

2013

Householders' safety-related decisions, plans, actions and outcomes during the 7 February 2009 Victorian (Australia) wildfires

J McLennan

La Trobe University

George A. Elliott

La Trobe University

M Omodei

La Trobe University

Joshua Whittaker

Royal Melbourne Institute of Technology, wjoshua@uow.edu.au

Publication Details

McLennan, J., Elliott, G., Omodei, M. & Whittaker, J. (2013). Householders' safety-related decisions, plans, actions and outcomes during the 7 February 2009 Victorian (Australia) wildfires. *Fire Safety Journal*, 61 175-184.

Householders' safety-related decisions, plans, actions and outcomes during the 7 February 2009 Victorian (Australia) wildfires

Abstract

This study examined decisions made by householders under wildfire threat. Data were obtained from interviews with survivors of severe wildfires in Victoria (Australia) on 7 February 2009 which killed 172 civilians and destroyed more than 2000 homes. Prior to this, Australian fire agency community wildfire safety policy was that residents should: 'Prepare, stay and defend or leave early'. Most of the 223 interviewees who stayed and defended did so because this was their wildfire safety plan, and they believed that they would be successful despite the predicted extreme fire danger weather. In 79% of cases, defence was successful; for the remaining 21% the house was destroyed and several lives were imperilled. Of the 216 who left for a safer location only 39% said that this was their wildfire safety plan; for most, the action of leaving was triggered by realisation of the imminent threat posed by the fire; 36% self-evacuated under hazardous conditions. The findings suggest that community wildfire safety programs should emphasize: (a) the risks associated with staying to defend a property; and (b) how householders should prepare in order to leave safely if a fire threatens.

Keywords

actions, february, plans, 7, householders', during, safety-related, outcomes, decisions, wildfires, (australia), victorian, 2009

Publication Details

Mclennan, J., Elliott, G., Omodei, M. & Whittaker, J. (2013). Householders' safety-related decisions, plans, actions and outcomes during the 7 February 2009 Victorian (Australia) wildfires. *Fire Safety Journal*, 61 175-184.

Householders' safety-related decisions, plans, actions and outcomes during the 7 February
2009 Victorian (Australia) wildfires

J. McLennan^{a,*}, G. Elliott^a, M. Omodei^a, J. Whittaker^b

^a School of Psychological Science, La Trobe University, Kingsbury Drive, Bundoora Victoria
3086, Australia

^b National Climate Change Adaptation Research Facility, RMIT University, 124 La Trobe
Street, Melbourne Victoria 3000, Australia

*Corresponding author. Tel +61394795363; fax +61394791956

E-mail address: j.mclennan@latrobe.edu.au

ABSTRACT

This study examined decisions made by householders under wildfire threat. Data were obtained from interviews with survivors of severe wildfires in Victoria (Australia) on 7 February 2009 which killed 172 civilians and destroyed more than 2,000 homes. Prior to this, Australian fire agency community wildfire safety policy was that residents should: 'Prepare, stay and defend or leave early'. Most of the 223 interviewees who stayed and defended did so because this was their wildfire safety plan, and they believed that they would be successful despite the predicted extreme fire danger weather. In 79% of cases, defence was successful; for the remaining 21% the house was destroyed and several lives were imperilled. Of the 216 who left for a safer location only 39% said that this was their wildfire safety plan; for most, the action of leaving was triggered by realisation of the imminent threat posed by the fire; 36% self-evacuated under hazardous conditions. The findings suggest that community wildfire safety programs should emphasize: (a) the risks associated with staying to defend a property; and (b) how householders should prepare in order to leave safely if a fire threatens.

Keywords:

community wildfire safety

property defence

evacuation

risk perception

decision making

wildfire survival

1. Introduction

Because of its climate, vegetation types, and land use and human settlement patterns, the south-eastern Australian State of Victoria has a long history of disastrous bushfires associated with periods of drought and days of extreme fire danger weather—high maximum temperatures, low relative humidities, and strong winds. Over the period 1900-2008 there were 296 recorded civilian deaths caused by bushfires [1]. In this paper we use the term ‘bushfire’ when discussing the Australian context, and the synonym ‘wildfire’ when discussing trans-national safety issues.

Following investigations into multi-fatality bushfires in Victoria, South Australia and Tasmania 1967-1983, Australasian fire agencies concluded that (a) civilians were most likely to die because of either the effects of radiant heat or as a result of a motor vehicle accident while fleeing at the last moment, and (b) suitably prepared homes could be defended against bushfires while providing a safe refuge for people during the passage of the main fire front [2]. These conclusions informed the Australasian Fire Authorities Council’s (AFAC) 2005 community safety position that able-bodied people should be encouraged to remain on their property so as to defend their home when threatened by a bushfire: “...By extinguishing small initial ignitions, people of adequate mental, emotional, and physical fitness, equipped with appropriate skills, and basic resources, can save a building that would otherwise be lost in a fire...People should decide well in advance of a bushfire whether they will stay to defend them or leave if a bushfire threatens” [3, p. 6]. This position came to be summarised as ‘prepare, stay and defend or leave early’ [4] and was adopted as community bushfire safety policy by Australasian fire agencies. Such a policy differs from that adopted in most North American fire jurisdictions where evacuation of residents threatened by a wildfire is the preferred community safety strategy [5]. However, following the 2009 Victorian bushfires

(described below) Victoria Police reports that 113 people had perished in their homes [6] resulted in the policy coming under intense critical scrutiny [7].

Recent trends suggest that wildfires will increasingly pose threats to communities in Australia and other countries (notably the United States, Canada, Spain, and Greece) largely because of (a) climate change, (b) fuel and land management practices, and (c) increasing numbers of dwellings in or adjacent to wildland areas [8]. Improving community wildfire safety thus seems likely to challenge the capabilities of fire and land management agencies in these and other countries in the foreseeable future. More frequent serious wildfires and more households in at-risk locations requires fire agency personnel to better understand residents' safety-related decisions about staying and defending homes or evacuating, and factors likely to determine the outcomes of such decisions.

In the remainder of this paper we first note the limited research published so far about householders' decisions and actions during wildfires. We describe the disastrous bushfires which affected many communities in Victoria on 7 February 2009. We present findings from post-fire field interviews with a sample of survivors and relate these to householders' decisions to either stay and defend their homes or leave, and we discuss possible implications of these findings for community wildfire safety policy and practice.

1.1 Community wildfire safety research

Considerable research investigating aspects of community wildfire safety has been reported. Arguably, the largest thread of wildfire social science research has focussed on reducing vulnerability of dwellings to wildfire attack and has employed householder surveys inquiring about their wildfire mitigation intentions and actions (such as vegetation clearing and using fire-resistant building materials). The findings, overall, suggest that major determinants of householders' willingness to undertake mitigation activities include: (a) perception of bushfire risk; (b) knowledge of mitigation options; (c) acceptance of some

responsibility for property protection; (d) expectations that mitigation actions will be effective; and (e) beliefs that the costs of mitigation activities are acceptable in relation to other household priorities [9 - 14]. Other research findings suggest the likely importance of factors such as householder gender [15]; residents' attachment to place [16, 17]; and informal social community interaction networks [18].

