



**Bushfire Cooperative Research Centre Extension:
Communicating Risk - Human Behaviour Under Stress (2) Project**

Report Number 4: 2011

**Issues in Community Bushfire Safety:
Analyses of Interviews Conducted by the
2009 Victorian Bushfires Research Task
Force**

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December 2011**

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Table of Contents

Executive Summary	4
Section 1: Introduction and Background	7
The Bushfires Research Task Force	8
Aims	
Section 2: Methodology	10
The Task Force Interviews	10
Interview Transcript Coding	11
Those Interviewed	14
Technical Notes	15
Section 3: Preparations For Bushfire and Locations	16
Residents' Bushfire Survival Plans/Intentions	16
Level of Long Term Preparation	17
Insurance	18
Residents' General Knowledge of Bushfires and Bushfire Threat	18
Awareness of Predicted Fire Danger Weather	19
Physical Readiness on the Day for a Possible Bushfire	20
Awareness of Approaching Fire	21
Psychological Readiness to Take Action	22
Overall Readiness to Survive a Bushfire	23
Expected Official Warning?	24
Expected Agency Assistance?	24
Readiness and Expectations of Agencies	24
Sources of Information About the Fire Threat on 7 February 2009	24
Sense of Community	25
Attachment to Place	26
Section 4: Plans/Intentions, Actions, Outcomes	27
Prior Plans/Intentions in Relation to Actions	27
Actions in Relation to Prior Plans/Intentions	27
Plans/Intentions, Actions, Outcomes, Backup (Alternative) Plans	28
Actions in Relation to Property Outcomes	29
Property Outcomes in Relation to Long Term Preparation	29
Actions in Relation to Different Members of Households	30
Destinations of Residents Who Left	30
Would Residents Act Differently in Future?	30
Section 5: In What Ways Did Residents Who Stayed and Defended Differ From Those Who Left?	31
The People: Age, Gender, Dependent Children, Property Type	31
Links With Community, Attachment to Property	32
Preparation: Residents' Bushfire Survival Plans, Insurance	32
Level of Long Term Preparation	33
General Knowledge of Bushfires	34
Readiness on the Day: Awareness of Fire Danger Weather	35
Readiness if a Bushfire Was to Threaten	36
Awareness of Approaching Fire	37
Readiness to Act Once A Threat Was Known	38
Expected an Official Warning?	39
Expected Assistance?	39

Experiences on the Day: Sources of Information	39
Levels of Threat	40
Influential Decision Factors	41
Potentially Survival-Enhancing Factors	42
Potential Threat and Hazard Factors	43
Potential Risk-Enhancing Factors	44
Section 6: Concluding Discussion	45
References	47
Appendix A: Task Force Interview Guidelines	48
Appendix B: Transcript Coding/Recording Form	50
Appendix C: Threat Level rating Scale	53

Acknowledgements

The Bushfire CRC community bushfire safety and human behaviour Task Force interview program was coordinated by John Handmer (RMIT University) and Damien Killalea (Tasmania Fire Service). The transcription of interviews was coordinated by staff members of the Bushfire CRC and the Australasian Fire and Emergency Services Authorities Council (AFAC). The End-User Leader for the research reported here was Damien Killalea. We are grateful to Damien Killalea and Richard Thornton for helpful feedback on a draft version of the report.

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Executive Summary

Note that we have used the term 'bushland' to include any and all of forest-both native and plantation, woodlands, scrub, bushlands, and grasslands. We considered using 'wildland' as an alternative umbrella term but received strong feedback that 'bushland' was more appropriate in an Australian context.

1. Immediately following the 7 February 2009 Victorian bushfires the Bushfire CRC organised a multi-agency Task Force to investigate and report on four aspects of the fires: arson (in collaboration with Victoria Police); fire behaviour; building survivability and infrastructure; and human behaviour and community safety. This last involved interviewing a cross-section of survivors about their experiences.
 2. A total of 552 field interviews were conducted, resulting in 496 usable and informative interview transcripts. The transcripts were analysed following coding of aspects of survivors' accounts. This report describes findings in relation to issues of householder bushfire knowledge, planning, preparedness, decisions, actions, threats, and hazards.
 3. The aim of the report is to inform fire and emergency services agencies about survivors' beliefs, plans actions, and experiences which may have implications for current community bushfire safety policies, priorities, programs, and practices.
 4. Survivors' accounts covered eight fire complexes: Beechworth, Bendigo, Bunyip, Churchill, Horsham, Kilmore, Murrindindi, and Narre Warren. Of the 496 transcripts, 360 were from residents of isolated rural properties, 99 were from residents of rural towns, and 37 were from residents of bushland-urban interface (suburban) streets.
 5. Bushfire survival plans: It is estimated that 81% of those who planned to stay and defend had undertaken more than minimal long term preparation to do so, while 34% of those whose plan was to leave safely had undertaken more than minimal long term preparation to do so. Overall, 6% of survivors planned to 'wait and see' before committing to a course of action; 9% had an unclear household bushfire plan; 70% of bushland-urban interface survivors had no household bushfire plan.
 6. Actions on the day: Of the 496 survivors, 8% were not at home on 7 February 2009 by chance; 2% were not at home by choice to be somewhere safer; 28% left safely before impact of a fire; 16% left under hazardous conditions; 36% stayed and defended their home successfully; 9% stayed and attempted to defend but were unsuccessful; 2% sheltered in place passively.
 7. Overall, less than one-third of those interviewed had undertaken a high level of long term preparation to implement their household bushfire survival plan. A little more than half of the bushland-urban interface residents had undertaken no preparation.
 8. Although many of those interviewed did not provide information on awareness of fire danger weather, 50% of those who did evidenced a high level of awareness of fire danger weather on 7 February 2009. However, these were all residents of isolated rural properties
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or towns: almost half of the bushland-urban residents were not aware of the predicted fire danger weather in relation to a potential threat to their property from a bushfire.

9. On five indicators of bushfire ‘readiness’ (long term preparation, awareness of fire danger weather, physical readiness for a possible bushfire, awareness of an approaching fire, and readiness to act upon knowledge of an imminent bushfire threat) residents of isolated rural properties described higher overall readiness levels than did residents of rural towns and bushland-urban interface residents—the latter described very low levels of readiness to survive a bushfire.
 10. It seems that most residents of isolated rural properties had a reasonable level of awareness of bushfire risk in general, and had personalised this and undertaken long term property preparation to defend against bushfire which may have been adequate for ‘typical’ low to moderate intensity bushfires.
 11. Most residents of bushland-urban interface dwellings did not understand themselves to be at-risk of bushfires, notwithstanding their proximity to bush or grassland. Residents of rural towns varied: some had an understanding of their risk similar to those who resided on isolated rural properties, some had an understanding similar to bushland-interface residents in relation to bushfire risk. Others had bushfire risk understandings intermediate between these.
 12. There is some indication that those interviewees who stated an expectation that they would receive an official warning that their property was under threat, and/or that they would be given firefighting assistance had lower levels of general readiness to survive bushfires.
 13. The most immediately useful sources of information for residents under bushfire threat were cues from the environment: smoke, flames, embers, sounds.
 14. Most of those whose bushfire plan was to leave did so. Most of those who planned to stay and defend did so—however, 20% decided to leave instead when they became aware of the intensity and/or proximity of the fire. Most of those whose ‘plan’ was to wait and see left, as did the majority of those who had no plan and most of those whose plan was unclear.
 15. Most (80%) of the homes which were defended actively survived, while 52% of the homes not actively defended survived.
 16. There was no compelling evidence that house survival was related to level of long term property preparation.
 17. Compared with those who left, those who stayed and defended described higher levels of bushfire readiness in the form of: long term preparation; general knowledge of bushfires; awareness of predicted fire danger weather; physical readiness for a possible bushfire on the day; and awareness of an approaching fire. They were also less likely to report expecting a warning from authorities that their properties would be threatened by a bushfire.
 18. Overall, those who stayed and defended were exposed to considerably higher levels of threat to life. However, 8% of those who left were exposed to severe or extreme levels of threat when forced to take last resort shelter as a result of leaving at the last minute.
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19. The major determinant of residents' decisions to stay and defend was a prior commitment to this course of action, coupled with a belief that their preparations were adequate and that they were capable of defending successfully. For most of those who left, the decision to leave was a complex mix of neither intending nor preparing to defend, and triggering by information about: the proximity and intensity of the fire, the perceived threat posed by the fire, and concern for the safety of family members.
20. Almost two-thirds of those who stayed and defended reported that their efforts were compromised to a greater or a lesser degree by equipment failure—involving mostly water and power supply. Three quarters had no back-up plan in the event that defence failed and the house burned.
21. About one in five of those on their property on the day reported that the safety of pets and/or livestock was a factor in their decisions and actions.
22. One quarter of those on their property on the day indicated that a lack of official information and warnings about the fire potentially exposed them to greater risk.
23. It seems that many residents who choose to stay and defend are likely to: underestimate the potential severity of a bushfire attack; overlook vulnerabilities of the house structure; not take into account possible failure of equipment and physical capabilities; and not prepare for survival in the event that defence is unsuccessful and the house burns.
24. It seems that bushfire survival plans to leave safely are difficult for many at-risk householders to prepare for, commit to, and implement. Few are likely to relocate to a place of safety before there is some indication of an actual bushfire threat (not just a prediction of a total fire ban day), and many are unlikely to leave in the absence of a trigger event which leads them to conclude that their property is likely to come under attack and it is 'time to leave'.

It should be noted that that many of these findings based on survivors' accounts correspond closely with *Key findings* concerning the bushfire fatalities reported by J. Handmer, S. O'Neil, and D. Killalea in their report to the 2009 Victorian Bushfires Royal Commission *Review of fatalities in the February 7, 2009, bushfires* (pp. 6-16).

Section 1: Introduction and Background

The 7 February 2009 Victorian Bushfires

(The following summary account is based on a detailed description in Volume 1 of the 2009 Victorian Bushfires Royal Commission *Final Report*).

On Saturday 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 several days in advance. Warnings of extreme fire risk expected on 7 February were broadcast widely via the electronic media, and reported extensively in daily newspapers during the preceding week.

