

Arbitration: Smart Buffer Design (FINAL: 25 August 2022)

Context and process

In 2020, the Washington Forest Protection Association (WFPA) submitted a proposal to Washington Forest Practices Board to be considered as a project to test methods to determine whether stream buffers can be allocated in a way to get better shading outcomes than by using a fixed-width buffer.

The proponents, Douglas Martin and Harry Bell, have sought to have their proposal and project for a Smart Buffer Design accepted as a CMER project, and thus far the project has not received the approval of the CMER Committee. There is general agreement that testing the concept of smart buffers to generate better shading of streams is worthwhile, and the design proposed has been reviewed by members of CMER. Members of the CMER Committee have exchanged comments on several versions of the proposal, and those caucuses in opposition have resisted approval. Disagreement on whether the proposal meets CMER standards has now led to an arbitrated decision.

Our panel met (via Zoom) with Chris Mendoza (Conservation Caucus), and Patrick Lizon and Stephanie Estrella (Ecology Caucus), and in a separate meeting (via Zoom) we met with the proponents Douglas Martin and Harry Bell. Both meetings were on 11 July 2022. We held a follow-up meeting (via Zoom) with the two proponents on 18 August 2022 for a discussion in response to our initial letter. The Conservation Caucus and Ecology Caucus did not request any follow-up to our initial letter. We finalized our letter following the second meeting with the proponents. Our summary and evaluation, below, are based upon the panel's reading of the documents provided and our discussions via Zoom.

Summary of the panel's understanding of the current situation

In addition to the interviews described above, we were provided with a "red line" proposal dated November 24, 2021, and a set of comments and process details from Washington State Department of Natural Resources. In this section, we summarize the information we reviewed. Statements provided below represent information provided to us in the interviews and documents, and do not necessarily represent our views, which are presented in the sections titled "evaluation" and "decision." The proponents had revised the proposal following earlier reviews by CMER. Nevertheless, members of the Conservation and Ecology Caucuses found the proposal to be lacking in relation to their expectation of CMER standards, and they judged responses from proponents were inadequate. We understand from the members of the two caucuses that acceptance by the CMER Committee would provide assurance to the Forest Practices Board, and results of the project would definitely be considered by Policy in relation to harvesting rules and future applications.

The Ecology and Conservation Caucuses raised numerous concerns, many of which relate to aspects of the proposal that were missing key elements and some statements that may not have been articulated as clearly as they should have been (see comments from the two caucuses). For

example, the stated objective of the study is "... to describe and evaluate effectiveness of a riparian SBD strategy for maintaining shade and minimizing changes in water temperature due to forest practices adjacent to Np streams in western Washington" (p. 2). However, the proponents emphasized during their meeting with the panel that the study is not a test of effectiveness in relation to forest practice rules. Another example is that the Ecology Caucus states that "buffer performance is expressed as the percentage effective shade per unit buffer area", which they say is not an appropriate metric. The two caucuses also note that the study sites were provided by industry partners that volunteered their operational areas. There was no attempt to randomize or otherwise control site selection.

The proponents have responded to many of the earlier review comments from the CMER Committee, and indicated that the proposal is still being revised. For example, they acknowledged that a proper literature review is required. In addition, the analytical framework and the specific statistical methods for analysis are still under development by a statistician with Weyerhaeuser.

There was some confusion about shade targets. In their response, the Conservation Caucus mentioned four times a target of 84%. However, the proponents indicated in our meeting that they did not mention specific targets in the proposal, and the panel could not find any mention of such a target in the red-line proposal that was provided to us. It is possible that this target was mentioned in an earlier draft that was not provided to our panel.

The project is already underway, and many of the sites being used are in their third year of the planned four-year project. The cutting plans for individual sites were approved through the Alternate Plan process. The cutting of the buffers has occurred as the project is in the third year of the planned four-year plan (2 years pre-cut, 2 years post-cut).

Both the proponents and the members of the Conservation and Ecology Caucuses acknowledged that CMER approval of the project is not required for the project to proceed, but would give the project greater certainty of having results regarded as meeting the expected standards of credibility that CMER approval implies. However, the proponents emphasized that this project is a test of a method, i.e. a pilot study, and they are not trying to evaluate some possible future rule that might be adopted. In particular, in relation to concerns about the possibility of harvesting to the streambank, they recognized that, in practice, streambanks would be protected for bank stability and habitat.

Evaluation

The proponents stated that their primary goal is to test the use of shade, in this case as predicted from LiDAR imagery, as a basis for designing buffers that meet the objective of providing at least as much shade as a standard treatment following DNR rules; i.e., the proposed study is a test of the method. The primary objective is to determine if buffers can be designed using shaded modelling to provide at least as much effective shade as current Np buffers. The proposal also includes an assessment of stream temperature response to the SBD treatments as a secondary objective.

In relation to the shade component of the study, shade targets represent an area of ambiguity in relation to forest practices, as Washington does not have shade targets codified in rule language, as is the case for stream temperature. While the proponents' Table 2 does include some target shade measures, these were based on the harvest approach selected by the landowners and not by an *a priori* study design protocol. As a test of methods, the focus on testing whether the concept can adequately provide the amount of shade intended requires some connection to targets related to a resource objective and/or a validation test of the method. For instance, the Department of Ecology recommended that this methods study include a full shaded treatment for comparison against control no-harvest sites to verify that the buffer evaluation approaches work as designed. Their SBD2 option in Table 2 comes close. The study design does not identify rationale(s) for the target amount of shade retention (or to justify the range of options for "buffer design target" sought [bottom P.16]), related to explicitly testing their methodology or for minimizing stream temperature increases.