Relatively few investigations of experiences of householders affected directly by significant wildfires and what they did in response to warnings or threats, and why, have been reported. Only four such studies were located in the literature². In surveys of three US communities affected by wildfires McCaffrey and Winter [19] found that many of the 551 residents surveyed who had been threatened by a wildfire chose to wait and see what developed before making a final decision about whether the perceived risk warranted evacuation. Cohn *et al.* [20] interviewed a total of 183 residents of three US communities about their wildfire evacuation experiences and identified several factors which made evacuation problematic for some residents, such as uncertainty about their actual level of risk and expected lack of facilities for evacuees. Proudley [21] interviewed 38 couples affected by a nine-fatality bushfire in South Australia and concluded that a policy of 'prepare, stay and defend or leave early' failed to take into account the complexities of choices facing families—especially mothers' concerns for the safety of their children—under imminent bushfire threat. Tibbits and Whittaker [22] analysed nine focus group discussions (73 participants) about experiences during bushfires in north-eastern Victoria in 2003, and particularly householders' understanding and actions concerning the 'prepare, stay and defend or leave early' policy. They concluded that while most residents had a good understanding of what was involved in preparing a property and defending it against a bushfire, few had a sound understanding of what was involved in leaving safely (that is, self-evacuating) before a bushfire presented a threat to life.

Taken together, the four studies suggest that the decisions householders make and the actions they take when warned of a possible wildfire threat involve several interrelated factors, such as (a) perceived risk; (b) perceived options and potential costs and benefits of acting on each; (c) household resources and vulnerabilities; and (d) prior plans and preparations. What seems to be lacking from the current literature is data from householders whose properties have been seriously threatened, or impacted, by wildfire. In particular, detailed accounts of householders' survival-related decisions and actions, including major determinants, are needed. The present study aims to contribute to remedying this knowledge gap.

1.2 The 7 February 2009 Victorian bushfires.

On 7 February 2009 the State of Victoria experienced Australia's worst single day of bushfires in recorded history. Extreme fire danger weather was predicted by the Bureau of Meteorology six days in advance. Warnings of extreme fire risk expected on the day were broadcast frequently, and reported extensively in daily newspapers during the preceding week, as noted by the 2009 Victorian Bushfires Royal Commission of inquiry [7].

From mid-morning, numerous fires broke out across much of Victoria. As predicted, the weather conditions were extreme, with high temperatures (>44 degrees Celsius), low relative humidities (<10%), and strong winds (>100kph) across most of the State. The rainfall for the previous 12 months was well below the annual average, and this followed a decade of drought conditions. There were 173 bushfire-related fatalities in total¹; more than 2,000 homes were destroyed; and several communities were devastated; resulting in severe economic, social, and environmental costs, amounting to at least US\$4 billion [7].

In the aftermath of the fires a Royal Commission of inquiry was established, which delivered its Final Report on 31 July, 2010 [7]. Fire agencies were criticised for failures to provide timely warnings to communities under imminent threats. Evidence presented to the

Royal Commission suggested that there may have been fewer fatalities and injuries if people had made (and acted upon) decisions more appropriate to their situation in relation to the extreme weather conditions, especially decisions to leave—self-evacuate--early. Table 1 [23] summarizes the circumstances of the 172 civilian deaths attributed directly to events on the day of the fires.

Insert Table 1 about here

The high percentage of fatalities in or near destroyed homes contributed to subsequent modification of the ‘Prepare, stay and defend or leave early’ community bushfire safety policy [3] so that the dangers of staying and defending during extreme fire danger weather conditions were emphasised and leaving early was promoted as being the safer option [24]: the new policy was encapsulated as “Prepare. Act. Survive.” [25].

2. Data Collection and Analysis

Immediately following the 7 February 2009 bushfires senior Bushfire Cooperative Research Centre³ staff organised a multi-agency research task force to investigate aspects of the fires and report to the 2009 Victorian Bushfires Royal Commission. A major component of the work of the task force was to interview a cross-section of householders in areas affected by eight particularly destructive fire complexes⁴.

2.1. Householders interviewed

Interviews were conducted with 496 residents, from different households, whose properties were impacted or threatened by the worst bushfires. There were 320 men (65%) and 173 women (35%), while the gender of three interviewees was not recorded and not evident from the interview transcripts. Interviewees’ mean age was 49.8 years (SD = 11.6 years).

Thirty-nine of those interviewed were not at home on the day of the fires by chance rather than by decisions about bushfire safety--they were absent for a range of work, recreational, and family related reasons. Ten others relocated to a presumed safer location the day before the fires. Of the 447 householders at their residences on the day of the fires, 223 stayed and defended their homes, 216 left, and 8 sheltered in place passively.

2.2. *Interview procedures*

The following is a summary, a detailed account is in McLennan *et al.* [26]. Interviews were semi-structured, a copy of the interview guide is in the Appendix. Most interviews were conducted by 11 staff or research students associated with Royal Melbourne Institute of Technology (RMIT) University or La Trobe University. Other interviewers were community safety staff from several state fire agencies. Most interviews lasted between 20 and 40 minutes. Interviews were recorded digitally, and transcribed and checked by professional transcription services.

2.3 *Interview transcript analyses*

A content-coding and rating scheme was constructed, following the interview topic guide, to extract relevant information from the interviews in order to establish trends and identify associations among reported plans, actions, outcomes and experiences. The coding categories used are summarised in Table 2.

Insert Table 2 about here

Each transcript was coded independently by two coders; reliability indices are reported in the Results section. Disagreements were resolved by joint reviews of the transcripts in question, discussion and consensus.

The overall analysis procedure involved four steps: (i) coding householder statements in each transcript by two coders independently, and agreement; (ii) copying the coded transcript elements into corresponding coding and rating categories in an *nVivo8* text-management software file; (iii) entering coding and rating values into an *SPSS* data file and quantitative analyses; (iv) examining participants' statements in the *nVivo8* coding categories for themes [27] to assist in the interpretation of the quantitative findings.

3. Results

Findings are presented under three sub-headings: 3.1 Plans, actions, outcomes, safety issues; 3.2 Preparations for a bushfire: those who stayed and defended, and those who left; 3.3 Deciding to stay and defend or to leave when there is a bushfire threat.

3.1 Plans, actions, outcomes, safety issues

As indicated previously, of the 496 householders interviewed 39 were not at their residences on the day of the fires by chance (17, 44%, of these homes were destroyed). Their data have been omitted from subsequent analyses. Table 3 shows bushfire survival plans or intentions of the remaining 457 householders who made bushfire survival-related decisions.

