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FOREST FUEL STRUCTURE AND LOADING ALONG A GRADIENT OF GRAY- PHASE MOUNTAIN PINE BEETLE SEVERITY IN JASPER NATIONAL PARK, ALBERTA, CANADA

ABSTRACT

Wildland fire fuels within the gray-phase of mountain pine beetle (*Dendroctonus ponderosae* Hopkins) outbreak (4-10 years post mortality) are treated as homogenous despite potential variability. To assess if proportion of mortality due to mountain pine beetle in gray-phase stands significantly affects fuel structure, composition, and loading, detailed fuel measurements were collected across a range of severity in Jasper National Park, Alberta, Canada, by coincidence 1-3 years before a major wildfire. These were categorized based on outbreak severity thresholds of Light (35%), Moderate (36%-65%), and Severe (>65%) beetle-induced pine mortality defined as the proportion of killed trees within a stand. The canopy fuels of both mature and small tree cohorts were significantly reduced with increasing outbreak severity. Severely affected stands showed a 49% reduction in mature tree canopy bulk density from original loading but increased herbaceous vegetation. Moderately affected stands had higher coarse woody debris loading (mean = 3.21 kg m⁻²; SE = 0.49 kg m⁻²). These severity ratings can be used to quantify canopy fuel loss and signal potential shifts to other surface fuel types, barring fire. This is one of the first studies to showcase variability within gray-phase outbreak fuels, despite their prevalence in western Canada, and discuss the potential influences on fire behaviour.

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