From mid-morning, numerous fires broke out across much of the State. As predicted, the weather conditions were extreme—high temperatures (>44 degrees Celsius), low relative humidities (<10%), and strong winds (>100kph). The rainfall for the previous 12 months was well below the annual average, and this followed 10 years of drought conditions. The so-called 'Black Saturday' bushfires caused 173 fatalities in total; more than 2,000 homes were destroyed; about 5,000 people were made homeless; and several communities were devastated; resulting in severe economic, social, and environmental costs, amounting to at least US\$4 billion (2009 Victorian Bushfires Royal Commission 2010).

The Bushfires Research Task Force

Immediately following 7 February 2009, the Bushfire Cooperative Research Centre organised a multi-agency Task Force to investigate the fires. An important aspect of this was interviewing a large cross-section of survivors (other aspects involved analysing fire behaviour and assessing the survivability of dwellings and other structures in affected communities). The interview program was lead by Professor John Handmer (RMIT University) and Mr. Damien Killalea (Tasmania Fire Service).

An analysis and reporting team undertook two qualitative analyses of the verbal content of interview transcripts, under the leadership of Professor John Handmer and Dr Joshua Whittaker from RMIT University's Centre For Risk and Community Safety. The analyses focussed on survivors' statements about four aspects of human behaviour and community safety in relation to the 7 February 2009 fires:

- Planning and Preparedness.
- Information and Warnings.
- Intentions and Actions.
- Other (Emerging) Issues in Relation to Community Bushfire Safety.

The team's first, interim, report described findings from content-analyses of 201 survivors' accounts of their experiences (Whittaker *et al.* 2009a). At the request of the Royal Commission a second analysis was undertaken which incorporated an additional 100 transcripts of interviews with survivors drawn from a wider range of fires. A second, final, report based on 301 interview transcripts confirmed the initial findings (Whittaker *et al.* 2009b).

Whittaker *et al.* (2009b) found, among other things, that:

- (a) fire agencies and local councils had been only modestly successful at informing members of at-risk communities about effective preparation and planning for bushfires;
- (b) there was generally poor appreciation by community members of the implications of the predicted extreme levels of fire danger weather; and
- (c) a significant number of residents intended to ‘wait and see’ what the fire was like before committing to a decision to either stay and defend or leave.

The Task Force final report on human behaviour and community safety: (i) focussed somewhat narrowly on interview content central to the terms of reference of the Royal Commission; (ii) only drew upon a subset of the accounts provided by interviewees; and (iii) used a qualitative methodology which did not lend itself readily to comparisons of the experiences of interviewees from different locations or who undertook particular actions during the fire—such as those who lived on isolated rural properties compared with those who lived in townships, or those who stayed and defended their properties compared with those who left before impact of a fire.

In September 2010 the Bushfire CRC commissioned an analysis of all the Task Force interview transcripts to identify any additional community bushfire safety issues not addressed by the two previous Task Force reports on human behaviour and community bushfire safety. A decision was taken by the researchers to employ a different analysis procedure (described below) with a quantitative focus, rather than simply repeat the use of qualitative procedures similar to those which generated the two previous reports.

Aims

The aims of the research reported here were:

1. To examine systematically all the transcripts of interviews with survivors conducted by the 2009 Victorian Bushfires Research Task Force.
2. To extract information about survivors’ beliefs, plans, actions and experiences from these transcripts potentially relevant to a range of community bushfire safety issues.
3. To inform fire and emergency services agencies about survivors’ beliefs, plans, actions, and experiences which may have implications for community bushfire safety.

No attempt has been made to relate findings to the numerous community bushfire safety initiatives adopted by agencies following the findings of the 2009 Victorian Bushfires Royal Commission. We have not addressed general bushfire safety issues such the adequacy of official bushfire alerts and warnings; local government policies in relation to vegetation clearing and building approvals; and residents being prevented by Victoria Police from returning to fire affected areas. We judged that such issues had been more than adequately covered in the 2009 Victorian Bushfires Royal Commission Interim and Final Reports. Our focus was on survivors’ reported experiences related directly to their survival leading up to, and on, Black Saturday.

No recommendations have been proposed. It is suggested that the findings described in this report be considered by fire and emergency services agencies in relation to their current community bushfire safety policies, priorities, programs, and practices.

It may be helpful to consider this report in conjunction with reading, or re-reading, four other complementary reports:

- *Human behaviour and community safety*. Victorian 2009 Bushfire Research Response Final Report October 2009, Melbourne: Bushfire Cooperative Research Centre.
<http://www.bushfirecrc.com/managed/resource/chapter-2-human-behaviour.pdf>
 - *Use of informal places of shelter and last resort on 7 February 2009: Peoples' observations and experiences – Marysville, Kinglake, Kinglake West, Callignee*. School of Psychological Science, La Trobe University & Bushfire CRC.
http://www.cfa.vic.gov.au/documents/research/Use_of_Informal_Places_of_Shelter_and_Last_Resort.pdf
 - *Community members' decision making under the stress of imminent bushfire threat – Murrindindi Fire*. School of Psychological Science, La Trobe University.
<http://www.bushfirecrc.com/publications/citation/bf-3138>
 - *Review of fatalities in the February 7, 2009, bushfires*. Melbourne: Centre For Risk and Community Safety RMIT University and Bushfire CRC.
<http://www.bushfirecrc.com/managed/resource/review-fatalities-february-7.pdf>
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Section 2:

The Bushfire CRC Task Force Human Behaviour and Community Safety Research Project: Methodology

The Task Force Interviews

Participants were interviewed at their properties (survived, damaged, or destroyed), most over the course of six weeks following the fire. It is not possible to state with certainty the total number of Task Force interviewers, because events in the field meant that roles had to be flexible. On the basis of examining the transcripts, it appears that about 60% of the interviews were conducted by 11 research staff and students, or former students, from RMIT University and La Trobe University. The other 40% were conducted by fire agency staff, mostly by those involved in community bushfire safety programs.

Because of the damage to local infrastructure and the large number of displaced residents it was not possible to recruit a random sample of survivors to interview. However, those interviewed represented a range of locations, property types, household compositions, and outcomes. Interviews were conducted at properties where people were present on those days on which Task Force teams were in the area. Almost all those approached agreed to be interviewed, there were reportedly very few refusals and these were apparently due mostly to residents not having the time to be interviewed when approached. Interviews were semi-structured in format, and followed an interview guide which invited survivors to describe:

1. Their preparations for a bushfire and their bushfire plan prior to 7 February 2009.
2. Information and warnings received about predicted fire danger weather and fires on the day.
3. What they did when they became aware of a fire threat and why,—if they defended, what was it like? If they left: when, why? Where did they go?
4. Would they do anything differently about bushfire threat in the future and why.

Interviewers were instructed to encourage participants to provide as detailed an account of their experiences as possible. The interview guide is appended (A).

Most interviews lasted between 20 and 40 minutes. Interviews were recorded digitally, and transcribed and checked by one of two professional legal transcription services (Ripper Reporters, and Pacific Transcription Services).

As indicated previously, the interviewees constituted a sample of convenience, not necessarily a representative sample of those affected by the 7 February 2009 fires. In particular, those whose homes were destroyed are almost certainly under-represented, simply because many of these former householders were no longer able to reside on their property or in the local area.

The number of interviews

There has been some uncertainty about the number of interviews conducted by the Task Force with survivors of the 2009 Victorian bushfires in relation to human behaviour and community safety. Initially, a figure of 608 interviews was proposed by Bushfire Cooperative Research Centre staff managing the Task Force. However, it now appears that this figure referred to the number of digital recorder tracks sent for transcription. It seems that initially,

some inexperienced interviewers stopped interview recordings (due to interruptions for various reasons) and re-started the recorder (rather than simply pausing and resuming) which resulted in several interviews being recorded across multiple tracks. A total of **556** interview transcripts were produced by the two professional transcription services utilised. Four of these were duplicates, leaving **552** individual transcripts. A total of **56** transcripts were discarded because they were unusable: short fragments of interviews (presumably resulting from digital recorder operating difficulties); poorly conducted interviews containing no relevant information; interviews with individuals who had been engaged in fire-related operational duties remote from their residence; and interviews with individuals who had not been involved personally with the fires but who provided ‘hearsay’ accounts of what others had described to them. Thus, a total of **496** interview transcripts generated the information in the present report.

Quality of the Interviews

From a research perspective, the quality of the 496 interviews varies greatly in terms of the comprehensiveness of the information provided. Each transcript was rated by coders for comprehensiveness in relation to coverage of the topics specified by the interview guide (1-4 above):

- 400/496 = 81% addressed all of topics 1 – 4 of the interview guide.
- 96/496 = 19% did not address all of topics 1 -- 4 of the interview guide.

Of the 400 interviews which addressed all four interview guide topics, 71 (18%) elicited detailed information related to community bushfire safety which elaborated on topics 1 -- 4 appreciably.

It is important for readers to understand the conditions under which the interviews were conducted. For the first two weeks of Task Force activity, there were still fires burning in some locations. Most interviewers were obliged to wear full PPE because of the hazardous nature of the environments in which they were working (including threat of falling trees and limbs, cracked septic tanks, dead animals, fallen power and telephone lines, building rubble and debris, and the possibility of asbestos contamination of sites). Temperatures were often above 30 degrees Celsius. Those interviewed were all, to a greater or lesser extent, experiencing stress—some had lost not only homes, pets, and livestock but family members and neighbours killed in the fires. Interviewers had been briefed on the need for sensitivity in relation to survivors’ well being and on occasions chose not to ask certain questions, not to follow-up sensitive issues, and to cut interviews short when survivors evidenced distress. Many interviewers reported that they found some interviews upsetting because of the nature of the events described. There seems little doubt that these factors contributed appreciably to the inconsistent coverage of topics across interviews—especially in relation to issues such as insurance, and information somewhat peripheral to events on the day of the fires, such as knowledge or previous training or experience associated with bushfires. Generally, interviews with those who were not on their property on the day of the fire (either by chance or by a bushfire safety-related decision) were cursory, and these interviews account for much of the ‘missing’ information noted in some sections of this report.