Insert Table 3 about here

Only 10 (2%) householders acted upon fire danger weather warnings from authorities by leaving on the previous day. Of the 229 householders who intended to stay and defend their home, 80% did so (another sheltered passively because of the perceived intensity of the fire); while 20% changed their minds because of the perceived threat posed by the fire (another left the previous day because of the predicted severe fire danger weather conditions). Of the 103 householders who intended to leave safely, 65% did so; 24% left under hazardous conditions; while 11% attempted to defend or sheltered passively because they decided that it was not

safe to leave. Of the 125 householders who intended to wait and see what developed, or had no plan, or described an unclear plan, 70% left; while 27% attempted to defend their home (and 3% sheltered passively) because they judged that it was too dangerous to leave.

For the 216 householders who left, 44% of their homes were destroyed; for the 223 householders who stayed and defended, 20% of their homes were destroyed: for this sample of householders defended homes were less likely to be lost compared with undefended homes: $\chi^2 (n = 439; df = 1) = 27.50, p < .001, V = .26$. This is consistent with previous findings that defended homes are more likely to survive a bushfire than undefended homes [28, 29]. For the 181 householders who both planned to stay and defend and did so, 21% of their homes were destroyed. This last finding that prior planning to stay and defend did not increase the likelihood of successful home defence was unexpected, possible explanations are discussed in Section 3.2.

Table 4 summarizes the major potential safety-compromising issues described by the 439 householders who stayed and defended or left on the day (responses from those who left the previous day or who sheltered passively were omitted).

Insert Table 4 about here

Safety compromising issues were defined as any events or circumstances which householders described as having threatened successful implementation of their bushfire survival intentions. Lack of time to prepare to respond to the direct fire threat (because of inadequate warning information) was reported to be a potential, and for some an actual, safety-compromising factor by a little more than one-third of those stayed and defended; and by a little less than one-third of those who left. Feelings of panic, fear, or anxiety; the fire intensity being much greater than expected; and feeling responsible for the safety of dependent family

members were reported to be issues by appreciable numbers of both those who stayed and defended and those who left.

Many of those who stayed and defended described how (a) failure of household firefighting equipment—mostly water pumps and plastic pipes, fittings and water tanks; (b) a pre-existing lack of stored water because of the drought; and (c) fatigue or injury to themselves or family members during the event had potentially compromised their survival. Many of those who left described lack of official information and warnings about specific locations under threat, and roads obstructed by fallen trees or downed power lines as potentially compromising their safety.

Sixty-six householders interviewed described having a backup, or fall-back, plan if their initial plan could not be implemented, or failed: originally, 52 had planned to stay and defend, 8 had planned to leave, 6 had an unclear plan or intended to wait and see what developed. In almost all cases the backup plan was to take last-resort shelter near to the house—in a vehicle on a cleared area, in a home swimming pool or farm dam, or in an out-building or improvised fire shelter such as a cellar. Few of these fall-back plans appeared to have been developed in detail or prepared for. However, 14 of these 66 householders survived by implementing their last-resort shelter backup plan.

3.2 Preparations for a wildfire: those who stayed and defended and those who left

Table 5 compares those who stayed and defended with those who left on ratings of five indicators of bushfire readiness. The 4-level rating scales are described in Table 2. Chi-square analyses showed that householders who stayed and defended their properties described significantly higher levels of long-term preparation to survive a bushfire; greater knowledge of bushfires; and higher levels of preparation to survive if a bushfire was to occur on the day in question. Those who stayed and defended also received somewhat higher overall ratings of awareness of fire danger weather, awareness of an approaching bushfire,

psychological readiness to act when threatened. While intriguing, the differences were not sufficient to reach the criterion for statistical significance.

Insert Table 5 about here

A higher percentage of men (57%) than women (36%) stayed and defended. However, Chi-square analyses showed that there were no gender X readiness indicator interactions—that is, within the categories of those who stayed and defended, and those who left, men and women did not differ significantly in their rating patterns and only combined results are shown.

Supplementary analyses showed that there were no significant differences between those who defended their homes successfully and those whose homes were destroyed on: (a) overall ratings of long-term preparation; (b) knowledge of bushfire; or (c) preparation on the day. Taken with the finding noted in Section 3.1 that having planned to stay and defend did not increase the probability of defending successfully, these results suggest that householder success or failure in property defence on the day was determined to some extent by external factors such as the extreme weather conditions, fuel load and proximity, ground slope, and building construction vulnerability--as well as by chance (Table 4).

3.3 Deciding to stay and defend or to leave when there is a wildfire threat

While householders were not specifically asked, a somewhat higher percentage of householders who stayed and defended volunteered mention of an emotional attachment to their home and surrounding environment (43%) compared with those who left (27%):

$\chi^2 (n = 439; df = 1) = 11.21, p < .001, V = .16$. Also, a somewhat higher percentage of those who stayed and defended mentioned links to neighbours and other local residents (58%) compared with those who left (40%): $\chi^2 (n = 439; df = 1) = 13.57, p < .001, V = .18$.

Together, these suggest that for some staying and defending was associated with a feeling of

attachment to home and community. This finding is consistent with that reported by Paveglio *et al.* [30]. Of those who stayed and defended, 35 (16%) mentioned that they had expected to receive a specific warning from authorities that their property would be threatened by the fires while 33 (15%) said that they had *not* expected such a warning. Of those who left, 53 (25%) mentioned that they had expected a specific warning from authorities, while 8 (4%) said that they had not expected such a warning. These differences suggest that those who stayed and defended were more likely to believe that they were responsible for their own safety under bushfire threat: $\chi^2 (n = 129; df = 1) = 17.00, p < .001, V = .38$.

Table 6 lists 12 potential determinants of decisions to either stay and defend or to leave which were mentioned by householders as decision influences. Those who stayed and defended were more likely to report self-efficacy; prior commitment to their plan; and outcome efficacy as decision influences. Those who left were more likely to report an environmental trigger (smoke, flames, embers); family safety concerns; perceived threat from the fire; and warnings of danger from neighbours and family as decision influences. Other decision influences mentioned by householders included: information about the fires broadcast by local radio services; lack of time in which to respond to the fire threat (due mostly to lack of warnings); and the need to protect animals—both household pets and livestock. However, differences between those who stayed and defended and those who left in the frequency of these reported influences were small and not significant.

Insert Table 6 about here

4. Discussion

4.1 Limitations of the study

Before discussing implications of the findings, potential limitations of the research are acknowledged. Interviews were conducted on properties where residents were present on days when task force teams were in the area. Because of the level of destruction and community dislocation it was not possible to recruit a random representative sample of householders in the fire-affected locations studied. While those interviewed covered a range of locations, dwelling types, household compositions, and outcomes, householders whose homes were destroyed are probably under-represented among the interviewees because they were no longer able to reside in the local area.

