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NATURAL RESOURCES**

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To: Curt Veldhuisen and Terra Rentz, TFW Policy Co-Chairs

Form: Mark Hicks, Adaptive Management Program Administrator 

Subject: Buffer Characteristics Integrity and Function (BCIF) Findings Transmittal

At their December 17, 2019 meeting, the Cooperative Monitoring Evaluation and Research Committee (CMER) formally approved answers to the first 6 questions of the Framework for Successful Policy/CMER Interaction for the report titled: ***Changes in Stand Structure, Buffer Tree Mortality and Riparian-Associated Functions 10 Years after Timber Harvest Adjacent to Non-Fish-Bearing Perennial Streams in Western Washington.*** The purpose of this memo is to transmit those findings to TFW Policy (Policy). Upon receipt, Policy has 180-days to make an action or no-action recommendation to the Forest Practices Board.

The BCIF study used an after-control impact experimental design. This design uses post-harvest data from a randomly selected sample of 15 treatment sites across western Washington. Data from the treatment sites was compared with data from unharvested reference sites to estimate the magnitude and duration of treatment effects. The fifteen treatment sites contained a mixture of treatments allowed under the Westside Type Np Riparian Prescriptions, but harvest units did not typically include entire Np streams from the Type F break to the Perennial Initiation Point. Data collection occurred at three, five and 10 years post-harvest. However, the authors could not sample all sites at each date because five reference sites were harvested prior to the year-10 post-harvest survey and access was denied for one treatment and reference site in year three and another treatment site in year ten.

Three components (treatments) of the Westside Type Np Riparian Prescriptions were evaluated: unbuffered clear-cut harvest to the channel edge (CC treatment), 50-foot wide no-cut buffers (BUF treatment), and 56-foot radius no-cut buffers around the perennial initiation points (PIP treatment). Unharvested second-growth reference (REF) reaches were located in proximity of the treatment sites. The study documents the magnitude of change in stand structure, tree mortality, wood recruitment, shade, wood cover and soil disturbance when the riparian prescriptions for Westside Type Np (perennial non-fish-bearing) streams were applied in an operational setting. This extended 10-year post-harvest report augments earlier findings presented in the Westside Type N BCIF Study 5-year post-harvest report (Schuett-Hames et al. 2012).

Summary Technical Findings:

Change in Stand Structure. During the first five years after harvest, density and basal area decreased in BUF, PIP and REF stands because tree mortality exceeded ingrowth of young trees. Mean cumulative mortality as a percentage of live basal area was 48.1% in PIP stands, 27.2% in BUF stands and 9.4% in REF stands. Over the entire 10-year post-harvest period, cumulative change in live basal area (trees >4" DBH) was positive in REF stands (+2.7%) and negative in BUF (-14.1%) and PIP (-38.9%) stands, however the BUF-REF contrast was not statistically significant.

Tree fall and Wood Input to Streams. Tree fall and wood recruitment was driven by mortality with rates highest during the first five years post-harvest. Cumulative recruited wood volume in the (BUF) and (PIP) reaches was double and four times the REF volume, respectively. Wood recruitment was minimal in CC reaches during the 10 year period due to lack of trees, following slash input (primarily branches and tops) during harvest.

Shade/Cover. One year after harvest, canopy closure, an indicator of shade from trees and tall shrubs, was lower in the BUF (76%) and PIP (52%) reaches compared to the REF reaches (89%). By year 10, canopy closure in the BUF and PIP reaches increased to over 85%. Mean canopy closure in the CC reaches was only 12% one year after harvest of trees, but increased to 37% by year 5 and 72% by year 10.

Soil Disturbance. All BUF and PIP reaches met the performance target (<10% of the ELZ area with soil disturbance) but one of eight CC reaches exceeded the target. The average distance to the stream for erosion features that delivered sediment was 1.0 foot and a maximum of 7.7 feet.

Possible Implications:

The Westside Type N BCIF Study was not designed to address some important aspects of Type N riparian prescription effectiveness, including aquatic resource effects (e.g. amphibians and macro-invertebrates), water quality (e.g. stream temperature and turbidity) or downstream effects on fish-bearing streams. However, the study findings raise some key policy questions for the adaptive management program:

- 1) Is the level of disturbance and recovery (logging debris input, changes to shade/temperature and reduction in large wood recruitment and loading) particularly from clear-cut harvest of type Np RMZs consistent with the resource objectives of the FPHCP?
- 2) What proportion of the stream network represents an appropriate balance between buffers for resource protection and clear-cut harvest for economic and operational considerations?
- 3) What buffer strategies would provide the desired level of protection to achieve resource objectives and appropriately balance economic and operational considerations?
- 4) Should sites with high vulnerability to wind be identified and managed differently?

5) Is there a strategy for protecting sensitive sites (e.g., PIPs) that would be more effective than small patch buffers prone to wind damage?

The BCIF study has increased our understanding of the short-term effects of applying the Type Np rule prescriptions along Western Washington headwater streams. At a minimum it should be provided as an additional source of information for the Type Np Workgroup. Policy should also deliberate on the four questions posed by the authors in reaching a recommendation for the Forest Practices Board on whether prescription-scale effects observed in the study are meeting the goals of the state forest practices program.