



Coarse woody debris legacies and spatial arrangement as artifacts of past management practices

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Introduction

The ecosystem management paradigm embraces the restoration and maintenance of ecological processes across many scales, and coarse woody debris (CWD) is an essential element of forest ecosystems. Standing (SDW) and down dead wood (DDW) are important components whose many ecological roles are well documented, but our knowledge of management impacts on this resource is not well understood. Because CWD in hardwood forests has slow decay rates, it can influence ecological processes at local, stand, and landscape levels for several decades. Forest stands subject to management will experience long-term changes to CWD dynamics, thus, influencing future spatiotemporal inputs of CWD. The association between management and abundance of CWD has been well documented (Sturtevant et al. 1997; Angers et al. 2005), but its influence on connectivity of CWD has been less studied. Connectivity among CWD can enhance species fitness and prove to be critical for dispersal-limited organisms that use CWD including bryophytes, fungi, lichen, insects, and reptiles (Schiegg 2000; Laaaka-Lindberg et al. 2006; Manning et al. 2013). We examined the quantity, quality, and spatial arrangement of CWD in a relict forest and two managed forests that were partially harvested 46+ years ago.

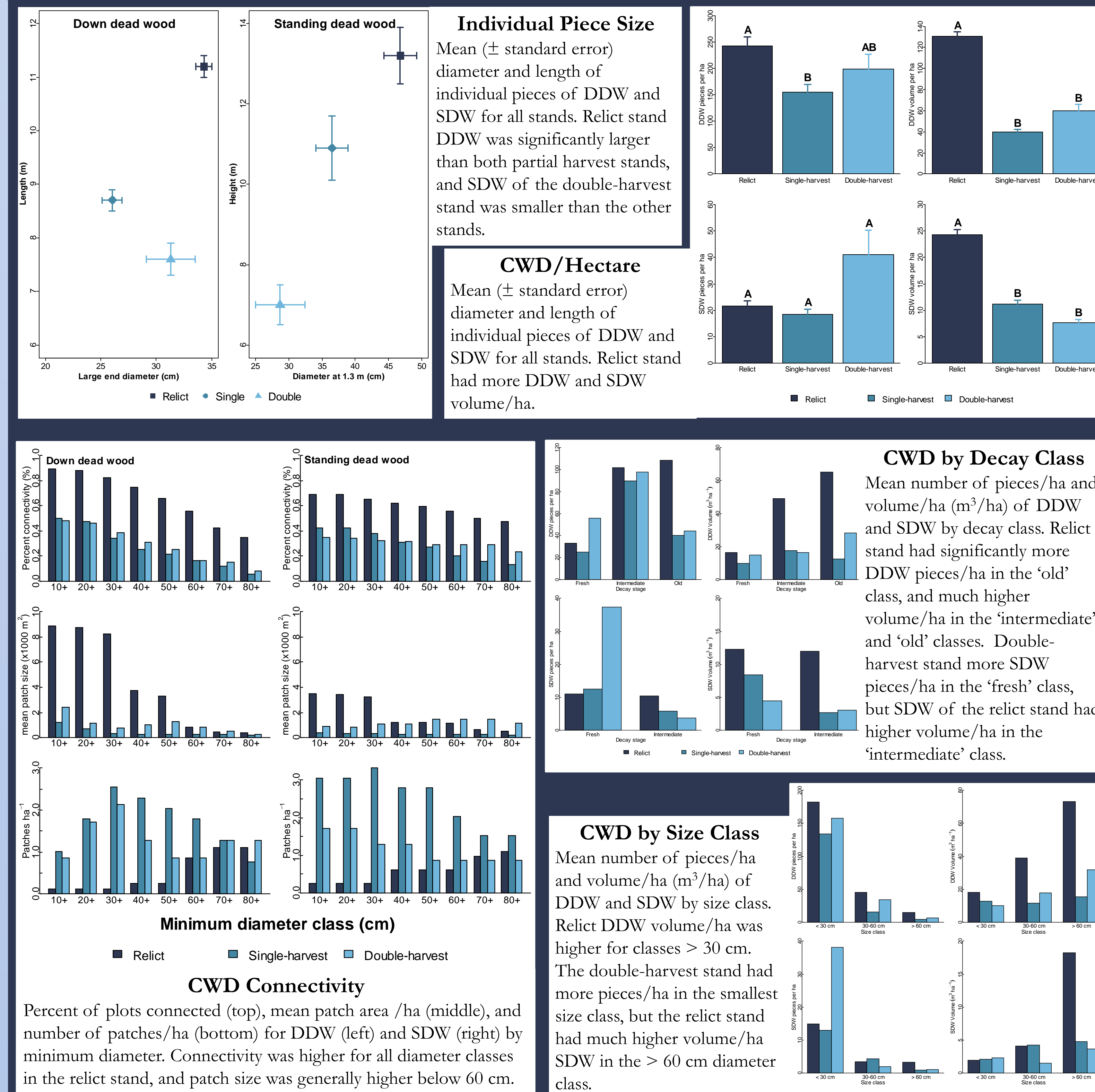
Hypotheses

- 1) The amount of CWD would be lower in managed stands related to structure of living material.
- 2) The relict stand would have larger individual pieces of CWD related to structure of living material.
- 3) The relict stand would have more volume of CWD in larger size classes related to structure of living material.
- 4) The relict stand would have more highly decayed CWD related to larger piece size.
- 5) Distribution of DDW and SDW would exhibit higher levels of connectivity in the relict stand related to larger piece size.

Methods

We used variable radius plots on a 10 m x 10 m grid to sample stands. For DDW we measured large and small end diameters and length, and for SDW we measured diameter and height; decay classes were assigned to each. Only pieces sampled in 2 or more plots were eligible to be considered in the connectivity analysis; adjacent plots that contained a CWD piece of the designated size were considered connected. Connectivity was simply defined as the percentage of all plots that were considered connected.

Results



Discussion

Individual piece size and volume of CWD was significantly greater in the relict stand, and larger volumes were observed in more highly decayed CWD and larger size classes. Differences are related to degree of the partial harvests that altered the structure of the live trees of the managed stands. Harvesting opens up canopy space, which is then occupied by a greater number of smaller stems competing for canopy space. At the stand level, fewer large stems are dying, thus, CWD input rates are lower in managed stands, and output, i.e. decay rates, are higher because smaller stems decay faster. Larger CWD also provides a storage effect because they decay slower, thus, allowing for greater accumulation of CWD and increased connectivity among CWD. From a management perspective, maintenance of large material, both live and dead, should be preserved to promote increased abundance and connectivity.



Literature cited

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