Most survivors would have been exposed to subsequent media reporting on the fires, which may have influenced aspects of their interviews. Hindsight bias, in which knowledge of event outcomes influences judgements of the predictability of the outcomes [31], may thus have had some effects on householders' reports of events. However, there seem no grounds to suppose that these effects would differ markedly overall for those who stayed and defended compared those who left. Issues of hindsight bias and survivors' recollections are discussed in more detail by McLennan *et al.* [32].

4.2 Preparations, warnings and information

The findings from this sample of bushfire-affected householders suggest that fire agencies had been only moderately successful in their prior information- and education-based endeavours to prepare Victorian communities for bushfires. Only about half of those interviewed indicated a high level of awareness of the risks implied by the predicted fire danger weather. Of those who stayed and defended their property, a little less than half had undertaken a high level of preparation for defence. Of those who left when threatened, less than half had undertaken significant planning and preparation for such an eventuality. It

appears that many residents in bushfire prone areas prior to February 2009 did not perceive community bushfire safety messages as being relevant to their situation.

It seems that both fire agency community safety personnel and residents of at-risk communities had poor appreciations of the likely intensities of bushfires burning under the weather conditions on the day [7]. The significant percentage (20%) of defended homes destroyed, together with the finding that house-defence success was unrelated to level of property preparation, suggests that the messages received by householders about the ‘prepare stay and defend’ component of agencies’ bushfire community safety policy [2-4] did not take sufficient account of increased vulnerabilities under such extreme bushfire conditions--of houses, domestic firefighting equipment, and householders.

The reports by many of those who left at the last moment under imminent threat suggest that the ‘...or leave early’ component of agencies’ bushfire community safety policy [2-4] was poorly understood—consistent with the findings reported previously by Tibbits and Whittaker [22] following the 2003 bushfires in north-east Victoria.

The accounts given, both by those who stayed and defended and those who left under threat, indicated perceived failings in systems and procedures for warning and informing residents under bushfire threat during extreme weather conditions. Evidence presented subsequently to the Bushfires Royal Commission [7] supported the reports of many of those interviewed that their safety was jeopardised by a lack of timely and accurate information about the location and speed and direction of travel of bushfires threatening communities. This issue seems likely to remain a challenge for fire agencies. Message texting and social media did not play a significant role during the 2009 Victorian bushfires. It remains to be seen if these emerging communication modalities can be harnessed to enhance the effectiveness of wildfire threat warnings in the future, notwithstanding optimistic claims by some [33, 34].

4.3 Deciding to either stay and defend or to leave

Inevitably, the data-reduction procedures which enabled quantitative analyses to identify trends and associations among issues reported by those interviewed blur the varied and complex reasons which determined any given individual householder's decision to stay and defend or to leave in the face of bushfire threat. Transcripts often described quite complex householder circumstances where competing threats and priorities had to be managed—for example, safety of family members versus severe financial losses—and such individual experiences were lost. However, broad themes are apparent. The data suggest that for many who stayed and defended, their reasons included an emotional attachment to their home and neighbours and a belief that they were, at least to some extent, responsible for protecting their property against bushfire rather than relying wholly on authorities. Acquired knowledge of bushfire risk generated a plan to prepare, stay and defend in expectation of success. While commitment to their plan to stay and defend was the principal decision driver for most, some abandoned this plan when they judged that the threat posed by the approaching fire was greater than anticipated. A sub-set of those who stayed and defended did so because they judged that there was no time to leave safely and that attempting to defend the house was a safer option than fleeing.

It is more difficult to specify the decision-drivers of those who left. For most, it seems that the major distal factor was absence of a plan to prepare stay and defend. However, there appeared to be considerable variation among householders in what drove decisions to not plan to stay and defend. Some did not perceive their home to be at risk of bushfire attack. Others judged the likely danger to family members as too great to warrant defence. However, only a small number perceived the danger associated with a potential bushfire to be so high as to warrant detailed planning and preparation to minimise the risk. For all, a trigger event was the proximal decision factor. For a very few, this trigger was the fire danger weather

predictions. For most, the trigger event was a warning (either official or unofficial) of the danger posed: as credible information about the proximity or intensity of the fire; and/or as sensory cues from the environment—smoke, embers, flames.

A small, but significant, percentage of householders planned to wait and see how the situation developed before committing to either staying and defending or leaving. While fire agencies warn against taking such an approach to warnings of a possible bushfire threat [25] the limited available evidence [19, 20, 22, 35] indicates that a significant percentage of residents will do so in the face of a wildfire threat warning. Clearly, further research is needed so authorities better understand the reasons behind householders' planning to wait and see what develops when advised of a wildfire threat, and the implications such thinking has for community wildfire safety endeavours.

5. Conclusions

1. The limitations inherent in a post-disaster field research study such as this one mean that findings should be regarded as suggestive. In particular, the interview sample was largely one of convenience and generalisations of findings about householder preparedness to other communities are questionable. However, two subsequent post-bushfire research studies in Western Australia, Lake Clifton (January 2011) and Perth Hills (February 2011) found similarly low levels of householder preparedness for bushfire [36, 37]. Additional post-wildfire investigations of householders' decisions and actions are needed to further confirm and extend the present findings and to evaluate the effectiveness of fire agencies' current and future community wildfire policies, priorities, and programs.

2. Unless there are appreciable changes in Australian community attitudes generally toward bushfire risk, it seems likely that few householders will leave their home and self-evacuate to a safer location based solely on fire danger weather prediction-based warnings. For most residents who do not plan to defend their home, a decision to leave will be made only when a

trigger event, such as a credible warning message (official or unofficial) or environmental cues (such as smoke, embers, flames), indicates an *actual* bushfire threat.

3. A distinction needs to be made, by at-risk householders and fire agency staff alike, between the risks faced by householders under typical wildfire threat conditions and dangers entailed by wildfires burning under extreme fire danger weather conditions such as those which occurred in Victoria on 7 February 2009. This is especially relevant to property defence, where preparations which may well be adequate under typical wildfire weather conditions are likely to prove inadequate under extreme conditions. Educational material about property defence against wildfires should emphasize the risks involved and the need for a sound back-up plan in case defence fails. Specifying adequacy of property preparedness for defence in relation to different weather conditions is a formidable challenge for wildfire safety agencies.

