



## Experiences of sheltering during the Black Saturday bushfires: Implications for policy and research



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### ABSTRACT

More than half of those who died in the 2009 Black Saturday bushfires in Victoria, Australia, were sheltering inside a house at the time of their death. This marks a shift in bushfire fatality trends, which previously saw most fatalities occurring outside while residents attempted to protect assets or evacuate. This paper presents findings from research that examined people's experiences of sheltering in and exiting houses, sheds, personal shelters and other structures on Black Saturday. Qualitative data were sourced from 315 semi-structured interviews with residents affected by the bushfires and 50 witness statements presented to the Victorian Bushfires Royal Commission. Results indicate that despite limited planning and preparation specifically for sheltering on Black Saturday, many residents protected themselves from fire by sheltering inside houses, other structures and in open spaces. Most sheltered actively, engaging in regular monitoring and action to protect the shelter and occupants. However, some found sheltering challenging due to heat, smoke and responsibilities for children, vulnerable household members and the incapacitated. Misconceptions persist about the safety offered by houses and, in particular, bathrooms during bushfires. Education and advice should emphasise the need to plan and prepare for active sheltering, regardless of whether people intend to stay and defend or leave. The paper offers recommendations to promote planning and preparedness for active sheltering and identifies areas for further research.

### 1. Introduction

173 people died and more than 2000 houses were destroyed in the 2009 Black Saturday bushfires in Victoria, Australia. Initial police reports indicated that 113 people died inside houses, 27 outside a house, 16 in or near cars, 7 in garages or sheds, 5 on roadways, 1 in an open land reserve, and 4 at a location outside the fire perimeter [1]. Subsequent research examined the activities civilians were engaged in immediately preceding their death, finding that 26 people died defending a house or property, 7 protecting livestock or other assets, 35 while evacuating, 41 while sheltering after attempts to defend a house or property, 47 while sheltering without attempts to defend, 3 in an indefensible shelter, and 3 in a shelter where activities are unknown [7].<sup>1</sup> The large proportion of people who died inside while sheltering on Black Saturday marks a significant shift in bushfire fatality trends, which previously saw the majority of deaths occur outside while

residents attempted to protect assets or evacuate [22].

The large loss of human life and property on Black Saturday led to the establishment of the 2009 Victorian Bushfires Royal Commission (VBRC) [50]. A key concern for the Commission was the viability of the 'Prepare, stay and defend or leave early' (PSDLE) policy. Under this policy, Australian fire services advised residents to prepare to stay and defend their homes and properties or leave before a bushfire occurred in their area [4]. The Commission observed that the phrase 'stay and defend or leave early' did not accurately reflect what people do in bushfires, noting many will delay making a decision until they are directly threatened. The Commission concluded that a comprehensive bushfire policy must accommodate the different scenarios people might experience by providing different advice and more options, including the possibility of sheltering. State and local governments responded by designating 'Neighbourhood Safer Places' as places of last resort, and the Australian Building Codes Board [3] developed standards for the

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<sup>1</sup> These figures exclude 4 of the 173 deaths attributed to Black Saturday. Three were not directly related to the effect of the fire and one occurred after February 7 during firefighting operations.



Fig. 1. Areas of Victoria affected by bushfires during January and February 2009 (shaded dark grey).

design and construction of bushfire shelters for private use. Anecdotal evidence suggests that residents of bushfire risk areas are increasingly constructing or converting existing structures into bunkers (e.g. [54]). Fire services have recognised that people might want to install private shelters and are providing advice relating to sheltering. Importantly, this advice emphasises that sheltering should be planned for as a ‘last resort’ or back-up in the event that evacuation or defence is not possible (e.g. [14]). (Fig. 1).

