

A proposed approach incorporating lidar and aerial imagery for large area estimates of lodgepole pine (*Pinus contorta*) volume killed by mountain pine beetle (*Dendroctonus ponderosae*)

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Abstract

The volume of pine killed by mountain pine beetle is a critical indicator of an infestation's impact on timber supply. Operationally, mountain pine beetle damage is typically mapped by broad-scale aerial surveys, and recorded damage is combined with existing forest inventory data to generate coarse estimates of volume losses. In this communication, we propose an alternative approach to improve the precision of volume estimates and to this end, present a sampling methodology that combines high spatial resolution digital aerial imagery and small footprint discrete return lidar data collected over 0.25 ha photo plots selected from representative sampling transects. Species composition, diameter, and mountain pine beetle attack stage are manually interpreted from the imagery, while lidar provides accurate measures of dominant stand height. Species-specific equations are then used to estimate the volume of pine mortality, which may then be extrapolated across a larger area of interest using forest inventory data.

Keywords: forest inventory, timber supply, lidar, digital aerial imagery, volume, mountain pine beetle