

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

**Project Title:** Eastside Type N Riparian Effectiveness Project (Lean Pilot)

**Study Design Title:** Eastside Type N Riparian Effectiveness Study Design

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

Yes. ENREP will determine if, and to what extent, the prescriptions found in the Type N Riparian Prescriptions Rule Group are effective in achieving performance targets and water quality standards, particularly as they apply to sediment and stream temperature in eastern Washington.

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

Yes. This exploratory study design was developed by a TWIG under the LEAN process, and the design was reviewed and approved by CMER consistent with the Protocol and Standards Manual (2016), and successfully went through Independent Scientific Peer Review (ISPR).

**4. What does the study tell us? What does the study not tell us? (This is where the study and its relationship to rules, guidance, targets, etc are to be described in detail. Consider technical findings; study limitations; and implications to rules, guidance, resource objectives, functional objectives, and performance targets; in addition to other information.)**

*What the study will tell us:*

As companion to the Type N Effectiveness “Hard Rock” and “Soft Rock” studies, this study will inform Policy of the quantitative changes in FPHCP covered resources, water quality and aquatic life coincident with forest harvest activities in eastern Washington.

To that end, the study specifically addresses the following critical questions:

1. What is the magnitude of change in water temperature, canopy closure, and stream cover of Type Np channels in the first two years after harvest?
2. What is the magnitude of change in stream flow and suspended sediment export from the Type Np basin in the first two years after harvest?
3. What is the relationship between aquatic life (and their supporting resources) and observed changes in hydrology, sediment, and temperature associated with forest management activity?

This study will use a hierarchical design that incorporates a blocked Multiple Before-After/Control-Impact (MBACI) design with reaches nested within basins to quantify the magnitude of change that occurs as a result of harvest activity. The MBACI design, which is replicated in space and time, controls for natural variability throughout the pre- and post-treatment periods and allows us to estimate the likelihood that observed effects are related to anthropogenic activity (Underwood, 1994; Downes et al. 2002).

***What the study will not tell us:***

The study will not directly address alternate prescriptions. It will test a 50' Type Np buffer consistent with current rule. One of the design goals of the 'dry' study was to evaluate the effect of buffering or not-buffering dry reaches. In all the sites where we have over 1000' of stream that is predominately dry for more than 2 months (e.g., Springdale, BlueGrouse, and their eastern Cascade analogs), we will be working with landowners to clearcut harvest a portion of the dry stream network. This was always a design goal for the 'dry' component of the study that was communicated to landowners of those sites, but not well articulated in the approved study design document. We recognize that there was interest by certain members to also see clearcut harvest in perennially wet reaches, and this was discussed as an option in the March 23, 2018 CMER meeting. Clearcut harvest along perennially wet reaches has not been discussed with the landowners, and the decision on where and how perennial reaches are treated will need to be resolved at a later date with the involvement of landowners and their harvest implementation teams to ensure that experimental treatments both meet their scientific and management objectives and are practically feasible. Insights into alternate prescriptions are expected to occur through meta-analyses that incorporate the results of this study and the larger body of research on forestry effects.

The study is designed with only two-years of pre-treatment monitoring and at least two-years of post-treatment monitoring. Two-years is not enough time to capture the full range of effects, especially those that are likely to be episodic. Although the degree of inference will be limited by the relatively short pre and post-treatment phases, this has been shown to be adequate for quantifying the initial changes associated with harvest (e.g., McIntyre *et al.* 2017). Longer-term monitoring will be required to determine the overall trajectory of the response and to capture a broader range of climate conditions and greater potential for episodic changes with less frequent recurrence intervals (e.g., temperature recovery, sediment export from processes that act over longer time-scales, changes associated with flood or drought events, and delayed response in aquatic communities).

By experimenting at the basin scale, we can examine reach-scale effects within the drainage basin, as well as cumulative exports to downstream fish-bearing waters, but we cannot directly address downstream effects. These sites are not appropriate for evaluating effects on fish and have limited utility for assessing even downstream effects on temperature given that the adjoining higher-order streams the study basins discharge to are influenced by land uses both upstream and immediately downstream of their confluences with the study streams.

The three site pairs identified for inclusion of the study span a gradient of precipitation and channel wetness in the northern Rockies ecoregion and we seek another three pairs in the eastern cascades across a similar gradient of precipitation. Small sample size, relative to observational studies, is an issue for most experimental studies and especially so for field-based studies like this. However, experimental studies are essential to testing the effectiveness of specific riparian prescriptions. Given our limited amount of basin-scale replication, the results of this study should not be viewed solely in

isolation, but rather as a part of the larger body of research on forestry effects. Failure to obtain additional sites will reduce power of the study and level of inference, especially as they relate to CMER lands with higher levels of aquifer permeability.

**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?)**

ENREP is a companion to the two westside Type N Effectiveness studies and will provide information about how riparian processes and functions provided by Type Np buffers maintained at levels that meet FP HCP resource objectives and performance targets for shade, stream temperature, LWD recruitment, litter fall, and aquatic life in eastern Washington.

In addition, ENREP will address whether different types of Type N channels explain variability among basins in their responses to forest practices. It will also address the effect of buffering or not buffering spatially intermittent stream reaches in Type Np streams. The results are likely to empirically inform the Eastside Np Effectiveness Project, which is listed in the CMER workplan as a literature review related to Ns rule effectiveness.

ENREP is currently the only Type Np Effectives study planned or underway in eastern Washington.

**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 rules are based on multiple assumptions regarding the effectiveness of Np riparian buffers and protecting resource objectives. Some of these assumptions appear to hold while others appear questionable based on results from the Type N Experimental “Hard Rock” study in western Washington.

This is the only study that will specifically address Type Np rule effectiveness in eastern Washington, and how responses vary along a spatial, hydroclimatic gradient, and associated gradient of seasonal surface water presence. As such, it is expected to provide a substantial gain in information in the context of other Type Np and related forest research.