4. The difficulties that many residents reported in knowing when to leave safely suggests that Australasian fire agencies may need to provide more detailed and specific information to householders about evacuating in the face of bushfire threat. Following the 2009 Victorian fires, AFAC revised aspects of its official community bushfire safety position to give more weight to the 'leave early' option: "People usually have two safe options when threatened by bushfire: leaving early or staying and defending adequately prepared properties. Leaving early is always the safest option" [24, p. 1]. It is probably unwise to assume that householders residing in wildfire-prone locations will necessarily have a sound understanding of what leaving "early" means for their particular circumstances, and the planning and preparations needed to ensure their safety in the face of a wildfire threat. At present, it seems almost inevitable that for many who do not intend to stay and defend, leaving will follow a period of waiting and seeing. This needs to be addressed directly by agencies, not simply dismissed as being a dangerous choice.

Notes:

¹ The official total death toll due to the bushfires is 173: 172 civilians and a firefighter killed by a falling tree during ongoing containment operations on 17 February [7]. It has been estimated that during the heatwave in south-eastern Australia 17 January to 8 February 2009 some 374 people died from heat-related causes not associated with bushfires [38].

² A qualitative analysis of a sample of the Bushfire Cooperative Research Centre 2009 Victorian bushfires task force interview transcripts was reported to the Victorian Bushfires Royal Commission [39]. A preliminary analysis using data from 49 task force interviews with survivors of the Murrindindi Fire complex was reported previously [32]. While less comprehensive than the present study, the findings in both the previous reports were consistent with those reported here. Strawderman *et al.* [40] conducted a telephone survey of residents affected by the 2007 San Diego wildfires but the focus was on what type of warning was more likely to result in evacuation. Several studies have been reported which investigated householders' reported intentions if threatened by a wildfire [e.g., 16, 41, 42]

³ Information about the Bushfire Cooperative Research Centre is available at www.bushfirecrc.com

⁴ The fire complexes were: Beechworth-Mudgegonga, Bendigo, Bunyip, Churchill, Horsham, Kilmore East, Murrindindi, and Narre Warren [7].

Acknowledgements

The research was supported by a Bushfire Cooperative Research Centre Extension Grant. However, the views expressed are those of the authors and do not necessarily reflect the views of the Board of the funding agency. The research was approved by the La Trobe University Human Ethics Committee. The authors thank Geoff Conway, Damien Killalea, Illy McNeill, and Lyndsey Wright for their suggestions to revise an earlier version of the

manuscript. We are grateful to two anonymous reviewers for helpful feedback on a previous version of the paper.

References

- [1] K. Haynes, J. Handmer, J. McAneney, A. Tibbits, L. Coates, Australian bushfire fatalities 1900-2008: Exploring trends in relation to the 'Prepare, stay and defend or leave early' policy, *Environmental Science & Policy* 13(3) (2010) 185-194. doi: 10.1016/j.envsci.2010.03.002
- [2] J. Handmer, A. Tibbits, Is staying at home the safest option during bushfires? Historical evidence for an Australia approach, *Environmental Hazards* 6 (2) (2005) 81-91. doi: 10.1016/J.HAZARDS.2005.10.006
- [3] Australasian Fire Authorities Council, Position Paper on Bushfires and Community Safety, AFAC, East Melbourne, 2005.
<http://www.royalcommission.vic.gov.au/Documents/Document-files/Exhibits/TEN-001-001-0077>
- [4] A. Tibbits, J. Handmer, K. Haynes, T. Lowe, J. Whittaker, Prepare, stay and defend or leave early, in: J. Handmer, K. Haynes (Eds.), *Community Bushfire Safety*, CSIRO Publishing, Melbourne, 2008, pp.59-71.
- [5] T. Paveglio, M. Carroll, P. Jakes, Adoption and perceptions of shelter in place in California's Santa Fe Protection District, *International Journal of Wildland Fire* 19 (2010) 677-688. doi: 10.1071/WF09034
- [6] Australian Associated Press.. Black Saturday data reveals where victims died. *The Age*, 28 May 2009. <http://www.theage.com.au/national/black-saturday-data-reveals-where-victims-died-20090528-borp.html>
- [7] 2009 Victorian Bushfires Royal Commission, 2009 Victorian Bushfires Royal Commission Final Report, Government Printer for the State of Victoria, Melbourne, 2010.
<http://www.royalcommission.vic.gov.au/Commission-Reports/Final-Report>

- [8] Y. Liu, J. Stanfurf, S. Goodrick, Trends in global wildfire potential, *Forest Ecology and Management* 259 (2010) 685-697. doi: 10.1016/j.foreco.2009.09.002
- [9] T. Hall, M. Slothower, Cognitive factors affecting homeowners' reactions to defensible space in the Oregon coast range, *Society & Natural Resources* 22 (2009) 95-110. doi: 10.1080/08941920802392187
- [10] W. Martin, I. Martin, B. Kent, The role of risk perceptions in the risk mitigation process: The case of wildfire in high risk communities *Journal of Environmental Management* 91 (2009) 489-498. doi: 10.1016/J.JENVMAN.2009.09.007
- [11] S. McCaffrey, M. Stidman, E. Toman, B. Shindler, Outreach programs, peer pressure and common sense: What motivates homeowners to mitigate wildfire risk? *Environmental Management* 48 (2011) 475-488. doi: 10.1007/s00267-011-9704-6
- [12] B. McFarlane, T. McGee, H. Faulkner, Complexity of homeowner wildfire risk mitigation: An integration of hazard theories, *International Journal of Wildland Fire* 20 (2011) 921-931. doi: .org/10.1071/WF10096
- [13] T. McGee, B. McFarlane, J. Varghese, An examination of the influence of hazard experience on wildfire risk perceptions and adoption of mitigation measures, *Society & Natural Resources* 22 (2009) 308-323. doi: 10.1080/08941920801910765
- [14] D. Paton, P. Burgelt, T. Prior, Living with bushfire risk: Social and environmental influences on preparedness, *The Australian Journal of Emergency Management* 23(3) (2008) 41-48.
- [15] C. Eriksen, N. Gill, L. Head, The gendered dimensions of bushfire in changing rural landscapes in Australia. *Journal of Rural Studies* 26 (2010) 332-342. doi: 10.1016/j.rurstud.2010.06.001