Interview Transcript Coding

Because of the semi-structured nature of the interviews (originally deemed necessary in order to encourage survivors to describe fully their varied experiences) a 22-category interview content coding frame was constructed for the present report, based on the interview guide topics, to allow potentially relevant information to be extracted from each interview in such a

way that specific topics mentioned by interviewees could be enumerated so as to allow a range of potential issues to be investigated. The coding frame used to analyse the transcripts of interviews with residents who were on their properties on the day comprised the following content categories:

-
1. Household composition on the day, and interviewee information.
 2. Whereabouts on 7 February 2009.
 3. Reported actions if present on the property on the day of the fires: stayed and actively defended, or left before fire impact.
 4. Rated level of threat experienced by household members (Appendix C).
 5. Reported outcomes: house survived, damaged, destroyed, took last-resort shelter, left safely, left in danger.
 6. Stated plans prior to 7 February 2009: 'stay and defend', 'leave', 'wait and see', 'no plan'—if no unambiguous statement: 'unclear plan'.
 7. Reported evidence of training, experience with bushfires, reading of agency bushfire material.
 8. Reported insurance coverage.
 9. 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, up to two or three of the above, in relation to staying and defending, **or** to leaving.
 - Minimal (2) – limited vegetation clearing, discussion of leaving if threatened.
 - Nil (1).
 10. 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).
 11. 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).
-

12. 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).

13. 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.

14. 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

15. Sources of information about the fire threat.

16. Expected an official warning of bushfire threat to community and/or firefighting assistance?

17. Report of potential influence on decision making.

18. Reported survival-enhancing activities.

19. Reported survival-compromising activities.

20. Other key issues potentially related to outcome.

21. Likely action if threatened by a bushfire in the future.

22. Evidence of: sense of community, and attachment to property.

A copy of the interview coding recording sheet used for each transcript is appended (B). Each transcript was coded independently by two coders. Instances of disagreement were rare and were resolved by joint re-examination of the transcripts in question, discussion, and consensus.

The overall analysis process involved four steps.

1. Coding of relevant statements in each transcript independently by two coders, using the above coding frame, and agreement.
2. Copying the coded transcript segments into corresponding coding categories in an *NVivo8* text management software file.
3. Entry of codings for each of 496 transcripts (see below) into an *Excel* data file, and analyses using the *SPSS PAWS 18* statistical package.
4. Participants' statements in *NVivo8* file coding categories were examined for content and themes by the two coders independently, following standard procedures

recommended for thematic content analysis of verbal protocols. The coders subsequently discussed themes identified and came to agreement on common issues described by participants in relation to each coding category.

Those Interviewed

The 496 interviews were conducted with survivors of eight major fire complexes (in alphabetical order):

<u>Fire Complex</u>	<u>Number of interviews</u>
1. Beechworth	9
2. Bendigo	24
3. Bunyip	14
4. Churchill	33
5. Horsham	10
6. Kilmore	344
7. Murrindindi	49
8. Narre Warren	13

(Because of the destructiveness of the Kilmore Fire and the large area affected, a major interviewing effort was directed at properties affected by this fire).

To explore possible differences in bushfire knowledge and preparation associated with location of residence, interviewees' residences were classified as:

- Rural residential -- isolated dwelling, on a large rural property
[Fire complexes: Beechworth, Bunyip, Churchill, Kilmore (299 properties), Murrindindi (5 properties)] 360
- Town street residence
[Fire complexes: Horsham, Kilmore (45 properties), Murrindindi (44 properties)] 99
- Bushland-urban interface suburban residence (B-U-I)
[Bendigo, Narre Warren] 37

(Classifications were based on the street/road address of the residence and inspection of street directories and Google maps on-line).

The 496 interviewees were 320 men (65%) and 173 women (35%), the gender of three interviewees was not clear from the transcripts. Interviewees' mean age was 49.8 years (SD = 11.6 years, range 13-81 years). Note that the 13 year old had been home alone when the fire impacted and was rescued by a parent, who consented to the boy being interviewed and was present during the course of the interview. Almost three-quarters (73%) of those interviewed were from households with no dependent children under 16 years of age, the remaining households comprised an average of 1.8 children per household.

The following summarises the status and actions of the 496 interviewees on Saturday 7 February, 2009:

- Not at home due to chance 8% (39)
- Not at home by decision to be somewhere safer 2% (10)

- Left home prior to any evident threat 4% (20)
- Left home safely under imminent threat 24% (118)
- Left home in hazardous conditions under imminent threat 16% (78)
- Stayed and defended successfully 36% (176)
- Stayed and attempted to defend-unsuccessful, sheltered in place 4% (20)
- Stayed and attempted to defend-unsuccessful, fled 5% (27)
- Stayed, sheltered in place passively 2% (8)

Noteworthy features of the above include:

1. How **few** interviewees (10, 2%) chose to leave their homes in order to be in a safer location prior to 7 February 2009.
2. How **many** interviewees (231, 47%) stayed and either defended or sheltered in place.
3. The relatively high percentage of those who attempted to defend their home who were **unsuccessful**: $47/223 = 21\%$.

Technical Notes

We used the term ‘bushland’ to include any and all of forest-both native and plantation, woodlands, scrub, bushlands, and grasslands. We considered using ‘wildland’ as an alternative umbrella term but received strong feedback that ‘bushland’ was more appropriate in an Australian context.

To assist in readability, statistical detail has mostly been omitted from the report. Details are available from the authors.

1. Percentages have mostly been rounded to the nearest whole number, this means that some percentages may not total 100 because of rounding ‘errors’.
2. There may be inconsistencies across tables in some totals and sub-totals because of missing information. The statistics software used (*SPSS PASW Statistics 18.0*) deletes from any analysis all cases which have missing values.
3. Cross-tabulations were analysed using Fisher’s Exact Probability procedure, with a significance value set at $p < .01$.
4. Comparisons of means of groups used Analysis of Variance (ANOVA) tests, and Tukey’s *post hoc* procedure with a significance value set at $p < .05$.
5. Three indices of how strongly factors were associated (that is, correlated or ‘went together’), were used. First, to indicate how strongly ratings of different types of bushfire preparation and activities were associated, correlation coefficients (r) were calculated. Second, to indicate how strongly an overall bushfire ‘readiness’ score was associated with, say, mentioning links to neighbours, point-biserial correlation coefficients ($r_{\text{point biserial}}$) were calculated. Both types of coefficient can range in magnitude from -1 through 0 to +1. Third, to indicate how strongly house survival or destruction was associated with level of long term preparation contingency coefficients (C) were calculated. These can (mostly) range from 0 to +1. For all three, a generally accepted rule of thumb is that a coefficient less than 0.3 (regardless of + or -) indicates ‘weak’ association; 0.3 to 0.4 ‘moderate’; and 0.5 or greater ‘strong’ association.

Section 3: How well prepared were interviewees for a bushfire in February 2009? Did their location make a difference?

Residents' Bushfire Survival Plans/Intentions.

The majority of residents (86%) reported having thought about the possibility of a bushfire and having a plan or an intention about what they would do if a bushfire threatened (Table 3.1) However, the specificity of plans and the level of preparatory activities undertaken to implement the plan or intention varied greatly. In an attempt to quantify overall 'quality' of plans, the data on level of long term bushfire preparation (summarised in Table 3.2) were taken into account. It was assumed that in order for a plan to be considered meaningful, there should be evidence of more than minimal preparation for it to be implemented. Of the 355 interviewees who reported a plan to either leave early or stay and defend (Table 3.1) 232, or 65%, described more than minimal long term preparation to implement the plan. Of the 118 who reported a plan to leave early, 40, or 34%, described more than minimal long term preparation to implement the plan. Of the 237 who reported a plan to stay and defend, 192, or 81%, described more than minimal long term preparation to implement the plan.

Occupants of Rural properties were most likely to report having a plan. Occupants of Bushland-Urban Interface (suburban) properties were least likely to have a plan. A somewhat similar percentage of residents reported a plan to 'wait and see' across the three types of property locations (overall, 6%).

Table 3.1: Residents' Bushfire Survival Plans/Intentions

Bushfire plan/intention	<i>All (N = 496)</i>	<i>Rural (n=360)</i>	<i>Town (n=99)</i>	<i>Bushland-Urban Interface (B-U-I) (n=37)</i>	<i>Differences?</i>
Leave early	24% (118)	24% (86)	28% (28)	11% (4)	Town > B-U-I
Stay and defend	48% (237)	53% (189)	46% (45)	8% (3)	Rural > Town & B-U-I; Town > B-U-I
Wait and see	6% (28)	7% (24)	3% (3)	3% (1)	No significant differences
No plan	14% (67)	7% (25)	16% (16)	70% (26)	B-U-I > Rural & Town; Town > Rural
Unclear	46	36	3	7	

Level of Long Term Preparation

Overall, less than one-third of residents described a ‘high’ level of *long-term* (that is, not driven by fire weather danger predictions for 7 February 2009) preparation for household bushfire survival. Statistical analyses suggest that overall level of long-term preparation was significantly higher for Rural residents than for both Town and Bushland-Urban Interface residents, and significantly higher for Town than for Bushland-Urban Interface residents. It is noteworthy that half the Bushland-Urban Interface residents (Bendigo and Narre Warren) had undertaken **no** preparation in case of a bushfire. Their transcripts show that they had simply never considered that their home might be vulnerable to bushfire attack, despite close proximity to bushland.

Table 3.2: Rated Levels of Residents’ Long-Term Preparations For Bushfire Survival

Level of long-term property preparation	All (N = 447)	Rural (n=324)	Town (n=88)	Bushland-Urban Interface (n=35)
High (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	29% (118)	34% (100)	22% (18)	0% (0)
Some (3): vegetation clearing, up to two or three of the above, in relation to staying and defending, or to leaving	33% (137)	37% (109)	28% (22)	17% (6)
Minimal (2): limited vegetation clearing, discussion of leaving if threatened	27% (109)	24% (70)	35% (28)	31% (11)
Nil (1)	11% (46)	6% (17)	14% (11)	51% (18)
Mean rating (1-4 scale)		3.2	2.7	1.7
SD		0.87	0.94	0.74
Not known	37	28	9	0

Insurance

The large number of ‘Not known’ cases makes interpretation of Table 3.3 problematic.

