ABSTRACT

TITLE:	Understory Plant Community Dynamics in Three Levels of Sudden Aspen Decline, San Juan Mountains, Colorado
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ABSTRACT: The majority of temperate forest ecosystems are characterized by complex histories of natural and human disturbances. Disturbances when combined tend to have complex effects on landscape and vegetation community dynamics. Disturbances that cause tree mortality generate biological legacies that can drastically alter the species composition of a landscape and ecosystem processes. Sudden Aspen Decline (SAD) is a relatively new phenomenon that has been observed throughout all of North America. Quaking aspen (Populus tremuloides) has experienced sudden, widespread, and severe dieback and mortality in Colorado starting in 2003. Although the causes of SAD are still being studied, it is hypothesized that the causal factors of SAD include above average ambient air temperature, moisture stress, insufficient nutrient uptake from soil, genotypic variations, poor regeneration, weak root systems, insects, and pathogens. For our study, we sampled understory plant communities in three levels of SAD: low (0-29%), moderate (29.1- 69%) and high (69.1-100%) in order to better understand how changes in aspen forest structure influence understory plant community dynamics. Our study was conducted on the USFS Dolores Ranger District of the San Juan National Forest (SJNF) outside of Mancos, Colorado, where the highest rates of SAD have been recorded. We placed 10 Modified-modified Whittaker (20 X 50m) plots containing four 1m2 sub-plots to quantify understory species richness, diversity, abundance, and frequency in each SAD level. Overall, we found significant differences (Pseudo F= 2.12 p=0.005) in the understory plant communities among the three levels of SAD. Pairwise comparisons illustrated that there were significant differences between low and high SAD stands (p=0.001) and moderate and high SAD stands (p=0.024). There were no significant differences (p=0.31) in understory plant communities between the low and moderate SAD stands. We found indicator species, species that were significantly faithful, for each level of SAD using an Indicator Species Analysis. Latherus leucanthus (IV 73.4, p=0.001), Fragaria virginiana (IV 55.6, p=0.012), Thalictrum fendleri (IV 55, p=0.0158), and Valerian occidentalis (IV 49.4, p=0.0072) were indicator species for low SAD plots. Campanula rotundifolia (IV 41.1, p=0.0440) and Solidago spp. (IV 40, p=0.0214) were indicator species for moderate SAD plots. Achillea lanulosa (IV 59, p 0.0036) was the only indicator species for high SAD stands. Our results show that there are differences in understory plant communities at different SAD levels. Land managers should be aware of plant composition changes when managing aspen stands because of the implications it has on other species' habitats and ecological processes in aspen stands.