- [16] D. Paton, G. Kelly, P. Burgelt, M. Doherty, Preparing for bushfires: Understanding intentions. *Disaster Prevention and Management* 15 (2006), 566-575. doi: 10.1108/09653560610685893
- [17] P. Jakes, L. Kruger, M. Monroe, K. Nelson, V. Sturtevant, Improving wildfire preparedness: Lessons from communities across the U.S. *Human Ecology Review* 14 (2007), 188-196.
- [18] H. Brenkert-Smith, Building bridges to fight fire: The role of informal social interactions in six Colorado wildland-urban interface communities. *International Journal of Wildland Fire* 19 (2010) 689-697. doi: 10.1071/WF09063
- [19] S. McCaffrey, G. Winter, Understanding homeowner preparation and intended actions when threatened by a wildfire. In S. McCaffrey, C. Fisher (Eds.), *Proceedings of the 2nd conference on the human dimensions of wildland fire*, General Technical Report NRS-P-84, US Department of Agriculture, Forest Service, Northern Research Station Newtown Square PA, 2011, pp. 88-95. <http://www.nrs.fs.fed.us/pubs/38521>
- [20] P. Cohn, M. Carroll, Y. Kumagai, Evacuation behavior during wildfires: Results of three case studies, *Western Journal of Applied Forestry* 21 (2006) 29-48.
- [21] M. Proudley, Fire, families and decisions, *The Australian Journal of Emergency Management* 23 (1) (2008) 37-43.
- [22] A. Tibbits, J. Whittaker, Stay and defend or leave early: Policy, problems and experiences during the 2003 Victorian bushfires, *Environmental Hazards* 7 (2007) 283-290. doi: 10.1016/J.ENVHAZ.2007.08.001
- [23] J. Handmer, S. O'Neil, D. Killalea, Review of fatalities in the February 7, 2009, bushfires, Centre For Risk and Community Safety RMIT University and Bushfire CRC Melbourne, 2010. <http://www.bushfirecrc.com/managed/resource/review-fatalities-february-7.pdf>

- [24] Australasian Fire and Emergency Services Authorities Council, Bushfires and Community Safety: Position. Version 4.1, 8 September 2010. East Melbourne, 2010.
http://knowledgeweb.afac.com.au/positions/documents/AFAC_Position_Bushfires_Community_Safety_v4.1.pdf
- [25] Australasian Fire and Emergency Services Council (AFAC), Prepare. Act. Survive. East Melbourne 2010.
<http://knowledgeweb.afac.com.au/research/community/documents/prepareactsurvive.pdf>
<http://knowledgeweb.afac.com.au/research/community/documents/prepareactsurvive.pdf>
- [26] J. McLennan, G. Elliott, M. Omodei, Issues in community bushfire safety: Analyses of interviews conducted by the 2009 Victorian bushfires research task force, School of Psychological Science, La Trobe University, Melbourne, 2011.
<http://www.bushfirecrc.com/publications/citation/bf-3160>
- [27] V. Braun, V. Clarke Using thematic analysis in psychology, *Qualitative Research in Psychology* 3 (2006) 77-101. doi: 10.1191/1478088706QP063OA
- [28] A. Wilson, I. Ferguson, Predicting the probability of house survival during bushfires, *Journal of Environmental Management* 23 (1986) 259-270
- [29] R. Blanchi, J. Leonard, R. Leicester, Bushfire risk at the rural urban interface. Proceedings of the Australasian Fire Authorities Council Conference, Brisbane 2006.
http://www.bushfirecrc.com/managed/resource/bushfire_risk_at_the_rural_urban_interface_-_brisbane_2006.pdf
- [30] T. Paveglio, M. Carroll, P. Jakes, Alternatives to evacuation during wildfires: Exploring adaptive capacity in one Idaho community. *Environmental Hazards* 9 (2010) 379-394.
doi:10.3763/ehaz.2010.0060

[31] A. Bradfield, G. Wells, Not the same old hindsight bias: Outcome information distorts a broad range of retrospective judgments, *Memory & Cognition* 33 (2005) 120–130. doi: 10.3758/BF03195302

[32] J. McLennan, G. Elliott, M. Omodei, Householder decision-making under imminent wildfire threat: Stay and defend or leave? *International Journal of Wildland Fire* (2012) 915-925. <http://dx.doi.org/10.1071/WF11061>

[33] L. Palen, Online social media in crisis events, *Educause Quarterly* 3 (2008) 76-78. <http://net.educause.edu/library/pdf/eqm08313.pdf>

[34] S. Vieweg, A. Hughes, K. Starbird, L. Palen, Microblogging during two natural hazards events. What Twitter may contribute to situational awareness. Paper presented at the Computer-Human Interaction Human Factors Conference-Crisis Informatics. Atlanta, Ga, April 10-15 2010.

http://www.pensivepuffin.com/dwmcphd/syllabi/info447_a10/readings/vieweg.et.al.TwitterAwareness.CHI10.pdf

[35] A. Rhodes The Australian ‘stay or go’ approach: Factors influencing householder decisions. Extended abstracts from the 2nd Human Dimensions of Wildfire Conference October 23-25. International Association of Wildland Fire. Fort Collins Co, 2007.

<http://www.iawfonline.org/pdf/HumanDimensionsExtendedAbstracts.pdf>

[36] J. McLennan, P. Dunlop, L. Kelly, G. Elliott, Lake Clifton Fire 10 January 2011: Interview task force report – community bushfire safety. Bushfire Cooperative Research Centre Melbourne 2011.

http://www.bushfirecrc.com/sites/default/files/managed/resource/fesa_report_lake_clifton_fire.pdf

- [37] J. Heath, C. Nulsen, P. Dunlop, P. Clarke, P. Burgelt, D. Morrison, The February 2011 fires in Roleystone, Kelmscott and Red Hill. Bushfire Cooperative Research Centre Melbourne 2011. http://www.bushfirecrc.com/managed/resource/bushfire_final_report_0.pdf
- [38] Department of Human Services, January 2009 heatwave in Victoria: An assessment of health impacts. State Government of Victoria, Melbourne, 2009.
http://www.health.vic.gov.au/chiefhealthofficer/downloads/heat_impact_rpt.pdf
- [39] J. Whittaker, J. McLennan, G. Elliott, J. Gilbert, J. Handmer, K. Haynes, S. Cowlshaw, Victorian 2009 Bushfire Research Response: Final Report, Bushfire CRC Post-fire Research Program in Human Behaviour. Melbourne, 2009.
<http://www.bushfirecrc.com/managed/resource/chapter-2-human-behaviour.pdf>
- [40] L. Strawderman, A. Salehi, K. Babski-Reeves, T. Thornton-Neaves, A. Cosby, Reverse 911 as a complementary evacuation warning system. *Natural Hazards Review* 13 (2012) 65-73. doi: 10.1061/(ASCE)NH.1527-6996.0000059
- [41] P. Mozumder, N. Raheem, J. Talberth, R. Berrens, Investigating intended evacuation from wildfires in the wildland-urban interface: Application of a bivariate model. *Forest Policy and Economics* 10 (2008) 415-423. doi: 10.1016/j.forpol.2008.02.002
- [42] J. Whittaker, J. Handmer, Community bushfire safety: A review of post-Black Saturday research, *Australian Journal of Emergency Management* 25(4) 7-13.
- .

Appendix

Bushfires Research Taskforce Human Behaviour and Community Safety Interviewer Guidelines

Note: these are a guide only. The participant is likely to answer many of the questions without being prompted.

Before the interview

- Introduce self
- Introduce research
- Provide ethics statement
- Stress independence from agencies and government
- Explain purpose
- Confidentiality
- Contact details
- Further research
- Obtain consent
- If consent is obtained, proceed with the interview

Interview questions and prompts

Starting question

- Tell me what happened to you during the fire

During the discussion prompt for:

Preparation

- How did you prepare? (timeframe)
- How well-prepared did you feel?
- Did you have a plan? If so, what was it?