Table 3.3 Reported Insurance Status

Insurance	<i>All (N = 496)</i>	<i>Rural (n=360)</i>	<i>Town (n=99)</i>	<i>Bushland-Urban Interface (n=37)</i>	<i>Differences?</i>
Yes	87% (205)	87% (143)	80% (32)	97% (30)	No significant differences
Yes, but under-insured	8% (19)	8% (14)	10% (4)	3% (1)	No significant differences
No	5% (12)	5% (8)	10% (4)	(0)	No significant differences
Not known	260	195	59	6	

Residents’ General Knowledge of Bushfire Threat and Survival

Not all interviewers asked about this. The number of ‘Not known’ codings in Table 3.4 means that the findings should be interpreted with caution. Overall, about two-thirds of those who commented reported some activities likely to increase their knowledge of bushfires. Statistical analyses suggested that the overall reported level of knowledge of bushfires was significantly lower for Bushland-Urban Interface residents compared with that of Rural and Town residents; however, there was no significant overall difference between Rural and Town residents.

Table 3.4: Rated Level of Residents’ Knowledge of Bushfire Threat and Survival

Rated level of general knowledge of bushfire behaviour/threat	<i>All (N = 447)</i>	<i>Rural (n=324)</i>	<i>Town (n=88)</i>	<i>Bushland-Urban Interface (n=35)</i>
High (4): Two or more of training, reading, practice, experience	21% (69)	24% (47)	26% (18)	3% (1)
Some (3): Attended meeting(s) or reading	41% (132)	46% (96)	40% (28)	9% (3)
Minimal (2): General knowledge from the media	24% (76)	17% (38)	26% (18)	60% (20)
Nil (1)	14% (45)	14% (30)	9% (6)	27% (9)
Mean rating (1-4 scale)		2.9	2.8	1.9
SD		0.95	0.93	0.70
Not known	125	105	18	2

Awareness of Predicted Fire Danger Weather

Despite almost saturation coverage in both print and electronic media warning of the extreme fire danger weather predicted for 7 February 2009 in the week preceding, only half of those asked reported vigilant behaviour (Table 3.5). Statistical analyses suggest that overall level of awareness of fire danger weather on 7 February 2009 was significantly higher for Rural residents than for Town or Bushland-Urban Interface residents; and significantly higher for Town than for Bushland-Urban Interface residents. Almost half the Bushland-Urban Interface residents reported being unaware of fire danger associated with the predicted weather conditions.

Table 3.5; Rated Level of Residents' Awareness of the Predicted Fire Danger Weather Threat

Awareness of fire danger weather on 7 February 2009	<i>All (N = 447)</i>	<i>Rural (n=324)</i>	<i>Town (n=88)</i>	<i>Bushland-Urban Interface (n=35)</i>
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.	50% (174)	58% (140)	46% (34)	0% (0)
Some (3): Infrequent checks of two or more of the above.	25% (87)	27% (65)	20% (15)	20% (7)
Minimal (2): Radio on, or occasional glance at the environment.	14% (48)	9% (22)	19% (14)	34% (12)
Nil (1)	12% (42)	6% (15)	15% (11)	46% (16)
Mean rating (1-4 scale)		3.4	3.0	1.7
SD		0.86	1.11	0.77
Not known	96	82	14	0

Physical Readiness on the Day For a Possible Bushfire

Overall, about two thirds of interviewees reported undertaking more than minimal physical preparation to defend or to leave safely. Statistical analyses suggest that overall level of physical preparation if a bushfire was to threaten on 7 February 2009 was significantly higher for Rural residents than for Town or Bushland-Urban Interface residents, and significantly higher for Town than for Bushland-Urban Interface residents. Three quarters of Bushland-Urban Interface residents did not take any preparatory activities.

Table 3.6: Rated Level of Residents' Physical Readiness For a Bushfire on the Day

Physical readiness on the day IF a bushfire was to threaten	<i>All (N = 447)</i>	<i>Rural (n=324)</i>	<i>Town (n=88)</i>	<i>Bushland-Urban Interface (n=35)</i>
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	25% (110)	30% (96)	16% (14)	0% (0)
Some (3): Some evidence of special preparation to defend or to leave: one or two of the above.	34% (150)	35% (112)	42% (37)	6% (1)
Minimal (2): Clearing of leaf litter and similar; or discussion of leaving if a fire was reported.	22% (96)	20% (64)	28% (25)	19% (7)
Nil (1)	20% (88)	15% (49)	14% (12)	75% (27)
Mean rating (1-4 scale)		3.2	2.8	1.3
SD		0.94	0.89	0.59
Not known	3	3	0	0

Awareness of the Approaching Fire

Somewhat less than half of those interviewed reported more than minimal awareness of an approaching fire before attack was imminent and obvious on the basis of visual and/or auditory cues. Statistical analyses suggest that overall level of awareness of the approaching bushfire was significantly higher for Rural residents than for Bushland-Urban Interface residents, and significantly higher for Town than for Bushland-Urban Interface residents: half of the Bushland-Urban Interface residents described being taken by surprise. There was no overall difference between Rural and Town residents.

Table 3.7: Rated Level of Residents' Awareness of an Approaching Bushfire

Awareness of the approaching bushfire	<i>All (N = 447)</i>	<i>Rural (n=324)</i>	<i>Town (n=88)</i>	<i>Bushland-Urban Interface (n=35)</i>
High (4): Early awareness of a fire, active attempts to track location.	14% (64)	16% (51)	15% (13)	0% (0)
Some (3): Awareness of fire somewhere in the area.	33% (258)	61% (204)	55% (49)	19% (5)
Minimal (2): Only aware when threat imminent and obvious	28% (106)	20% (68)	30% (26)	32% (12)
Nil (1): Taken by surprise	11% (27)	3% (9)	0% (0)	49% (18)
Mean rating (1-4 scale)		3.0	2.9	1.7
SD		0.70	0.76	0.78
Not known	2	2	0	0

Psychological Readiness to Take Survival Action Once it was Known That a Bushfire Threatened

Somewhat less than two thirds of those interviewed reported greater than minimal readiness to take survival action once a threat was apparent. Statistical analyses suggest that overall readiness to act once it was known that a bushfire threatened on 7 February 2009 was significantly higher for Rural residents than for Town or Bushland-Urban Interface residents; and significantly higher for Town than for Bushland-Urban Interface residents. Almost three quarters of the Bushland-Urban Interface residents reported a lack of psychological readiness to act: surprise, disbelief, inertia, panic.

Table 3.8: Rated Level of Residents' Psychological Readiness to Take Survival Action

Readiness to act once it was known that a bushfire threatened	<i>All (N = 447)</i>	<i>Rural (n=324)</i>	<i>Town (n=88)</i>	<i>Bushland-Urban Interface (n=36)</i>
High (4): Acknowledged threat, anticipated impact; immediate action	28% (123)	33% (107)	18% (15)	3% (1)
Some (3): Aware of threat, some concern, some uncertainty about action	33% (145)	31% (98)	32% (26)	17% (6)
Minimal (2): Aware of a fire, threat not personalized, uncertainty/hesitation	28% (126)	28% (91)	40% (33)	8% (3)
Nil (1): Surprised, inaction or 'panic' reaction	11% (50)	8% (25)	10% (8)	72% (26)
Mean Rating (1-4 scale)		2.9	2.6	1.5
SD		0.96	0.91	0.88
Not known	3	3	6	0

Overall 'Readiness' To Survive a Bushfire

Ratings of five indicators of readiness were significantly positively correlated, with correlation coefficients (r) ranging from .41 (moderate) to .61 (high).

Table 3.9: Inter-correlations Among Five Indicators of Readiness to Survive a Bushfire

	Long Term Preparation	Awareness of Fire Danger Weather	Physical Readiness on the Day	Awareness of Approaching Fire	Psychological Readiness to Act
Long Term Preparation	--	.46	.60	.41	.42
Awareness of Fire Danger Weather		--	.47	.49	.43
Physical Readiness on the Day			--	.51	.61
Awareness of Approaching Fire				--	.52
Psychological Readiness to Act					--

Statistical analysis confirmed that ratings on the five indicators could be meaningfully summed to generate an overall 'Bushfire Survival Readiness' score for each person; scores could range from 5 to 20. Overall Readiness score was correlated strongly with rating level (1-4) of Knowledge of Bushfires: $r = .57$.

The mean Bushfire Survival Readiness scores of residents of Rural, Town, and Bushland-Urban Interface properties were then compared. Statistical analysis confirmed that the mean Readiness score of Rural residents was significantly higher than those of Town and Bushland-Urban Interface residents, and the mean Readiness score for Town residents was higher than that of Bushland-Urban Interface residents. The mean Readiness score for Bushland-Urban Interface residents was a little more than half that of Rural and Town residents.

Table 3.10: Bushfire Survival Readiness Scores: Rural, Town, B-U-I Residents

Overall Readiness (5 – 20)	Rural (n=324)	Town (n=88)	Bushland-Urban Interface (n=35)	Differences?
Mean (on a 5-20 scale)	15.4	14.0	7.9	Rural > Town & B-U-I; Town > B-U-I
SD	3.19	3.80	3.06	

Expected an Official Warning From Authorities That Their Property Was Threatened?

Residents were not asked this specific question. However, 129 made a comment about the issue in the course of their interview. About two thirds of those who volunteered a comment expected some form of official warning that their property was going to be threatened.

Table 3.11: Residents' Mention of Expectations of an Official Warning

Expected a warning?	All (N = 131)	Rural (n=87)	Town (n=40)	Bushland-Urban Interface(n=5)	Differences?
Yes	69% (90)	67% (58)	70% (28)	100% (5)	No significant differences
No	31% (41)	33% (29)	30% (12)	0% (0)	

Expected firefighting assistance?

