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TO: Susan Braley, Washington Department of Ecology

FROM: Ashley Coble, Ph. D., Senior Scientist
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SUBJECT: Comments on WA Department of Ecology's Salmon Spawning Habitat Protection Rule

NCASI appreciates the opportunity to comment on Washington Department of Ecology's (hereafter Ecology) proposed Salmon Spawning Habitat Protection Rule.

NCASI is an independent, non-profit research institute that focuses on environmental topics of interest to the forest products industry. NCASI conducts research and technical studies on behalf of forest products companies across the US, and its members represent over 80% of the pulp and paper production and two-thirds of wood panels produced nationwide. In its capacity as a research organization, NCASI has a long history of working to inform the science needed to address numerous environmental topics related to the forest products industry including effluent regulation, water quality management, and relationships between human and natural stressors on aquatic ecosystems. The following comments are provided to help ensure that important scientific aspects of Ecology's approach for protecting salmon spawning habitat in Washington State waterbodies and the proposed dissolved oxygen (DO) and fine sediment criteria are appropriately addressed and are transparent to a broad scientific and resource management community.

1. ***Inclusion of percent saturation in DO criteria language is important to account for temperature variation***

Ecology's review and discussion of Freshwater Intragravel Criteria Development (Brown and Hallock, 2009) concluded that a percent oxygen saturation criterion may be a more feasible measure of oxygen conditions to protect spawning gravels than raising instream oxygen concentration criteria. This is because percent saturation (DO% saturation) accounts for the effect of temperature and barometric pressure (elevation often used as a surrogate) on DO concentration. We concur that inclusion of percent saturation in DO criteria language is more reasonable than implementing concentration-only criteria given the wide range of environmental conditions that affect DO concentration.

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Importantly, the inclusion of DO% saturation as well as DO concentration allows for flexibility in DO conditions associated with changes in temperature or barometric pressure that may physically preclude attainment of DO concentration criteria. Brown and Hallock (2009) describe that DO% saturation may be a more direct approach to identify anthropogenic alterations on oxygen capturing activities that affect aeration rates, addition of nutrients, low-oxygen discharge, or substances with biochemical oxygen demand.

2. Achievability of proposed water column DO concentration criteria in Washington State reference streams

Although Ecology has provided background on the motivation for re-visiting existing DO criteria, there remains concern as to whether proposed DO criteria are achievable even in reference streams. Ecology's analysis indicates that 20.6% (13 of 63) of 'least impacted reference sites' would not meet either the proposed water column DO concentration or DO% saturation criteria (Table 6 in Preliminary Technical Support Document (TSD)). Importantly, Table 6 identifies the number of sites that do not meet 95% saturation, which is not the proposed saturation limit. No assessment of the number of reference sites that do not meet the 90% saturation criteria is presented in the TSD, but Brown and Hallock's 2009 analysis indicates 34% of ambient stations in Washington would not meet the proposed 90% criteria. It is also unknown whether these streams would meet intragravel DO criteria. The underlying data in Ecology's evaluations represent a single timepoint field measurement and is not representative of the actual minima of these sites, which suggests that more than 20% of their reference sites would fail to meet the proposed water column criteria if diel and seasonal variation were evaluated. Recent temporally-detailed DO concentration data available from 9 USGS stream gaging stations in Washington[1] show that, over the course of a year, all 9 sites would be listed as impaired based on the proposed DO concentration criteria (Figure 1; DO% saturation is not available). Most of these are large rivers ranging in size from 33 km^2 to 14,500 km^2 (drainage area information not available for all sites) likely reflecting a variety of land uses.

