ABSTRACT

TITLE:	Ground-Dwelling Arthropod Community Diversity in Populus Tremuloides Stands Affected by Sudden Aspen Decline in Southwestern Colorado, USA.
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ABSTRACT: Sudden aspen decline (SAD) has become a recognizable issue among aspen (Populus tremuloides) stands on the Colorado Plateau and throughout the Western US, and Canada. Increasing temperatures coupled with drought in the early twenty-first century predisposed aspens to SAD and caused a loss of aspen overstory cover and inhibited aspen regeneration. The Intergovernmental Panel on Climate Change predicts global temperatures to continue to increase 0.2C per decade, which will continue to perpetuate SAD. Recent studies have shown that as the intensity of SAD increases the composition of the understory changes as well, usually with an increase in grass abundance. To our knowledge, how SAD affects ground-dwelling arthropod communities has not been previously studied. Research in other habitats shows ground-dwelling arthropod diversity is most affected by disturbance and understory plant diversity. We conducted a study investigating the effects of three levels of SAD (healthy, moderate, and high) and a coppice harvest treatment (N=7/SAD level or treatment) on ground-dwelling arthropod diversity in the San Juan National Forest, southwestern Colorado. We established two pitfall traps every ten meters along a 50m transect (N=12 Traps/site x7 sites/SAD level or treatment). Collecting occurred twice during the peak growing season, once in mid-June and once in mid-July. In addition, we quantified overstory aspen stand characteristics and understory vegetation biomass by functional groups to correlate with ground-dwelling arthropod richness and abundance. We found that the ground-dwelling arthropod community was directly affected by the variable stand structure created by SAD. We found significant differences between the four aspen categories in the mid-summer collection (F=5.41, P=0.0004) and in the late summer collection (F=2.56, P=0.0076). Arthropod family diversity decreased and abundance of individuals increased as the SAD level increased. Multiple indicator families were found and could be explained by niches they fill and how the SAD has impacted the environment. It is important for land managers to understand the ecological impacts of SAD and coppice harvesting of SAD on ground-dwelling arthropods as this group constitutes a large proportion of biodiversity in aspen stands and thus the uniqueness of this vegetation type.