Appendix 6-C

Evaluation of Canopy Removal in Conformance with Peak flow Target

Appendix 6-B describes analyses associated with identifying thresholds for peakflow changes that will limit suspended sediment load changes to 20%, consistent with the load allocations in Section 5.5. This appendix describes staff's evaluation of the peakflow model developed in Caspar Creek (Lewis, 2001) (Equation 1), solving for the proportion of watershed harvested, while ensuring the peakflow increase threshold of 10%, as identified in Appendix 6-B, is not exceeded.

The peakflow model equation and coefficients are described below, followed by an example spreadsheet for a sample area. Because the proportion of watershed area logged *(ci)* is a ratio, the evaluation is not dependent on catchment size.

$$E(r) = \exp\{[1+B_2(t-1)]c[B_4+B_5\ln(y_c)+B_6\ln(w)]\} \qquad \textit{Equation 1}$$

Where:

- ***E(r)*** = expected ratio between the observed flow and the expected flow without a logging effect in a watershed as a result of a storm (unitless ratio)
- B_2 = logging recovery coefficient (-0.0771)
- B_4 = vegetation reduction constant (1.1030)
- B_5 = storm size coefficient (-0.0963)
- B_6 = watershed wetness coefficient (-0.2343)
- y_c = mean of unit area peak flows at control watersheds HEN and IVE ($m^3\ s^{-1}\ ha^{-1}$)
- ***w*** = antecedent wetness (unitless parameter)
- ***c*** = proportion of watershed canopy removed (unitless ratio)
- ***t*** = time since harvest that calculation is made (years)

PEAK FLOW CALCULATION FOR SAMPLE AREA								
Unit 2								
Recurrance Interval (yrs)			1.25					
Index Logging Year			2013					
Logging Recovery Coef. (B_2)			-0.0771					
Constant (B_4)			1.1030					
Storm Size Coef. (B_5)			-0.0963					
Watershed Wetness Coef. (B_6)			-0.2343					
Watershed Wetness Index (w)			150.0000					
Control Peak Flow (y_{nfc})			0.0075					
Expected Control Pk. Flow (y_c)			0.0059					
Watershed Size (ACRES)			100					
					Proportion	Summers	Observed/	Annual
	Clearcut	**ST/SW**	**Selection**	Clearcut	Wtrshd.	Since	Expected	Peak Flow
				Equiv.	Logged	Logged	Peak Flow	Change
Year	**(ac.)**	**(ac.)**	**(ac.)**	(ac.)	(c)	(t)	Ratio	(%)
2013	0.0	0.0	0.0	20.0	0.20000	0	1.09532	9.532

Application of the peakflow model for a sample area indicates that in order to not exceed a threshold of 10% for peakflow changes, canopy removal in an given catchment should be limited to 20% over a ten year period, while peakflows recover.