Prospective Answers to the 6 Questions from the CMER / Policy Interaction Framework Document

August 3, 2023

Project Title: Riparian Characteristics and Shade Response
Study Design Title: Riparian Characteristics and Shade Response Experimental Research Study

1. Will the study inform a rule, numeric target, performance target, or resource objective (Yes/No)? If Yes, go to the next question. If No, provide a short explanation on the purpose of the study.)

Yes.

2. Will the study inform the Forest Practices Rules, the Forest Practices Board Manual guidelines, or Schedules L-1 or L-2?

The Riparian Characteristics and Shade Response (RCS) study will inform the Adaptive Management Program on the effects on shade of forest harvest and thinning in riparian buffers of varying widths (Appendix A). The RCS study is thematically relevant to several Forest Practices Rules that incorporate shade protection (WAC 222-30-040) for Type F and Np streams, such as Desired Future Condition (DFC) Options, Hardwood Conversion rules in WAC 222-30-021, and eastside riparian management zone (RMZ) leave tree requirements (WAC 222-30-022).

3. Will the study be carried out pursuant to CMER scientific protocols (i.e., study design, peer review)? (Provide short explanation. Be clear on use of ISPR.)

Yes. This design was developed by RSAG, and was reviewed and approved by CMER consistent with the Protocol and Standards Manual (2016), and was reviewed and approved by the University of Washington's Independent Scientific Peer Review (ISPR) process.

4. What will the study tell us? What will the study not tell us?

What the study will tell us:
This study will address key questions about how shade could be affected by using forest thinning as a riparian management tool.

Washington's forest practices regulations include riparian prescriptions that incorporate stream-adjacent no-harvest buffers of varying width. The rules include no-harvest buffers that can be used alone or in some cases applied in combination with adjacent buffers of varying width within which some amount of harvest (thinning) is allowed. Field research is particularly limited examining the combined effect of stream-adjacent no-harvest zone width and adjacent-stand harvest intensity (i.e., thinning density) on stream shade. (RCS Study Design)

The study is intended to isolate the relationship between immediate post-thinning stand characteristics (e.g., trees per acre, basal area per acre, crown area, and tree height) and stream

shade. While there is some research relating thinning regimens and shade, there is a lack of studies that evaluate combinations of no-cut riparian buffer widths with various widths and densities (including clearcut harvest) in the adjacent thinned area of the RMZ. To accomplish this, the RCS study will evaluate the magnitude and shape of the shade response curves to a range of buffer widths and thinning intensities across 20 sites throughout Washington.

More specifically, we will learn:
1. How stream shade responds to riparian thinning and clearcut treatments for different stream-adjacent no-thinning harvest buffer zone widths and adjacent-stand thinning harvest intensities.
2. How stream shade response to the treatments may vary among ecoregions where commercial timber harvest commonly occurs in Washington state.
3. How stream shade response to the treatments is related to immediate post-thinning harvest stand characteristics (e.g., trees per acre, basal area per acre, crown area, and tree height) and pre-treatment stand conditions.

The RCS study will reveal the main trends (shape, magnitude and direction of the shade response curves) associated with thinning treatments and buffer widths. In addition, the RCS study will reveal variation in the shade response to treatments within and across selected ecoregions.

There is currently uncertainty how the proposed treatments within the RCS study (clear cut, Curtis' relative density of 20, and Curtis' relative density of 40) compare to the thinning that is allowed under Forest Practices Rules (i.e., DFC option 1). However, we will collect data on residual stand conditions (tree counts, diameter at breast height (DBH), tree species, tree height) so that RCS study treatments can be compared to the two DFC Options. Taking the results of the RCS study (shade curves) into consideration, stakeholders and other end users can also infer potential effects of alternate harvest plans (e.g., Small Forest Landowner template proposal) or inform potential rule change consideration by the Forest Practices Board on shade. Applicability will depend on the outcome of the study. The study might also inform potential future DFC options, and if so, provide guidance to landowners who want to utilize these options.

What the study will not tell us:
This study does not test the Forest Practices Rules (numeric targets, performance targets, or resource objectives) as they are written, since thinning and buffer size treatments in the RCS study are different in magnitude and extent to what is allowed in the current Forest Practice Rules. This study will not tell us how shade changes over time, or develop causal links between shade and other riparian functions (e.g., stream temperature, tree growth, mortality, large wood recruitment) or riparian biological communities.

Furthermore, this study will not compare the suitability or accuracy of different methods used to quantify shade.

The main limitation is that the study design and analysis will provide predictive capabilities only for no-harvest zones of 25, 50, and 75 feet, and for thinning out to 100 feet with no-harvest zones of 25, 50, and 75 feet. The design will not provide information about thinning treatment levels for riparian buffers other than 100 feet wide, such as buffers with a 25-foot stream-adjacent no-harvest zone and an adjacent 25-foot wide thinning zone (total buffer width of 50 feet). The design also will not provide information for thinning treatment levels in the absence of a stream-adjacent no-harvest

zone. By nature of the study treatments, this study will not address any effects from harvest that would occur between 0 to 25 feet from the stream bank. Likewise, the RCS study will provide limited information on any effect from harvest occurring 100 feet or greater from the stream bank. This will limit the scope of study findings to only treatments within the 25 to 100-ft zones.

