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Bushfire fatalities and house loss in Australia: Exploring the spatial, temporal and localised context

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Abstract:
This paper examines the spatial, temporal and localised context of bushfire fatalities and house loss in Australia. The analysis focused principally on understanding the strength of correlations between location where fatal exposure occurred, fire weather conditions (using the McArthur Forest Fire Danger Index (FFDI) and its individual components), proximity to fuel, proximity to other objects (houses and/or vehicles) and fatality activity and decision making leading up to the death.

The analysis is based on a dataset containing bushfire related life loss and house loss in Australia over the past 110 years (1901-2011). Over this time period 260 bushfires have been associated with a total of 825 known civilian (733) and firefighter fatalities (92), and 8778 houses destroyed. The analysis included spatial, temporal and localised context in which the fatalities have occurred.

The analysis demonstrated that:
• The losses are dominated by major events that have occurred under very severe weather conditions
• The location of fatal exposure provides a useful context to better understand the specific level of shelter a person had when they died with 58% occurring out in the open, 28% occurring inside structures and 8% in vehicles.
• Male and female civilian fatalities within structures were evenly represented, while male fatalities out in the open were approximately 3 times greater than female fatalities out in the open (mainly in earlier years)
• 41% of fatalities within structure occurred in rooms with reduced visibility to the outside
• Fatalities within structures represent over 75% of all fatalities under very severe conditions (weather conditions exceeding an FFDI value of 100). These are associated with people dying while attempting to shelter mainly in their place of residence. Conversely lower values of FFDI are associated with people who are caught outside while defending their property.
• Over 60% of fatalities occurred within 100m of a residence
• 80% of all fatalities and 60% of the house loss occurred within 30 m of the forest.

Keywords: Wildland fire, Fatalities, WUI, House loss, Risk

1. Introduction

In Australia the studies of community safety at the urban interface were mainly based on post bushfire surveys and subsequent analysis to better understand the mechanisms of bushfire attack at the urban interface. The important points of consideration in those studies were on the building design, the immediate landscape, the type of urban interface and human activity and how they significantly influence the risk of loss (e.g. Barrow, 1945; Raphaele Blanchi & Leonard, 2008; Leonard & McArthur, 1999; Ramsay \textit{et al}., 1987).

Some studies have been performed on the behaviour of civilian fatalities during bushfires (e.g. Handmer & Haynes, 2008; Haynes \textit{et al}., 2010; O’Neill & Handmer, 2012; Tibbits, Blanchi, & Gill, 2006). While these studies on civilian fatalities have mainly focused on the behaviour of the victims