217. Biofuel harvests, coarse woody debris, and biodiversity – what we know and what we need to know

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Abstract: Forest harvest operations often produce large amounts of harvest residue which typically becomes fine (foliage, small limbs and trees) and coarse woody debris (snags and downed logs). If removed at harvest, residual biomass has potential to be a local energy source and to produce marketable biofuel feedstock. But, CWD in particular serves critical life-history functions (e.g., breeding, foraging, basking) for a variety of organisms. Unfortunately, little is known about how forest biodiversity would respond to large scale removal of harvest residues. We calculated 693 biodiversity effect sizes from 25 studies involving manipulations of CWD (i.e., removed or added downed woody debris and/or snags). Diversity and abundance of both cavity- and open-nesting birds were substantially and consistently lower in treatments with lower amounts of downed CWD and/or standing snags, as was biomass of invertebrates. However, cumulative effect sizes for other taxa were not as large, were based on fewer studies, and varied among manipulation types. Little is currently known about biodiversity response to harvest of fine woody debris. Predicting the effects of biomass harvests on forest biodiversity is uncertain at best until more is known about how operational harvests actually change fine and coarse woody debris levels over long time periods. Pilot biomass harvests report post-harvest changes in CWD levels much smaller than the experimental changes involved in the studies we analyzed. Thus, operational biomass harvests may not change CWD levels enough to appreciably influence forest biodiversity, especially when following biomass harvest guidelines that require leaving a portion of harvest residues. Landscape ecology can help reduce this uncertainty by investigating how biodiversity responses scale from the small scale of manipulative experiments (i.e., 10-ha plots) to operational forest management and how biodiversity response to CWD levels might vary at different spatial and temporal scales and in different landscape contexts.

Keywords: biodiversity, biofuel, coarse woody debris, forest management