Despite greater emphasis on sheltering as a back-up or last resort, there have been few detailed studies of resident sheltering practices in Australian bushfires. Research has tended to focus on the decision-making and behaviour of people who evacuate when threatened by bushfire and those who remain to defend homes and property (e.g. [59,30,58,33]). While some studies have highlighted dangers associated with ‘passive’ sheltering, usually in the context of fatalities (e.g. [22,20]), relatively little is known about why and how people shelter.

In the context of bushfire, we consider sheltering as any action to protect oneself from the immediate effects of flames, embers, heat and smoke. People may shelter for short or long periods of time, as their primary response or as part of other responses, such as defending or evacuating. In this paper, we draw a distinction between active and inactive sheltering, which are characterised, respectively, by the presence or absence of attempts to regularly monitor conditions inside and outside the shelter, as well as actions to protect the shelter and its occupants.

This paper presents findings from research that examined the circumstances and challenges people experienced when sheltering and exiting houses, sheds, personal shelters and other structures during the Black Saturday bushfires [8]. The research entailed analysis of data related to resident decision-making and behaviour, and factors such as house design, fire behaviour and the surrounding landscape. This paper focuses on findings from a qualitative analysis of the Bushfire and Natural Hazards Cooperative Research Centre’s (BNHCRC) interviews with residents collected as part of the ‘2009 Victorian Bushfires Research Taskforce’ and lay witness statements to the VBRC (see [50]).

## 2. Sheltering during bushfire

Taking shelter is one of many options available to people seeking protection from hazards. While early evacuation is usually considered the safest option, numerous factors may prevent people from evacuating safely, including the inability to provide or receive an early warning (e.g. in cases of rapid onset or communication failure), road networks

that prevent swift egress, and responses of citizens who may be unable or unwilling to leave [28,37]. Last minute evacuations are historically a major cause of bushfire fatalities in Australia [22]. Eight of the nine people killed in the 2005 Eyre Peninsula bushfires in South Australia, for instance, died in or near cars while attempting to flee the fire [47]. On Black Saturday, the large number of people who died inside houses has often overshadowed the fact that 35 people died while attempting to evacuate [7]. The possibility that it may be safer to remain in a fire affected area than attempt last-minute evacuation is reflected in fire service emergency warnings, which may advise that it is too late to leave and that residents should seek shelter (e.g. [2]).

While some research into bushfires has documented sheltering behaviours (e.g. [19]), most studies focus on the roles played by occupants when defending houses or evacuating. This research has underpinned development of the PSDLE policy, which is based on evidence that adequately prepared residents can protect houses from bushfires (e.g. [24,59,43,19,58]), and that a large number of deaths have occurred during late evacuations (e.g. [23,27,59,22]). However, numerous studies document the tendency for people to ‘wait and see’ what a fire is like, or wait until they are threatened, before deciding to stay or leave [30,31,34,44,52,56,58]. This approach increases the likelihood that residents will be forced into dangerous responses, such as late evacuation, untenable defence and inactive sheltering.

Much early evidence of sheltering in Australia comes from the 1939 Black Friday bushfires in Victoria, where people working and living in the bush retreated inside structures such as houses, timber mills and dugouts to protect themselves from radiant heat and flames [11,19]. Judge Leonard Stretton’s [49] Royal Commission into the fires recommended the construction of dugouts at all timber mill settlements, but noted that financial costs and liability fears had prevented their construction in the past. Research following the 1983 Ash Wednesday bushfires in Victoria found that many people remained at their homes to defend and/or shelter ([59]; Lazarus et al., 1984, [23]). The Bushfire Review Committee subsequently stressed the need to consider sheltering as an alternative to evacuation, observing that ‘a considerable number of people found communal shelter in large, well-constructed buildings and survived, even though the fire threat outside the buildings was acute’ ([35], p. 162). The Committee proposed that the State Government construct or adapt school buildings for use as shelters ‘to mitigate the possibility of students being exposed to risk by being sent home ahead of an advancing fire front’ ([35], p. 162).

A number of studies provide insights into sheltering behaviour in the Black Saturday bushfires. In a survey of populations affected by the

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