Residents were not asked this specific question. However, 102 made a comment about the issue in the course of their interview. One third of those who volunteered a comment said that they expected firefighting assistance from agencies in protecting their properties.

Table 3.12: Residents' Mention of Expectations of Firefighting Assistance

Expected assistance?	All (N = 105)	Rural (n=86)	Town (n=18)	Bushland-Urban Interface (n=1)	Differences?
Yes	33% (35)	36% (31)	17% (3)	100% (1)	No significant differences
No	67% (70)	64% (55)	83% (15)	0% (0)	

Readiness and Expectations of Agencies

Analyses suggested that: (a) expecting a warning from agencies that one's property would be threatened was associated with **lower** levels of overall Readiness ($r_{\text{point biserial}} = -.54$); and (b) expecting firefighting agency assistance with property defence was associated somewhat with **lower** levels of overall Readiness ($r_{\text{point biserial}} = -.30$).

Sources of Information About The Fire Threats on 7 February 2009

Overwhelmingly, residents utilised environmental cues as a key source of information about an emerging fire threat: sight of smoke, embers, flames; and in a few instances the sound of the approaching fire. Rural residents were most likely to have used radio reports (mostly ABC) as a source of information. Bushland-Urban Interface residents were least likely to have used radio reports. Telephone contact from family, friends and neighbours was an important source of information about an emerging fire threat. Rural and Town residents were more likely to have consulted web sites (mostly CFA and DSE) seeking information. Neighbourhood phone trees were an important and very influential source of information for 5% of those interviewed, almost all of whom were residents of Rural properties. Television was not a major source of information (Table 3.13).

Table 3.13: Residents' Use of Sources of Information About a Possible Bushfire Threat

Information Source	<i>All (N = 447)</i>	<i>Rural (n=324)</i>	<i>Town (n=88)</i>	<i>Bushland-Urban Interface (n=35)</i>	<i>Differences?</i>
Environmental Cues: smoke, embers, flames, sounds	89% (399)	90% (291)	88% (77)	89% (31)	No significant differences
Radio Announcements (almost all ABC)	49% (218)	57% (185)	43% (38)	14% (5)	Rural > Town & B-U-I; Town > B-U-I
Mobile/Telephone: neighbours, family	43% (191)	44% (144)	44% (39)	23% (8)	No significant differences
Internet; agency web sites	23% (104)	27% (88)	18% (16)	0% (0)	Rural & Town > B-U-I
Personal visit: mostly neighbours, some police & ES	20% (91)	17% (56)	26% (23)	34% (12)	No significant differences
Neighbourhood phone tree	5% (22)	6% (20)	2% (2)	0% (0)	No significant differences
Television news announcements	4% (20)	6% (18)	2% (2)	0% (0)	No significant differences

Sense of Community

Residents were not asked specifically about this. However, 227 commented on links with neighbours. Almost all who did so were residents of Rural or Town properties. Volunteering a statement about a sense of community was associated moderately with higher levels of overall Readiness: $r_{\text{point biserial}} = .33$

Table 3.14: Residents' Mention of Links to Community Members

Mentioned a sense of community?	<i>All (N = 496)</i>	<i>Rural (n=360)</i>	<i>Town (n=99)</i>	<i>Bushland-Urban Interface (n=37)</i>	<i>Differences?</i>
Yes	46% (227)	47% (169)	57% (56)	5% (2)	Rural & Town > B-U-I
No mention	54% (269)	53% (191)	43% (43)	95% (35)	

Attachment to Place

Residents were not asked specifically about this. However, 167 commented on their emotional attachment to their property and surrounds, mostly the aesthetic (rather than economic) aspects of their environment—both natural and constructed (especially gardens). All who did so were residents of Rural or Town properties. Volunteering a statement about attachment to place was associated weakly with higher levels of overall Readiness: $r_{\text{point biserial}} = .23$

Table 3.15: Residents' Mention of an Emotional Attachment to the Property or the Place

Described an attachment to place?	All (N = 496)	Rural (n=360)	Town (n=99)	Bushland-Urban Interface (n=37)	Differences?
Yes	34% (167)	34% (121)	47% (46)	0% (0)	Rural & Town > B-U-I
No mention	66% (329)	66% (239)	53% (53)	100% (37)	

Section 4:

Plans/Intentions, Actions, Outcomes

Data from the 39 residents who were not on their property on the day have not been included.

Prior Plans/Intentions in Relation to Actions on the Day

Most (82%) of those whose intention was to leave safely did so; most (79%) of those who intended to stay and defend did so. Most (85%) of those whose plan was to wait and see, left—as did the majority of those who had no plan (61%), the remainder stayed and defended or sheltered passively. Most (74%) of those with an unclear plan left.

Table 4.1: Residents' Prior Plans/Intentions in Relation to Actions on the Day

Plan/Intention	<i>Action: Not present by decision</i>	<i>Action: Left</i>	<i>Action: Stayed and defended</i>	<i>Action: Stayed and sheltered passively</i>	<i>Total</i>
Leave safely	8% (8)	82% (84)	10% (10)	1% (1)	103
Stay and defend	0.4% (1)	20% (45)	79% (181)	1% (2)	229
Wait and see	4% (1)	85% (22)	12% (3)	0% (0)	26
No plan	0% (0)	61% (37)	34% (21)	5% (3)	61
Plan unclear	0% (0)	74% (28)	21% (8)	5% (2)	38
					457

Actions on the Day in Relation to Prior Plans/Intentions

Most (80%) of those who chose not to be present on the property on the day had planned to leave safely. The majority (40%) of those who left had planned to do so, but 21% had originally intended to stay and defend. Most (81%) of those who stayed and defended had planned to do so. The majority of those who sheltered passively either had no plan (38%) or an unclear plan (25%)—however, 25% had intended to actively defend but did not do so because of the perceived intensity of the fire.

Table 4.2: Residents' Actions on the Day in Relation to Their Prior Plans/Intentions

Action on the day	<i>Plan: Leave safely</i>	<i>Plan: Stay and defend</i>	<i>Plan: Wait and see</i>	<i>Plan: No plan</i>	<i>Plan: Plan Unclear</i>	<i>Total</i>
Not present by decision	80% (8)	10% (1)	10% (1)	0% (0)	0% (0)	10
Left	40% (84)	21% (45)	10% (22)	17% (37)	13% (28)	216
Stayed and defended	5% (10)	81% (181)	1% (3)	9% (21)	4% (8)	223
Sheltered passively	13% (1)	25% (2)	0% (0)	38% (3)	25% (2)	8
						457

Plans/Intentions, Actions, Outcomes, and Backup Plans^{1,2}

Table 4.3 expands the two previous tables by incorporating outcomes of actions and reports by residents of backup, or alternative plans. The Table indicates that more than one quarter (27%, 125) experienced some level of danger (left late, danger; attempted to defend – failed). Of these 125 residents, 15% (19) reported a backup or alternative survival plan.

Table 4.3: Residents' Plans/Intentions, Actions, Outcomes, and Backup (Alternative) Plans¹

Action & Outcome	<i>Plan/Intention: Leave early</i>	<i>Plan/Intention: Stay & Defend</i>	<i>Plan/Intention: Wait & See</i>	<i>Plan/Intention: No plan</i>	<i>Plan/Intention Unclear</i>
Not present by decision	8% (8) [1]	<1% (1)	4% (1)	0% (0)	0% (0)
Left early - before threat evident	14% (14) [3]	1% (2)	4% (1)	5% (3)	0% (0)
Left late: No danger	44% (45)	12% (27)	54% (14) [1]	33% (20)	32% (12)
Left late: Danger	24% (25) [4]	7% (16)	27% (7) [1]	23% (14)	42% (16) [1]
Defended successfully	9% (9)	63% (143) [40]	8% (2)	23% (14)	21% (8) [1]
Defended, failed: Took last resort shelter	0% (0)	8% (18) [7]	4% (1)	2% (1)	0% (0)
Defended, failed: Fled	1% (1)	9% (20) [4]	0% (0)	10% (6) [2] ²	0% (0)
Sheltered passively	1% (1)	<1%(2) [1]	0% (0)	5% (3)	5% (2)
TOTAL	(103) [8]	(229) [52]	(26) [2]	(61) [2]	(38) [2]

¹**Bolded** numbers in square brackets [] are those reporting a backup-alternative-plan—but see Table 5.18 and accompanying discussion.

²Despite stating that they had no plan, two residents mentioned alternative courses of action they could take if their property was menaced by bushfire

Actions on the Day in Relation to Property Outcomes

Most (80%) of the homes which were defended actively survived; slightly more than half (52%) of homes not actively defended survived.

Table 4.4: Actions on the Day and House Survival

Action on the day	Outcome: House survived	Outcome: House destroyed	Total
Not present by decision	37% (3)	63% (5)	8
Left	52% (103)	48% (94)	197
Stayed and defended	80% (178)	20% (44)	222
Sheltered passively	57% (4)	43% (3)	7
			434

Property Outcomes in Relation to Long Term Bushfire Preparation

There was no persuasive evidence in the data provided by those interviewed that house survival was related to rated level of long term property preparation. For the 173 interviewees (a) who planned to stay and defend, (b) who did so, and (c) for whom information on house survival/destruction had been recorded, the association between house survival/destruction and rated level of long term property preparation was weak and not significant: contingency coefficient $C = .16$. Table 4.4 shows the cross tabulations of house outcome by long term preparation level rating. Subsequent exploratory analyses failed to provide any further information in the data which might aid interpretation of this perhaps counter intuitive finding. It may be that under the extreme fire conditions of the day, random chance factors determined whether or not some houses survived regardless of preparation. It might also be the case that homes with high levels of long term bushfire preparation tended to be concentrated in higher-risk locations. There was a weak association between overall Bushfire Readiness score and house survival/destruction: $r_{\text{point biserial}} = .23$.