Information and warnings

- When and how did you first become aware about the fire?
- When did you realise the fire would impact your property?
- Did you receive a warning? Where from? When? How long before the fire? (formal and informal)

Response

- What did you do (Stay, protect property, shelter in place, wait and see, leave early, leave late)? Why?
- What did other household members do? Why?
- Who was there? What were they doing?
- Did you get any help? Did you help anyone? Did you see anyone else?
- What did you do after the fire front passed (e.g. stay, return)

Leaving

- When did you leave?
- Do you think you left early enough?
- Was there a trigger for leaving?
- Where did you go?
- How did you get there?
- When did you return?

Future

- Is there anything you would do differently?
- What could help the wider community respond to bushfires?

Thank participant.

Table 1

Circumstances associated with 172 civilian fatalities

Activity at time of death	%
Sheltering inside/near a structure	65
Fleeing: car and/or foot	17
Defending a dwelling	9
Caught in the open on foot	3
Other (<i>e.g.</i> , camping, subsequent heart attack)	5

Source: Handmer et al [23, p. 33]

Table 2
Interview Transcript Coding and Rating Categories

-
1. Household composition on the day, and interviewee details.
 2. Whereabouts on 7 February 2009, reasons: Chance? Safety?
 3. Reported actions if present on the property on the day of the fires: stayed and actively defended, left before fire impact, sheltered passively.
 4. Reported outcomes: house survived, damaged, destroyed; took last-resort shelter, left safely, left in danger.
 5. Stated plans prior to 7 February 2009: ‘stay and defend’, ‘leave’, ‘wait and see’, ‘no plan’—if no unambiguous statement: ‘unclear plan’.
 6. Reported evidence of training, experience with bushfires, reading of agency bushfire material.
 7. Reported insurance coverage.
 8. Reported evidence of level of long-term preparation for bushfire:
 - Extensive (4): vegetation clearing, independent water supply and independent power source, plus two or more of: sprinklers, implements, water containers, protective clothing; **or** detailed evacuation plan including three or more of: safety of documents and valuables, arrangements for pets/livestock, destination, evacuation routes, necessities for family needs for 24 hours or more.
 - Some (3): vegetation clearing, plus up to two or three of the above, in relation to staying and defending, **or** to leaving.
 - Minimal (2): limited vegetation clearing, **or** discussion of leaving if threatened.
 - Nil (1).
 9. Reported evidence of awareness of fire danger weather on 7 February 2009:
 - High (4): Frequent acts of vigilance during the day including monitoring the local radio, checking agency web sites, scanning the environment for smoke or embers, telephoning friends or family.
 - Some (3): Infrequent checks of two or more of the above.
 - Minimal (2): Radio on, or occasional glance at the environment.
 - Nil (1).
 10. Reported evidence of physical readiness for a bushfire on 7 February 2009:
 - High (4): equipment ready and tested, water containers filled, protective clothing ready; **or** bags packed and ready, pets/livestock readied, vehicle(s) fuelled and ready.
 - Some (3): some evidence of special preparation to defend **or** to leave: one or two of the above.

Minimal (2): clearing of leaf litter and similar; **or** discussion of leaving if a fire was reported.

Nil (1).

11. Reported evidence of knowledge of bushfires:

High (4): Two or more of training, reading, practice, experience.

Some (3): Attended CFA meeting(s) or reading.

Minimal (2): General knowledge from the media.

Nil (1).

12. Reported evidence of level of awareness of approaching fire:

High (4): Early awareness of a fire, active attempts to track location.

Some (3): Awareness of fire somewhere in the area.

Minimal (2): Only aware when threat obvious.

Nil (1): Taken by surprise.

13. Readiness to act if fire threatened

High (4): Acknowledged threat, anticipated impact; immediate action

Some (3): Aware of threat, some concern, some uncertainty about action

Minimal (2): Aware of a fire, threat not personalized, uncertainty/hesitation

Nil (1): Surprised: inaction or 'panic' reaction

14. Expected an official warning of bushfire threat to community?

15. Report of potential influence(s) on decision making (Table 6).

16. Other key issues or events potentially related to outcome (Table 4).

17. Evidence of: attachment to property, links to community.

Table 3

Householders' bushfire survival plans and actions (N = 457)

Plan	Action						
	Left previous day % (n)	Defended successfully % (n)	Defended failed % (n)	Sheltered passively % (n)	Left safely % (n)	Left danger % (n)	Total % (n)
Stay and defend	<1 (1)	31 (143)	8 (38)	<1 (2)	6 (29)	4 (16)	50 (229)
Leave safely	2 (8)	2 (9)	<1 (1)	<1 (1)	13 (59)	5 (25)	23 (103)
Wait and see	<1 (1)	<1 (2)	<1 (1)	0 (0)	3 (15)	2 (7)	6 (26)
No plan	0 (0)	3 (14)	2 (7)	1 (3)	5 (23)	3 (14)	13 (61)
Unclear plan	0 (0)	2 (8)	<1 (2)	<1 (2)	3 (12)	4 (16)	8 (38)
Total	2 (10)	39 (176)	10 (47)	2 (8)	30 (138)	17 (78)	100 (457)

Table 4

Potential safety-compromising issues described by more than five percent of householders present on the day and differences between those who stayed and defended and those who left (N = 439)

Safety-compromising issue	Percentage reporting ^a		Total number reporting (%) ^a	χ^2 ($df = 1$)	$p^{b,c}$	Cramer's V
	Stayed and defended (n = 223)	Left (n = 216)				
Lack of time to prepare	37%	32%	152 (37%)	1.13	.25 <i>ns</i>	.01
Equipment failure ^d	48%	17%	145 (33%)	47.19	<.001	.33
Lack of official information	18%	33%	111 (25%)	13.75	<.001	.18
Panic, fear, or anxiety	18%	19%	80 (18%)	<.01	.97 <i>ns</i>	.01
Lack of water ^e	23%	5%	62 (14%)	27.14	<.001	.26
Fire more intense than expected	57%	43%	56 (13%)	0.76	.38 <i>ns</i>	.05
House vulnerability ^f	18%	7%	55 (13%)	11.12	.001	.17
Householder injury/fatigue	17%	4%	46 (10%)	16.76	<.001	.20
Responsibility for dependents	10%	7%	37 (8%)	0.86	.35 <i>ns</i>	.05
Evacuation route blocked	4%	7%	25 (6%)	1.74	.19 <i>ns</i>	.07

^a Several householders reported more than one issue so the percentages sum to more than 100%.