[1] https://waterwatch.usgs.gov/wqwatch/map?state=wa&pcode=00300

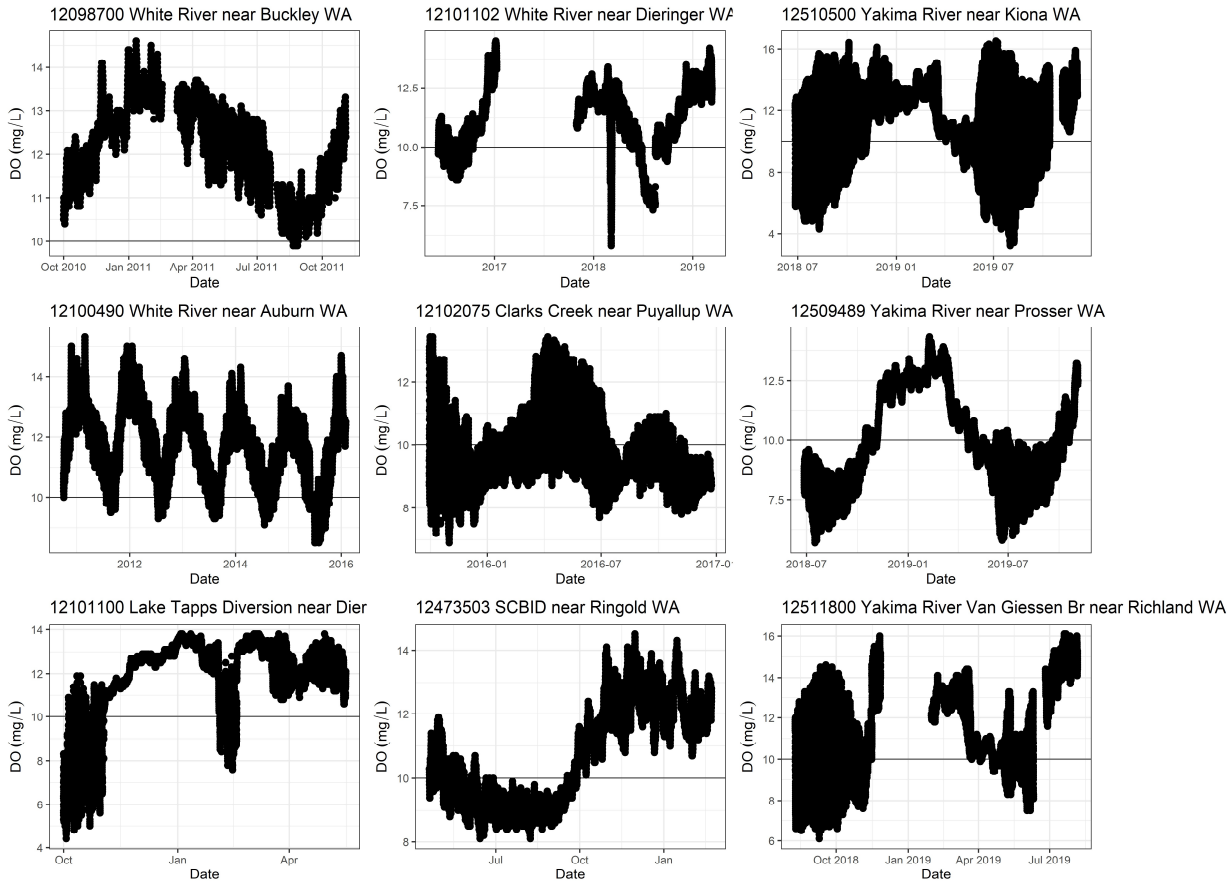

Figure 1. Temporal DO concentration (mg/L) from nine Washington State waterbodies described by USGS gage number and location.

3. Listing process for waterbodies that do not meet DO criteria is unclear

Ecology has indicated in their Preliminary Technical Support Document and Preliminary Rule Implementation Plan associated with the proposed Salmon Spawning Habitat Protection Rule that current waterbodies identified through the Water Quality Assessment process as impaired for DO may be a result of nutrients or temperature-related DO reductions. They follow that the oxygen saturation component will allow the focus of a TMDL to shift towards addressing temperature issues to resolve DO limitations, where needed, and that the addition of an oxygen saturation component to the DO criteria allows for a more accurate list of DO impairments for nutrients rather than temperature. Under the current Technical Support Document and Implementation Plan, it is unclear how waterbodies that fail to meet DO criteria will be listed, or how Ecology will determine whether failure to meet DO criteria is attributable to elevated temperatures or nutrients. Ecology should update these documents with this information to ensure full transparency to stakeholders.