Table 4.5: House Survival and Rated Level of Long-Term Property Preparation By Residents Who Planned and Stayed to Defend

House outcome	Nil	Minimal	Some	Extensive	Total
Survived	0% (0)	10% (14)	32% (45)	58% (83)	100% (142)
Destroyed	0% (0)	6% (2)	52% (16)	42% (13)	100% (31)
					(173)

For the 173 interviewees who left (that is, did not defend their property) and for whom information on house survival/destruction was recorded (it is coincidental that the number—173-- is the same as for those who defended), the association between house survival/destruction and rated level of long term bushfire preparation was weak and not significant: contingency coefficient $C = .19$. Table 4.5 shows the cross tabulation of house outcomes by long term preparation rating for those who left without any attempt to defend their property..

Table 4.6: House Survival and Rated Level of Long-Term Property Preparation By Residents Who Left

House outcome	Nil	Minimal	Some	Extensive	Total
Survived	12% (11)	37% (14)	42% (39)	9% (8)	100% (93)
Destroyed	26% (21)	35% (28)	30% (24)	9% (7)	100% (80)
					(173)

Actions on the Day in Relation to Different Members of Households

In 12% of households (N = 61) different members of a household took different actions, in almost all instances males stayed and defended while females left—usually with dependent children.

Destinations of Residents Who Left

Median values have been used in Table 4.6 rather than mean distances to places of safety from home because a few residents travelled great distances and the mean gives a misleading sense of the typical distance travelled. (The median value is the distance travelled from home to a place of safety by 50% of those in each destination category).

Places of last resort shelter were mostly either open areas, such as paddocks, roads, sporting ovals, or parks where survivors sheltered in their cars; or locations that shielded survivors on foot from radiant heat, such as road embankments, outbuildings, property dams, or culverts. Neighbourhood safer places were mostly parking areas, shopping centres, public swimming pools and reserves, or local CFA fire stations.

Table 4.7: Where Those Residents Who Left Went

Destination	Percent, number (N = 174)	Median distance (km)	Maximum distance (km)	Minimum distance (km)
Nearby town/city	47% (82)	30.5	130.0	1.0
Place of last-resort shelter	19% (33)	2.0	17.0	0.02
Family/Friends	17% (30)	5.0	213.0	1.0
'Neighbourhood' safer place	17% (29)	3.0	13.0	0.5
Not known	11			

Would Residents Act Differently on a Future Extreme Fire Danger Day?

About one in five residents who were asked if they would act differently on a future extreme bushfire danger day replied that they would. The percentages were almost identical for those who left and for those who stayed and defended.

Table 4.8: Residents' Stated Intentions For a Future Extreme Fire Danger Day?

Act Differently in Future?	Action: Left	Action: Stayed and defended	Total
Yes	19% (26)	18% (31)	19% (57)
No	81% (109)	82% (142)	81% (251)
Not known	81	50	131

Section 5: In What Ways Did Residents Who Stayed and Defended Differ From Those Who Left?

The People

Age

The average age of those who stayed and defended ($M = 51.1$ years, $SD = 11.1$) was slightly higher than those who left ($M = 48.4$ years, $SD = 11.8$).

Gender

Men were somewhat more likely to have stayed and defended, women were somewhat more likely to have left.

Table 5.1: Gender and Actions

Gender	<i>Left</i>	<i>Stayed & Defended</i>
Men	43% (135)	57% (178)
Women	64% (79)	36% (45)

Dependent Children

A somewhat greater percentage of those who left had dependent children compared with those who stayed and defended..

Table 5.2: Residents' Actions in Relation to Having Dependent Children

Dependent Children (<16 years)	<i>Left</i>	<i>Stayed & Defended</i>
Yes	34% (72)	24% (53)
No	66% (144)	76% (170)

Location of Property

Overall, whether residents' left or stayed and defended was not related to the type of property in which they lived.

Table 5.3: Residents' Actions and Location of their Property

Type of Property	<i>Left</i>	<i>Stayed & Defended</i>	<i>Difference?</i>
Rural	47% (149)	53% (171)	not significant
Town	55% (47)	45% (38)	not significant
Bushland-Urban Interface	59% (20)	41% (14)	not significant

Reported Links With Community Members

While residents were not asked specifically about this, many commented on their links with other residents. A somewhat higher percentage of those who stayed and defended mentioned links with other community members, mostly neighbours.

Table 5.4: Action and Mention of Links To Community Members

Mentioned Links With the Community?	Left (n=216)	Stayed & Defended (n=223)
Yes	40% (86)	58% (129)
No mention	60% (130)	42% (94)

Attachment to Property

While residents were not asked specifically about this, many commented on their emotional attachment to their property and surrounds. A somewhat higher percentage of those who stayed and defended mentioned an emotional attachment to the property, mostly aspects of the natural environment or the garden.

Table 5.5: Action and Mention of Attachment to Property

Mentioned attachment To the property?	Left (n=216)	Stayed & Defended (n=223)
Yes	27% (59)	43% (96)
No mention	73% (157)	57% (127)

Preparation

Residents' Bushfire Survival Plans

Residents who left were more likely to have an unclear plan and more likely to plan to wait and see. While a higher percentage of those who left reported having no plan, the difference was not great enough to be judged significant.

Table 5.6: Bushfire Survival Plan/Intention and Action

Plan/Intended Action	Left	Stayed & Defended	Difference?
Leave	39% (84)	5% (10)	significant
Stay & Defend	21% (45)	81% (181)	significant
Wait and See	10% (22)	1% (3)	significant
No Plan	17% (28)	9% (21)	not significant
Unclear Plan	13% (28)	4% (8)	significant
	100% (207)	100% (223)	

Insurance

While there were no evident differences in reported insurance coverage by those who left compared with those who stayed and defended, the large number of 'Not Known' cases makes interpretation highly problematic (Table 5.7).

Table 5. 7: Reported Insurance Status and Action

Insurance	<i>Left</i>	<i>Stayed & Defended</i>	<i>Difference?</i>
Yes	85% (87)	93% (98)	not significant
Yes, but under	7% (7)	6% (6)	not significant
No	8% (7)	2% (2)	not significant
Not Known	114	117	

Level of Long-Term Preparation

Residents who stayed and defended described much higher levels of long-term preparation compared with those who left. A higher percentage of residents who left had not undertaken any preparation for a bushfire. Statistical analysis showed that the mean rated level of preparation for bushfire survival by those who stayed and defended was significantly higher than that of those who left.

Table 5.8: Rated Levels of Long-Term Preparation - Left *versus* Stayed and Defended

Level of long-term property preparation	<i>Left (n=188)</i>	<i>Stayed and Defended (n=213)</i>
High (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	8% (15)	48% (102)
Some (3): vegetation clearing; up to two or three of the above, in relation to staying and defending, or to leaving	35% (66)	32% (69)
Minimal (2): limited vegetation clearing, or discussion of leaving if threatened	39% (73)	16% (33)
Nil (1)	19% (35)	4% (9)
Mean rating (1-4 scale)	2.3	3.2
SD	0.87	0.87
Not known	27	10

General Knowledge of Bushfires

Residents who stayed and defended received higher ratings of levels of knowledge of bushfire compared with those who left. A higher percentage of residents who left were rated as having no knowledge of bushfires. Statistical analysis showed that the mean level of ratings of knowledge for those who stayed and defended was significantly higher than that of those who left. The number of residents who did not provide information about their knowledge of bushfires means that the differences should be interpreted cautiously.

Table 5.9: Rated Levels of General Knowledge of Bushfires - Left *versus* Stayed and Defended

Rated level of general knowledge of bushfire behaviour/threat	<i>Left (n=122)</i>	<i>Stayed and Defended (n=171)</i>
High (4): Two or more of training, reading, practice, experience	14% (17)	28% (48)
Some (3): Attended meeting(s) or reading	29% (35)	53% (91)
Minimal (2): General knowledge from the media	34% (42)	15% (25)
Nil (1)	23% (28)	4% (7)
Mean rating (1-4 scale)	2.3	3.1
SD	0.98	0.77
Not known	94	52

Readiness On The Day

Awareness of Predicted Fire Danger Weather

Overall, those who left evidenced a somewhat lower level of awareness of the fire danger weather on 7 February 2009. Statistical analysis showed that the difference in mean awareness ratings was significant; however the magnitude of the difference was not large.

Table 5.10: Rated Levels of Awareness of Fire Danger Weather - Left *versus* Stayed and Defended

Awareness of fire danger weather on 7 February 2009	<i>Left (n=157)</i>	<i>Stayed & Defended (n=166)</i>
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.	42% (67)	58% (97)
Some (3): Infrequent checks of two or more of the above.	26% (41)	25% (41)
Minimal (2): Radio on, or occasional glance at the environment.	17% (26)	8% (14)
Nil (1)	15% (24)	8% (14)
Mean rating (1-4 scale)	3.0	3.3
SD	1.1	0.95
Not known	59	57

Readiness on the Day IF a Bushfire Was to Threaten

The overall level of physical readiness for a bushfire if one was to threaten was greater for those who stayed and defended than for those who left. Statistical analysis showed that the difference in mean physical readiness ratings was significant.

Table 5.11: Rated Levels of Physical Readiness For a Bushfire on the Day - Left *versus* Stayed and Defended

Physical readiness on the day IF a bushfire was to threaten	Left (n=202)	Stayed & Defended (n=220)
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	11% (23)	38% (84)
Some (3): Some evidence of special preparation to defend, or to leave: one or two of the above.	34% (69)	36% (80)
Minimal (2): Clearing of leaf litter and similar; or discussion of leaving if a fire was reported.	26% (53)	17% (38)
Nil (1)	29% (59)	8% 18
Mean rating (1-4 scale)	2.3	3.1
SD	1.00	0.94
Not known	14	3

Awareness of approaching Fire

Overall, awareness levels were somewhat higher for those who stayed and defended. Statistical analysis showed that the difference in awareness ratings was significant, but the magnitude of the difference between the means was not large.

