

Appendix 7

Dead wood biomass calculation

Dead wood following fire was calculated based on regression equations for assigning biomass to the structure classes. Pre-fire dead wood was assumed to be consumed by the fire. First the amount of dead wood created was estimated from the severity class. High severity fire, moderate severity fire and low severity fire killed 90%, 50% and 10% of the prefire biomass, respectively. The amount of consumption by fire of prefire volume for high, moderate and low severity was 0.08, 0.07 and 0.03 respectively (Campbell et al. 2007). The amount of fire-killed wood was then decayed according to the following:

$$\text{Equation 5.1 } Y_t = Y_0 e^{-kt}$$

where Y_t is the amount (mass or volume) of wood at time t and Y_0 is the amount of dead wood at time 0, immediately after the disturbance and k is the decay constant that reflects a combination of fragmentation and mineralization processes for decay of snags and down logs. Snags and down logs were lumped into one class of dead wood. $K = 0.05$ based on a rough estimate from Table 3 in Harmon et al. 1986.

Thus the estimate of dead biomass (Y) at time t following fire would be

$$\text{Equation 5.2 } Y_t = LF * LB * e^{-kt}, \text{ where } LB = \text{live biomass before fire.}$$

At some point in the future (e.g. 20 years) the estimated dead biomass at a future point in time will be mainly a function of dead wood produced in the new post fire stand. This estimate would come from the look-up table as described above. The transition from the modeled dead wood to the dead wood from the structure class lookup table for an IDU was accomplished by using the lookup table value when the modeled amount was less than the lookup table amount.

Campbell, J., D. Donato, D. Azuma, and B. Law. 2007. Pyrogenic carbon emission from a large wildfire in Oregon, United States. *Journal of Geophysical Research: Biogeosciences* (2005–2012) 112 (G4).

Harmon, M.E., Franklin, J.F., Swanson, F.J., Sollins, P., Gregory, S.V., Lattin, J.D., Anderson, N.H., Cline, S.P., Aumen, N.G., Sedell, J.R., Lienkaemper, G.W., Cromack, K., and Cummins, K.W. 1986. Ecology of coarse woody debris in temperate ecosystems. *Adv. Ecol. Res.* **15**: 133–302.