4. Implementation guidance for fine sediment narrative criterion is not sufficiently developed

Ecology does not currently have rule language that specifically describes a protective fine sediment criterion, nor does it specify when fine sediment is impairing aquatic life. Because a quantitative relationship between fine sediment-based parameters and a biological effect could not be established based on the current scientific literature or from feedback from a Science Advisory Group, and in recognition that a single numeric value cannot adequately describe a dynamic waterbody and the geological processes related to fine sediment inputs, Ecology has proposed a narrative criterion for fine sediment. While we agree that it is inappropriate to establish numeric criteria in the absence of clear cause-effect relationships and indicator thresholds, the proposed narrative criteria are premature because Ecology has not sufficiently developed implementation details to determine waterbody attainment of proposed fine sediment criteria. The Science Advisory Group convened on this topic strongly recommended that Ecology present an analysis of whether their proposed metrics and thresholds, or weight of evidence threshold will identify sediment-impaired waterbodies. This has not been completed, and it is unclear whether the proposed implementation approach will accurately identify sediment-impaired waterbodies or whether these impairments translate to adverse effects on salmon spawning success. We urge Ecology to present these analyses to a Scientific Advisory Group so they may provide data-based insight into the appropriateness of rule language.

5. Ecology's protocols for sediment characterization may not adequately measure endpoints described by rule language

Ecology has emphasized their interest in using existing Ecology protocols for sediment characterization (as outlined in TSD). Maximizing the value of existing data is useful to support an understanding of site characteristics and waterbody-sediment relationships, but Ecology should adapt their methods to meet the objectives of their proposed rule. For example, for visual estimates of percent surface substrate (TSD page 30), Ecology's protocol measures substrate across the bankfull channel (i.e. the stream channel extending to the stage where a stream begins to overtop its banks and spread into the floodplain), and not the wetted channel as recommended by EPA (Bryce et al. 2010). In their own data analysis relating surface fines to macroinvertebrate indices, Ecology acknowledges that this approach is flawed, and notes the importance in following EPA recommendations to focus on the wetted channel. Ecology corrects this issue by simply adding 5.5% to their measurements of percent sand fines (Larson et al. 2019). However, if this measurement will be used as a required metric for determining attainment of fine sediment criteria (as currently outlined in the Implementation Plan), Ecology should follow the best available science (i.e., EPA guidelines, Bryce et al. 2010) and use only wetted channel metrics rather than applying a correction factor to accommodate historic monitoring methods. Ecology protocols for other proposed metrics should also be scrutinized to ensure that they adhere to current, best-available science.

6. Fine sediment criteria and proposed methods may be unsuitable for large rivers

Ecology's proposed fine sediment criteria and methods for evaluating fine sediment are inappropriate for large rivers, which are likely to be designated as salmonid spawning, rearing, and migration uses. The

methods proposed for fine sediment have been developed for small streams. For example, the Fine Sediment Biotic Index (FSBI) was developed with 1st to 5th order streams (Relyea et al. 2012). The exclusion of larger rivers in index development was likely because macroinvertebrate community composition varies with longitudinal river distance as predicted by the River Continuum Concept (Vannote et al 1980). Similarly, sites in large rivers are expected to have greater sediment loads than headwater and mid-reach river sites. It is unclear if the FSBI has been validated for large rivers, but Ecology recognized that macroinvertebrate and sediment metrics are distinct in large rivers because these were excluded from a statewide assessment of macroinvertebrates and environmental stressors (Larson et al. 2019). Larson et al.'s analyses included Ecology's 0, 1st, 2nd, 3rd, and 4th + order streams in their site selection process, except those on tribal and federal lands, but state, "We also excluded tidal streams, streams in constructed channels, and great rivers (i.e. the Columbia River and lower Snake River) since samples from these types of sites would likely have contained very different macroinvertebrate communities.". In addition to the FSBI, a proposed required metric for fine sediment assessment is a visual estimate of percent substrate. Such evaluations are typically conducted across transects in wadable streams, and more challenging in larger rivers due to water depth or turbidity limiting view of the substrate. Although Ecology has developed "wide" protocols for non-wadeable streams that involve measurements in the wadeable stream margins, these may not accurately reflect sediment characteristics at these sites. This is particularly true during the required sampling period (July 1-October 15) when flows and current velocity are lower, and deposition of water column sediment is likely to occur.

Because Ecology has not examined biological and environmental patterns with respect to size or stream order classifications, it is not clear whether there are also differences across spatial scales within Ecology's existing macroinvertebrate and sediment datasets. As such, the application of proposed criteria to all streams would appear premature in the absence of information from large, non-wadeable streams. Ecology should evaluate existing data in the context of stream size to ensure that proposed criteria and assessment approaches are appropriate for all waterbodies.

References

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