Table 5.12: Rated Levels of Awareness of an Approaching Bushfire: - Left *versus* Stayed and Defended

Awareness of the approaching bushfire	<i>Left (n=213)</i>	<i>Stayed & Defended (n=221)</i>
High (4): Early awareness of a fire, active attempts to track location.	9% (20)	20% (44)
Some (3): Awareness of fire somewhere in the area.	59% (127)	55% (122)
Minimal (2): Only aware when threat imminent and obvious	25% (54)	22% (48)
Nil (1): Taken by surprise	6% (13)	3% (7)
Mean rating (1-4 scale)	2.7	2.9
SD	0.72	0.73
Not known	3	5

Readiness to Act Once it Was KNOWN That a Fire Threatened

There was little overall difference in readiness to act between those who left and those who stayed to defend. Statistical analysis indicated that the mean readiness rating for those who stayed and defended was not significantly different from that of those who left.

Table 5.13: Rated Levels of Psychological Readiness to Act Once A Bushfire was Known to Threaten - Left *versus* Stayed and Defended

Readiness to act once it was known that a bushfire threatened	Left (n=209)	Stayed & Defended (n=214)
High (4): Acknowledged threat, anticipated impact; immediate action	25% (53)	32% (68)
Some (3): Aware of threat, some concern, some uncertainty about action	30% (63)	29% (63)
Minimal (2): Aware of a fire, threat not personalized, uncertainty/hesitation	28% (59)	29% (62)
Nil (1): Surprised, inaction or 'panic' reaction	17% (35)	10% (21)
Mean Rating (1-4 scale)	2.6	2.8
SD	1.04	0.99
Not known	7	9

Expected an Official Warning That Their Property was Threatened?

As indicated previously, residents were not asked this specific question. However, 129 made a comment about the issue in the course of their interview. Table 5.13 summarises these. Statistical analysis indicated that a significantly greater percentage of those who left said that they had expected an official warning that their property was under threat.

Table 5.14 Residents' Reports That They Expected to be Warned By Authorities if Their Property was to Come Under Threat - Left *versus* Stayed and Defended

Expected an official warning of fire threat?	Left (n=61)	Stayed and Defended (n=68)
Yes	87% (53)	52% (35)
No	13% (8)	48% (33)

Expected Assistance From Firefighters?

As indicated previously, residents were not asked this specific question. However, 102 made a comment about the issue in the course of their interview. Table 5.14 summarises these. Statistical analysis indicated that there was no significant difference between those who left and those who stayed and defended in the percentage expecting assistance from firefighters.

Table 5.15: Residents' Reports That They Expected Firefighting Assistance From Authorities if Their Property Was to Come Under Attack - Left *versus* Stayed and Defended

Expected assistance?	Left (n=61)	Stayed and Defended (n=68)
Yes	39% (12)	30% (21)
No	61% (19)	70% (50)

Experiences On the Day

Sources of Information About Fire Threat

Table 5.16: Residents' Reported Use of Different Sources of Information About the Fire in Relation to Survival - Left *versus* Stayed and Defended

Information Source	Left (n=216)	Stayed & Defended (n=223)	Difference?
Environmental Cues: smoke, embers, flames, sounds	86% (186)	91% (202)	Not significant
Radio Announcements (almost all ABC)	43% (93)	50% (112)	Not significant
Mobile/Telephone: neighbours, family	41% (89)	40% (89)	Not significant
Internet; agency web sites	22% (48)	23% (52)	Not significant
Personal visit: mostly neighbours, some police & ES	26% (57)	14% (32)	Left > Stayed & Defended
Neighbourhood phone tree	3% (6)	7% (15)	Not significant
Television news announcements	4% (9)	5% (10)	Not significant

Table 5.16 indicates that, mostly, those who left and those who stayed made similar use of the different sources of information about the fires, except that a greater percentage of those who left reported having been given information about the fire “face-to-face”: from neighbours and from fire, police and emergency services personnel.

Levels of Threat Experienced

An 8-point Threat Level rating scale (0 = none, 7 = extreme) was developed to assess the level of danger survivors were exposed to: a copy of the rating scale is at Appendix C. Figure 5.1 below indicates that those who left mostly experienced much lower levels of threat compared with those who stayed and defended: 70% of those who left were exposed to threat levels less than “Significant” (that is, Levels 0 – 3), while only 3% of those who stayed and defended were exposed to threat levels less than “Significant”. Of those who left, 8% were exposed to threat levels of “Extreme” (7) or “Severe” (6): these were people who left late under hazardous conditions and were forced to take last resort shelter, mostly in their vehicles. Of those who stayed and defended 18% were exposed to threat levels of “Extreme” or “Severe”: these were mostly people who attempted to defend but were unsuccessful and had to flee or take last resort shelter.

Figure 5.1: Horizontal Bar-Graph Showing Frequency of Threat Level: Left and Stayed and Defended (X = ~5 cases)

Threat Level (Appendix C)		Frequency
<i>LEFT:</i>		
Extreme	7 X	4
Severe	6 XXX	13
Serious	5 XXXX	18
Significant	4 XXXXXX	29
Moderate	3 XXXXXX	28
Low	2 XXXXXXXXXXXXXXXXXXXX	84
Minimal	1 XXXXX	27
None	0 XXX	13
TOTAL		216
<i>STAYED & DEFENDED:</i>		
Extreme	7 X	6
Severe	6 XXXXXXXX	34
Serious	5 XXXXXXXX	72
Significant	4 XXXXXXXXXXXXXXXXXXXXXXXXXXXX	104
Moderate	3 X	7
Low	2	0
Minimal	1	0
None	0	0
TOTAL		223

$M = 2.7; SD = 1.64$

$M = 4.7; SD = 0.87$

Influential Decision Factors

The major determinant of a decision to stay and defend was prior commitment to this plan of action. Those who left reported four major determinants: environmental cues about the fire location and/or intensity; concern for the safety of family members; perceived threat posed by the fire; and information from trusted others about the location and/or intensity of the fire.

Those who left and those who stayed and defended did not differ overall on the relative importance of the seven other potential determinants. For both, lack of warning and time; the safety of pets or livestock; and the intensity of the fire exceeding expectations played a role in the decision making of many. Most of those in the 'left' category who commented on their expectations about the fire intensity/size/speed being exceeded had originally planned to stay and defend but changed their mind when they became aware of the intensity/size or speed of approach of the fire.

Table 5.17: Residents' Reported Factors Influencing Their Survival-Related Decision Making - Left versus Stayed and Defended

Decision Factor	<i>Action: Left (n=216)</i>	<i>Action: Stayed and defended (n=223)</i>	<i>Difference?</i>	<i>Total (N = 439)</i>
Environmental cues about fire proximity/intensity	71% (135)	29% (55)	Left > Stayed & defended	190
Commitment to plan	34% (89)	66% (174)	Stayed & defended > Left	263
Concern for safety of family members	75% (59)	25% (20)	Left > Stayed & defended	79
Perceived threat from the fire	60% (103)	40% (68)	Left > Stayed & defended	171
Information about the fire proximity/intensity from friends, neighbours, family	63% (59)	37% (35)	Left > Stayed & defended	94
Lack of warning/time, no alternative	41% (40)	59% (58)	Not significant	98
Safety of pets/livestock	58% (48)	42% (35)	Not significant	83
Insurance coverage	75% (6)	25% (2)	Not significant	8
Agency web site information	80% (4)	20% (1)	Not significant	5
Expectations about the fire exceeded	43% (24)	57% (32)	Not significant	56
Spousal disagreement	59% (13)	41% (9)	Not significant	22
Official radio warnings	43% (3)	57% (4)	Not significant	7

Potentially Survival-Enhancing Factors Reported

Not surprisingly, those who stayed and defended reported rather different survival-enhancing factors compared with those who left. Those who stayed and defended were more likely to report individual resilience-related factors, plus social support and assistance; while those who left were more likely to report the importance of information about the fire, and that responsibility for family members crystallised a decision to leave. A greater percentage of those who stayed and defended reported having a backup survival plan compared with those who left. For both groups, the most common backup plan was to take last-resort shelter near to the house. However, most plans were described in vague and general terms—see notes to Table 5.18 below. Few residents indicated awareness of the danger posed by radiant heat in getting to their proposed last-resort shelter (dams, cleared areas, improvised ‘bunkers’).

Table 5.18: Residents Reports of Factors Which Were Potentially Survival-Enhancing - Left versus Stayed and Defended

Survival factor	Action: Left (n=216)	Action: Stayed & defended (n=223)	Difference?	Total (N = 439)
Maintained attentional focus on survival-related actions (eg, “I kept moving the car around away from the fires”)	22% (45)	79% (168)	Stayed & defended > Left	213
Personal efficacy belief (eg, “I knew I could do it”)	7% (7)	93% (88)	Stayed & defended > Left	95
Reported a backup (alternative) plan	5% (10)#	24% (54)###	Stayed & defended > Left	64
Controlled/managed fear/anxiety	25% (39)	75% (119)	Stayed & defended > Left	158
Task outcome efficacy belief (eg, “I was confident about our preparations”)	8% (6)	92% (67)	Stayed & defended > Left	73
Decisions and actions directed at survival (eg, “I couldn’t do anything about the sheds”)	34% (85)	66% (168)	Stayed & defended > Left	253
Fire-relevant information and communication	73% (2)	27% (27)	Left > Stayed & defended	99
Support, help, assistance from others (neighbours, friends, family members)	32% (39)	68% (84)	Stayed & defended > Left	123
Responsibility for the safety of others	75% (33)	25% (11)	Left > Stayed & defended	44

1% (3) described a concrete and detailed backup (alternative) plan if evacuation by the intended means was not possible.

14% (31) described a concrete and detailed backup (alternative) plan if defence failed.

Potential Threat and Hazard Factors Reported

Again, the potential hazard factors reported by the two groups differed in several respects as a consequence of their survival circumstances. For those who stayed and defended, the main hazard/threat factors were associated with house defence being compromised: the need for sustained physical effort; fatigue or injury; equipment failure (mostly related to water supply—pumps, plastic pipes and fittings); and house vulnerability (mostly adjacent fuel loads and threat posed by ember attack). While the difference was not significant (due to the small numbers involved) it is noteworthy that 11% of those who left reported threats associated with blocked escape routes and vehicle breakdown or mishap (compared with 5% of those who stayed and defended—these were mostly people who attempted to defend, were unsuccessful and attempted to flee in a vehicle). Lack of warning and thus time to take survival-related action was mentioned as a hazard factor by a little more than one-third of both groups combined ($152/439 = 35\%$), equipment failure was mentioned by one-third of both groups combined ($145/439 = 33\%$).