^b Bonferroni critical p value = $.05/10 = .005$

^c *ns* = not significant

^d Most failures were associated with water supply: power, pumps; plastic pipes, fittings, water tanks.

^e Mostly, this involved low levels of stored water due to the drought conditions.

^f These included adjacent fuels, ground slope, and structure vulnerability to ember attack, often in combinations.

Table 5

Comparison of bushfire readiness indicator ratings for those who stayed and defended with those who left

Readiness Indicator ^a	Action	Readiness Rating Level (%)				n	χ^2 (<i>df</i> = 3)	<i>p</i> ^{bc}	Cramer's <i>V</i>
		Nil	Minimal	Some	High				
Long-term preparation (.94)	Defended	4	16	32	48	213	94.12	<.001	.48
	Left	19	38	35	8	189			
Knowledge of bushfire (.89)	Defended	4	15	53	28	171	49.79	<.001	.41
	Left	23	34	29	14	122			
Preparation on the day (.95)	Defended	8	17	37	38	220	58.37	<.001	.37
	Left	29	26	34	11	204			
Awareness of fire danger Weather (.88)	Defended	8	8	25	59	166	11.53	.009 <i>ns</i>	.19
	Left	15	17	26	42	158			
Awareness of approaching Fire (.92)	Defended	3	22	55	20	221	11.14	.011 <i>ns</i>	.16
	Left	6	25	60	9	214			
Readiness to take survival action (.83)	Defended	17	28	30	25	214	5.40	.145 <i>ns</i>	.15
	Left	10	29	29	32	210			

^aFigures in brackets are inter-rater reliability indices as Cohen's *Kappa*^bBonferroni critical *p* value is .05/6 = .008^c*ns* = not significant

Table 6

Percentage of each group of survivors reporting a specific decision influence, Chi-square tests, and transcript examples

Decision influence ^a	Percentage reporting decision influence		χ^2 (1, N=439)	<i>p</i> ^{bc}	Cramer's V	Examples ^d
	Stayed to defend n=223	Left n=216				
Self-efficacy (.85)	40%	3%	84.89	< .001	.44	Stayed: <i>...when I saw the fire coming, and it was just a grass fire, I said 'well, we can handle that.'</i> (#060) Left: <i>...And I was quite confident what I was doing, but it was difficult to see. I mean, I could have run off the road but I knew the main fire had gone through.</i> (#158)
Environmental trigger (.94)	25%	63%	63.99	< .001	.38	Stayed: <i>...we saw the smoke. We knew it was time to make a decision and I decided I'd stay and see if I could control any embers coming on to our property.</i> (#076) Left: <i>And I looked up...and saw a huge glow in the sky...and I said 'that's not smoke, that's fire'. And we said 'right, we're leaving'. That was our decision.</i> (#068)
Commitment to plan (.91)	78%	41%	61.90	< .001	.38	Stayed: <i>We'd always said, the three of us, that if there was a fire we would defend. Simple as that.</i> (#102) Left: <i>It just hadn't been practical to spend the time and money in setting ourselves up in order to stay. So we knew that if there was any threat of fire we wouldn't stay, under no circumstances.</i> (#064)
Outcome efficacy (.83)	30%	3%	58.84	< .001	.37	Stayed: <i>...as far as preparation and everything else, no I don't think there is anything more we could have done. We were as prepared as we could be.</i> (#044) Left: <i>I said to the kids 'Follow me straight to the Recreation Centre in Flowerdale'. Which I thought was the safest place, which as it turned out, it was.</i> (#307)
Family safety	9%	27%	25.02	< .001	.24	Stayed: <i>As for leaving the house, I knew J_____ and the boys</i>

concerns (.88)						<i>were going to be here (defending) and I couldn't have gone off and left them. (#106)</i> Left: <i>In my mind always I've said to M_____ if there's any sort of threat I don't care about the house. I'd just rather be with the kids and be safe. (#061)</i>
Perceived threat from fire (.91)	31%	48%	13.64	< .001	.18	Stayed: <i>Somebody said to me 'why didn't you get in the cars and leave?' because we had them sitting there. I said I couldn't have driven them out through that fire for anything. (#067)</i> Left: <i>Then a massive roar came and the flames came over the ridge...it was incredibly frightening. I said 'we need to go, go now'. (#065)</i>
Warnings from neighbours, family (.96)	37%	63%	8.80	.003	.14	Stayed: <i>The neighbours came from next door and told us there was a fire, so we got ready. (#167)</i> Left: <i>...and my friend rang me back and said you should probably think about going now, so he was obviously a lot more aware of what was going on than we were. (#105)</i>
Lack of warning, no alternative (.83)	26%	19%	3.55	.060 ns	.09	Stayed: <i>We saw (the fire) jump there and we thought, no we can't go now. So we were going to stay, we weren't going to go. (#060)</i> Left: <i>I went inside and grabbed my car keys, and it's lucky I had my keys inside because if I'd stayed outside I wouldn't have made it to my car. (#144)</i>
Concern for pets/livestock (.98)	16%	22%	3.05	.081 ns	.08	Stayed: <i>Then it got to the stage where I had to go to rescue the horse here. So I got the horse out and got back to the house. (#097)</i> Left: <i>One of the things that prompted me to leave early was with five dogs I didn't like my chances in a panic of getting (them) into car to get out of here. (#064)</i>
Insurance coverage (1.00)	1%	3%	2.17	.141 ns	.07	Stayed: <i>That's the other thing. That's another reason why I had to fight for it (--the house-). I'm not that rich, I can't afford insurance. (#257)</i> Left: [Interviewer] – <i>Now why did you make the decision to leave rather than stay?</i> [Householder]— <i>Because our house is</i>

						<i>insured. (#105)</i>
Perceived fire threat greater than expected (.88)	14%	11%	1.03	.310 <i>ns</i>	.05	Stayed: ... <i>get a bucket ready for after, to put the fires out, and I did all that. But the fire was so aggressive, all of a sudden all the windows exploded in my house and black smoke came in and I couldn't breathe anymore, so I had to go outside. (# 042)</i> Left: <i>I was at home and I thought, oh yeah, the bushfire's coming so no problems. So I got everything set up for a small bushfire. Once it came over that hill, mate, I'm out of there. So I ran. (#11)</i>
Local radio warnings/news (.92)	57%	43%	0.12	.740 <i>ns</i>	.02	Stayed: <i>On the Saturday we were just keeping an eye on things and listening to the radio news about where the fire was going, and watching the smoke. (#102)</i> Left: <i>So we listened to the (local) radio and about half an hour after, it came on the radio that there was a large fire at Churchill...so probably about 2pm we made a decision to leave. (#164)</i>

^a Figures in brackets are inter-rater reliability indices as Cohen's *Kappa*; householders could report more than one decision influence

^b Bonferroni critical *p* value = .05/12 = .004

^c *ns* = not significant

^d Number in brackets is the interview transcript number