5. What is the relationship between this study and any others that may be planned, underway, or recently completed? Factors to consider in answering this question include, but are not limited to:

    a. **Feasibility of obtaining more information to better inform Policy about resource effects.**
    b. **Are other relevant studies planned, underway, or recently completed? (If yes, what are they?)**

The RCS study, through applying a gradient of treatments, isolates the relationship between riparian buffer widths, harvest regimes (clearcut, moderate, and heavy thin based on Curtis' relative densities of 20 and 40), and shade. The RCS study will complement the body of knowledge developed in other CMER studies which assessed shade under current forest practices rules:

- Type N Experimental Buffer Treatment Project in Hard Rock Lithologies (Hard Rock Project)
- Type N Experimental Buffer Treatment Project in Soft Rock Lithologies (Soft Rock Project)
- Westside Type N Buffer Characteristics, Integrity, and Function (BCIF) Project
- Eastside Type F Solar Radiation/Effective Shade Project
- Eastside Type N Riparian Effectiveness Project (ENREP)
- Westside Type F Riparian Prescription Monitoring Project

The RCS study will add to this body of knowledge by filling gaps in the shade curve for clearcut and thinning options outside the scope of the current rules.

The Eastside Type N Riparian Effectiveness Study is currently being implemented and will test different thinning prescriptions under current rules, including effects on shade. The Westside Type F Effectiveness Study is currently being planned and will also test the effects of harvest on shade.

6. What is the scientific basis that underlies the rule, numeric target, performance target, or resource objective that the study informs? How much of an incremental gain in understanding do the study results represent?

The current RMZ rules are "designed to maintain important ecological processes and provide levels of LWD, shade and other riparian functions adequate to meet conservation objectives" of the Forest Practices Habitat Conservation Plan (FPHCP Section 4d-1.1). All of the studies listed in Question 5 evaluated shade levels in Type F and N waters and in some cases validated the FPHCP assumptions underlying the RMZ rules to maintain shade at or very near those found in old-growth stands (multi-structured late successional forest habitat).

The RCS study will provide an important increase in understanding of how well an active riparian management strategy (i.e., thinning and buffer width/length) could affect shade. The RCS will be the first CMER study to address the Conservation Objective of the Riparian Strategy which is "to restore riparian function to high levels on lands covered by the FPHCP and to maintain those levels once they are attained" (FPHCP Section 4b).

References

Forest Practices Habitat Conservation Plan. 2005. Section 4b: Riparian Strategy and Section 4d-1.1: Riparian Management Zones: Providing Large Woody Debris and Shade. Washington Department of Natural Resources.

Appendix A – Plot Layout and Harvest Intensities
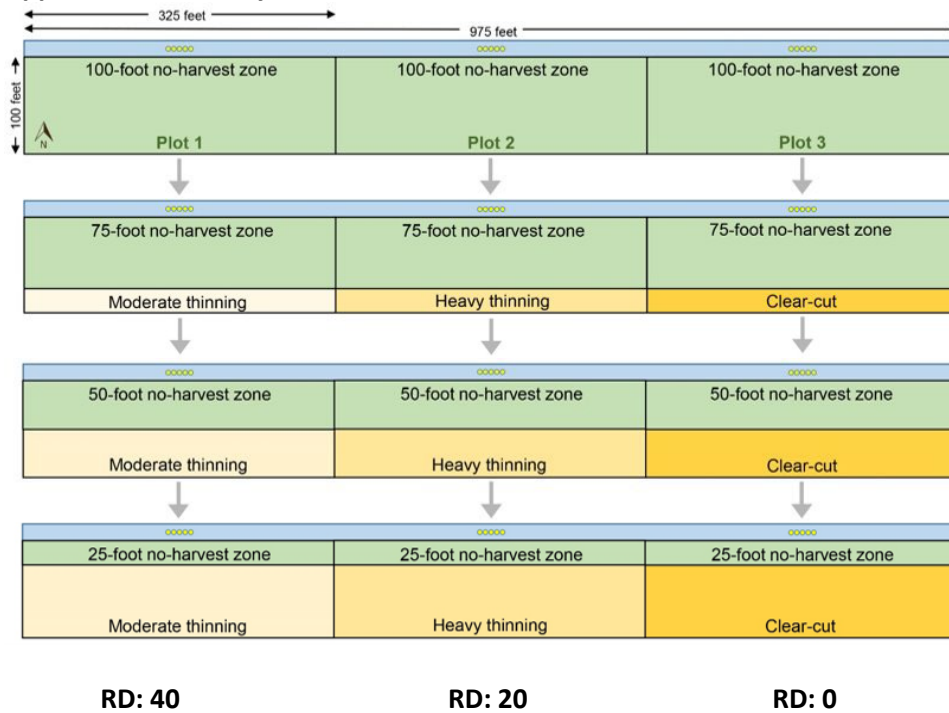
Figure 1. Treatments and shade measurements are implemented sequentially, as indicated by the arrows. The area upland from the treatments will be clearcut.