

Effects of post-fire coarse woody debris on fine litter decomposition and microarthropod distribution

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Understanding of how spatial heterogeneity influences ecosystem processes is incomplete, and the spatial patterns of ecosystem processes in disturbance-generated landscapes are largely unexplored. In forested landscapes, coarse woody debris (CWD) following stand-replacing fires creates conspicuous structural heterogeneity both within and among stands, yet its functional significance is unclear. We evaluated how microclimate and substrate conditions beneath post-fire CWD influence leaf litter decomposition and microarthropod distribution in areas of Yellowstone National Park that burned in the 1988 fires. Comparisons were made across six microsites (above and below highly decayed logs, below post-1988 CWD on the ground and suspended above the ground, below *Pinus contorta* saplings, and on open soil) within three 0.25-ha post-fire *P. contorta* stands. Mesh litterbags each containing 5 g of leaf litter (*P. contorta* needles or a mixture of herbaceous litter; n = 720 total) were nailed to the ground in August 2002 and retrieved in summer 2003. Litter mass loss indicated that decomposition rates were significantly lower under post-1988 suspended logs (mean mass loss 6.8% for needles; 27.1% for herbaceous litter) than at all other microsites (mean mass loss ranged from 12.7-16.1% for needles and from 33.2-40.3% for herbaceous litter). Following Tullgren funnel extractions from litterbags, microarthropod density and diversity were higher beneath recent and decayed logs contacting the ground than at other microsite conditions. Observed differences beneath CWD on the ground and CWD suspended above multiple logs suggest that CWD accumulation patterns resulting from large disturbances can influence ecosystem processes.