach. This approach includes a variety of habitat types, including those that are not used for spawning and egg incubation. The reasons Ecology adopted this approach is to reduce observer bias and changing location of riffles under various flow regimes during the sampling window.

Our concern with inclusion of other habitat (including pools) in this assessment is that estimates of D50, dominant substrate, and size distributions will not be reflective of the critical habitat type(s) used for egg incubation and rearing. Benthic collections from non-riffle habitat may indicate a lack of fine sediment index sensitive taxa and indicate fine sediment issues in a sampling reach. This may be true for the reach, but not for riffle habitat. The fine sediment sensitivity index was developed with a calibration data set from riffle habitat.

3) Snohomish County does not believe that Ecology has adequately demonstrated how sampling for fine sediment based upon the Watershed Health Monitoring (WHM) Program is relevant to spawning suitability or IDGO or that proposed methods allow for a credible assessment of anthropogenic factors.

Ecology emphasized that the fine sediment criteria is intended to protect all aquatic life and the criteria apply to all waters of the state, including but not limited to spawning and rearing habitat. In a response to Snohomish County they stated, that if early life stages of salmonids are protected, all aquatic species are protected. Ecology's recommendation that transect-based monitoring be used, which would include non-spawning habitats, (perhaps predominantly so), would lead to overestimating fine sediment content that is relevant to spawning habitat suitability. Moreover, since all useful guidance from the literature for salmon spawning habitat suitability is with reference to riffles and targeted spawning locations (not reach-wide), it's conceivable that if paired with IGDO sampling (of spawning habitats) that higher reach-scale fines would be correlated with higher site-specific IGDO. In reality, there would probably be little useful correlation between IGDO and fine sediments as IGDO in riffles would likely be more influenced by channel substrate size associated with geomorphological setting and channel size. We recommend Ecology demonstrate how sediment sampling based on the WHM program is relevant to spawning suitability or is related to IGDO and that there is a demonstrated potential for using the methods to assess anthropogenic factors.

4) Snohomish County is concerned about the inherent subjectivity in use of visual assessments and weight of evidence as method for use in determining compliance with fine sediment criteria. We agree that fine sediments are the attributable risk to invertebrate community health across large ranges of sediment conditions or among few land use types and that visual assessment can discern large differences (again between a few land use types), however the ability of visual assessments to discern small differences at sites with intermediate levels of fine sediment (compared to reference locations) or a fraction attributable to anthropogenic factors within the same land use type is doubtful, but would be useful for Ecology to substantiate.

5) Snohomish County is concerned that RBS is not a direct measurement of fine sediment, as the input to RBS is based on the entire particle size distribution and therefore will not produce information meaningful to the assessment of fine sediment. The quantitative RBS integrates channel dimensions, an estimated critical streambed diameter derived from the critical shear stress equation. Moreover, RBS can be adjusted due to other bed roughness factors like large woody debris, and therefore could be variable (high or low) based on factors other than fine sediment. See Kaufmann et al. 2008. Whereas RBS may correlate well with stream health, it does not provide an assessment of fine sediment content or quantity.

References:

Fellmen J.B, Hood E, Nagorski S, Hudson J, Pyare. 2019. Interactive physical and biotic factors control oxygen in salmon spawning streams in coastal Alaska. *Aquatic Sciences* 81(2):1-11.

Kaufmann, P.R, Faustini, J.M, Larsen, D.P, Shirazi, M.A., 2008. A roughness-corrected index of relative bed stability for regional stream surveys. *Geomorphology* 99 (1-4):150-170.