The temperature aspect of the study may be successful in detecting temperature change at the bottom of the catchment, but the approach 1) does not necessarily quantify water temperature changes throughout the watershed, and 2) may not be easily relatable to shade due to the potential influence of other uncontrolled-for aspects of the study sites. The proponents argued that measuring in-stream temperatures is not an objective associated with determining whether the method works, and that their methods study is at least one or two steps away from being a test of the effectiveness for meeting WQ standards for Washington State. The proponents have reiterated that temperature changes are secondary to the determination of effective shade, but clearly it is an important response measure and does not seem entirely "secondary" in the proposal. We are thus confused about the particular role of a temperature analysis in the study design.

As a test of methods, one could consider how the choice of midday (10:00 to 14:00) on August 1st for the shade calculations might affect outcomes. The Department of Ecology notes that there are differences of opinion on whether this particular date or time of day is sufficient, and we agree that this assumption should be tested. For example, a number of studies of forestry impacts on streams reported significant post-harvesting stream warming that occurred in May, June, and other months. For instance, data from CMER's hard rock and soft rock studies have shown temperature exceedances in several months, even with buffers. A simple remedy would be to determine how the choice of date for the SBD modelling of shaded changes the area of trees needed to meet the desired effective shade objectives.

A fundamental challenge is that the study design suffers from having industry partners setting their own local targets and by framing the project as a set of unreplicated "case studies". CMER's Protocols and Standards Manual requires randomized site selection, and this is not evident in the SBD proposal. Indeed, treating each site as a case study removes the need for any controls in site selection or standardization to ensure that the sites represent samples from clearly defined strata or environmental gradients. Further, the assignment of a site to SBD treatment or reference status was not random, and the SBD sites and reference sites were not paired in any obvious way – e.g., based on catchment area, topography or surficial geology. As shown in Figure 1 of the proposal, some treatment sites appear to be up to around 30 km from the nearest

reference. This lack of pairing based on meaningful criteria and the physical separation between reference and treatment sites raises concerns for the temperature component of the study because the pre-harvest calibration relations may lack the precision required to detect temperature changes that may exceed regulatory thresholds. In addition, the lack of a priori pairing based on meaningful criteria and the separation between treatment and reference sites increases the risk that pre-harvest calibration relations may not be stationary, which is important because stationarity is a requirement for successful application of the paired-catchment analysis..

Some language has been included in the proposal to indicate that the analysis may also include development of an explanatory model for shade based on all sites (at times referred to as a predictive model in the proposal). However, given the uncontrolled and non-random nature of site selection, it is unclear whether results, including an explanatory model, could be extrapolated to a broader population of sites. We are also concerned by the large number of described covariates, the available degrees of freedom, and the lack of explanation for how the explanatory models will be structured to navigate this issue (aside from the use of a “case study” approach, as mentioned in the previous paragraph).

While the current proposal and study design have some challenges and limitations, the panel believes that the smart buffer concept warrants careful consideration and testing as a potential approach to riparian management, and that the current study should provide some useful information and experience that can guide further testing and elaboration of the concept. When the proponents prepare their report, we recommend that the proponents focus on clearer statements of the project’s purpose, goals, limitations, and assumptions. For instance, given that the sites were not selected randomly to represent a particular gradient or category, and given that reference sites are not necessarily well paired with treatment sites, the proponents will need to articulate clearly the limitations that those choices impose on the interpretation of potential outcomes. We further suggest it would be worthwhile to include a short section on the future direction of this concept and recommendations for further research to evaluate its effectiveness as a management tool.

Decision

It is our opinion that this project as described in the proposal contains too many uncertainties and that we cannot recommend it be accepted by CMER. This project eventually may produce valuable results, but we will not know until the project report is completed and passes peer assessment. We agree that the concept is worthwhile and the method to get better shading outcomes should be evaluated. However, we are concerned regarding the choices of sites used, which were selected in the absence of a rigorous study design and selection criteria. The statistical analyses are still being developed, and are only captured in the proposal in a general way, without consideration of many critical details of model development and fitting. While the proposal states that “effective shade” is one response to demonstrate that alternative cutting plans can provide more shade than current rules, there are other measures. For instance, there is a temperature component to the study, which occupies a substantial amount of text in the proposal, but the proponents consider this component to be secondary despite statements that the protocol is intended to provide sufficient shade to minimize stream temperature increases. There are a

large number of “covariates” at the stand (aspect, topography, slope stability, and others) and reach level (riparian condition, slash and wood providing shade, wetted reaches, etc.), and we are uncertain how these will be dealt with in an explanatory model to make results broadly applicable. We are also uncertain of how a threshold of two (or more) sites (out of 20) showing desired effective shade would be a sufficient demonstration that the model works. Assurances from the proponents aside, without a full and rigorous proposal, we cannot be confident in the outcomes of this work. It is our decision that this proposal does not meet the standards we expect of a such a project.

Respectfully,

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