An efficient and comprehensive field protocol for assessing fuel characteristics for fire behaviour modelling in eucalypt forests.

Data quantifying the physical characteristics of bushfire fuels is fundamental to fire management decision-making. Knowing fuel characteristics and their spatial and temporal distribution has become increasingly important as fire managers rely on this information to plan fuel mitigation activities and to forecast potential fire danger, behaviour and effects.

Visual fuel assessment techniques have been shown to be subjective, often leading to inconsistent results that lack the accuracy required for fire management applications. The use of visual assessment methods has also resulted in a paucity of available physical fuel characteristic data from which our understanding of fuel dynamics can evolve. This highlights the need for simple, but sound, fuel measurement protocols that accurately quantify a fuel complex for both operational and research applications.

We describe a protocol to quantify characteristics for various fuel strata considered in Australian fire modelling applications, namely: surface; near-surface; elevated; intermediate; overstorey; and bark. For each layer, information on cover, height (or depth) and mass is collected. Fuel mass is sampled for fine fuels (d < 0.6 cm) in the surface and near-surface strata. Woody fuel mass and size class distribution is also measured (small, 0.6 cm < d < 7.5 cm, and large, d >7.5 cm).

The protocol integrates different sampling methods, such as destructive sampling for finer fuel particles, line intersect method for woody fuel, and indirect approaches through double sampling for elevated, bark and canopy fuels.

We test the method in a large fuel dynamics study in jarrah forest (*Eucalyptus marginata*) in southwest Western Australia and report on the efficiency of the approach and variability of the data collected.