Table 5.19: Residents Reports of Personal and Situational Survival-Compromising Factors - Left *versus* Stayed and Defended

Threat Factor	<i>Action: Left (n=216)</i>	<i>Action: Stayed & defended (n=223)</i>	<i>Differences?</i>	<i>Total (N = 439)</i>
Having to sustain physical effort and vigilance for a long period	6% (5)	94% (76)	Stayed & defended > Left	18% (81)
Equipment failure	26% (37)	75% (108)	Stayed & defended > Left	33% (145)
Lack of water	18% (11)	82% (51)	Stayed & defended > Left	14% (62)
Injury/fatigue self or other	20% (9)	80% (37)	Stayed & defended > Left	10% (46)
House vulnerability (adjacent fuel load and/or structural deficiency)	27% (15)	73% (40)	Stayed & defended > Left	13% (55)
Vehicle breakdown/mishap	78% (7)	22% (2)	Not significant	2% (9)
Property egress blocked (fallen trees, fires)	64% (16)	36% (9)	Not significant	6% (25)
Surprise: lack of warning, lack of time to prepare and act	45% (69)	55% (83)	Not significant	37% (152)

Potentially Risk-Amplifying Factors

More of those who left described how a lack of official warnings or other information about the fire—location, threats—potentially exposed them to greater risk. More of those who left described how a lack of confidence in their ability to do what was needed to survive potentially exposed them to greater risk—mostly associated with leaving late. There was no difference in the percentages of those who reported feelings of panic or fear or anxiety—nearly one in five of both groups combined reported these feelings (80/439 = 18%)

Table 5.20: Residents Reports Factors They Believed Increased Their Level of Risk - Left versus Stayed and Defended

Risk factor	<i>Action: Left (n=216)</i>	<i>Action: Stayed & defended (n=223)</i>	<i>Difference?</i>	<i>Total (N = 439)</i>
Absence of official information/warnings about the fire location and threat	65% (72)	35% (39)	Left > Stayed & defended	25% (111)
Lack of personal efficacy beliefs—lack of self-confidence about being able to successfully undertake the necessary survival-actions (eg, “I was worried that if I drove I might not be able to see because of smoke”)	71% (15)	29% (6)	Stayed & defended > Left	5% (21)
Lack of support/assistance from others—having to do things alone	36% (10)	64% (18)	Not significant	6% (28)
Demands/needs of dependent family members	40% (15)	60% (22)	Not significant	8% (37)
Decisions and actions not directed at survival (eg, “I reversed so fast I crashed into the gate post”)	55% (38)	45% (31)	Not significant	16% (69)
Loss of attentional control (eg, “I couldn’t stop worrying about the dog”)	44% (10)	56% (13)	Not significant	5% (23)
Lack of task outcome efficacy (eg, “I thought about getting out because I was worried the (car) window would break”)	53% (9)	47% (8)	Not significant	4% (17)
Panic/fear/anxiety	50% (40)	50% (40)	Not significant	18% (80)

Section 6

Concluding Discussion

Bushfire Survival Plans

It was clear from the content of the transcripts that householders' understandings of what constitutes a meaningful bushfire survival plan differed greatly. Many residents of isolated rural properties who intended to stay and defend had quite sound plans and had prepared accordingly. Many residents who lived in town streets and planned to stay and defend failed to take into account possible loss of electric power and town water supply. The overwhelming majority of bushland-urban interface ('suburban') residents had never seriously considered the possibility of bushfire threat: they were, effectively, 'blind' to the implications of adjacent bushland and thus had no bushfire survival plan.

It seems from the transcripts that in the absence of a major change in community perceptions of bushfire risk, very few residents in at-risk areas are likely to leave and go somewhere safer the day before a predicted day of total fire ban. Based on the transcripts of the few who did so in light of the fire danger weather warnings prior to 7 February 2009, those most likely to do this are people who are elderly or have young children *and* have a second residence elsewhere, such as a major city.

It was also clear from the content of the interview transcripts that there was a general failure by residents to understand the necessary requirements of a sound plan to leave safely under the stress of potential bushfire threat. Indeed, for most survivors who did not attempt to defend, their 'plan' seemed to consist of an intention to simply not be there if a fire threatened. Prior household consideration and discussion of suitable places to go, alternative routes to travel, what would constitute the trigger for safe departure, and what preparations were needed to make leaving safe and minimally inconvenient mostly had not happened. In many households, the needs of pets and livestock, young children, and elderly/handicapped members of a household had not been thought about.

Preparing, Staying and Defending

The overall impression created by the transcripts of 'stay and defenders' was that most had planned and prepared for a low to moderate intensity bushfire which could be dealt with quickly and easily without undue risk. We speculate that such an anticipatory understanding was created, at least in part, by a decade of television news images of residents wearing shorts, singlets and thongs, easily subduing flames of about half a metre in height using a plastic garden hose. There appeared to have been a general failure to appreciate the potential threat posed by a high intensity bushfire on a day of extreme fire danger weather, and ways in which houses are vulnerable to sustained ember attack associated with very strong winds.

In general, household bushfire 'human-machine defence systems' were brittle, and most failed to a greater or a lesser extent in face of high-intensity bushfire attacks lasting 30 minutes to more than an hour. Mains electrical power and water supplies failed. Plastic pipes and fittings melted due to radiant heat, petrol driven pumps motors stopped as fuel vaporised in carburettors, plastic water tanks melted, defenders got injured and/or became incapacitated through fatigue. Defenders were distracted from their primary survival-focussed tasks by concerns about the safety of less-able household members.

A robust fall-back plan to survive if defence failed and the house burned was rare. There seemed to be a generally low level of prior appreciation of the lethally destructive effects of radiant heat from a bushfire.

Notwithstanding, there were some accounts of successful household defence that demonstrated survival-enhancing behaviour under adversity. Most of these accounts described an acknowledgment of the high level of threat, extensive long and short-term preparation (including back-up plans if defence failed). The interviewees also reported high levels of personal and outcome efficacy (i.e. they were confident in their own abilities and their preparations), they remained task-focused and identified emerging threats, and were able to set aside potentially distracting thoughts or negative emotions like fear/anxiety. These interviewees were mostly rural land owners and those with some prior bushfire, or closely related (e.g. military), knowledge and/or experience.

Leaving Safely

As suggested above, an overall impression created by the transcripts of ‘leavers’ was that few had thought beyond a simplistic notion of ‘if a bushfire threatens we are out of here’. Another overall impression is that the typical ‘plan-in-action’ of those who ultimately left involved ‘waiting and seeing’, without having any clear idea of what they were waiting for and what they might expect to see that would spur them into action. A prior plan which comprised a checklist of preparations for leaving; agreed alternative safe havens and travel routes; and an agreed trigger set of circumstances which would initiate leaving, was rare.

While there were few fatalities on the day associated with leaving late in vehicles (n = 7, 4% of fatalities: Handmer, O’Neil, & Killalea, 2010, p. 24), some survivors’ accounts of their journeys leave a disturbing picture of ‘what might have been’ if even a single large tree had fallen and blocked any one of several major escape roads used by residents fleeing at the last minute.

Several of those interviewed indicated a belief, presumably based on bushfire safety messages, that it was dangerous to be on the roads in a bushfire. For some, paradoxically, this belief appeared to be a factor in delaying departure and potentially increasing their actual risk when evacuation became unavoidable. While there were fatalities associated with vehicle accidents and entrapments (see above), others survived because they used their vehicles as mobile last-resort ‘fire shelters’ in locations relatively clear of fuel (McLennan, 2010).

Location-Specific Issues Concerning Expectations and Bushfire Survival

While not coded for, two important issues emerged from the transcripts related to two specific locations. Several transcripts of interviews with Marysville survivors expressed the view that there was a widespread belief among residents that ‘Marysville would never burn’, largely because there was no prior history of bushfires ever impacting the town (the town was not impacted by the 1939 Black Friday fires). Several transcripts of interviews with householders in the Kinglake area indicated that many residents believed that any fire which broke out on 7 February 2009 would be a repetition of events associated with the bushfire which occurred in 2006: slow rate of spread, ample warning from authorities, and plenty of time to prepare properties or to leave safely (—and ultimately this fire did not threaten life or property).

The above comments based on survivors’ accounts correspond closely with Key findings concerning the fatalities noted by J. Handmer, S. O’Neil, and D. Killalea in their report to the 2009

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Appendix A

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.

Appendix B: Human Behaviour Project – Transcript Coding Form

1. a. Coder Initials: _____ b. Interview Code #: _____ c. Date Coded: _____

d. Length of Interview: _____

2. Interview (address): _____

3. Fire Complex: Beechworth; Bendigo; Bunyip; Churchill; Horsham; Kilmore East; Murrindindi; Narre Warren

4. Type of Property: Rural-Residential Home on a large block: 2-6 hectares

5. Household composition on the Day: _____

6. Children Under 16?: Unclear 0 1 2 3 4 Likely, but
ages/numbers unclear

7. Interviewee (1): Role: _____ (2): Role: _____

Gender: _____

Gender: _____

Age: _____yrs

Age: _____yrs

8. Status on Feb 7th:

Not at home: Not present (decision) Not present (chance) On Ops Duty
(FESA/DES/SES/Parks/Other)

At Home, Left:

Left early

Left late (no danger)

Left late (danger)

Took last resort shelter

Stayed:

Defended (success)

Defended (failed, stayed)

Defended (failed, abandoned) Safer precinct

Shelter passively around home

If Left or not Present (decision), where?

Friends/Family

Hotel/Motel

Nearby city town

Last resort shelter

Unclear

DIST (est): ___ ___ kms

Outcome: House survived House destroyed Unclear

Notes: _____

9. Plan/Intended Action: Leave Early Stay and Defend Wait and See No Plan Unclear Different

10. Training/Experience: Yes Some No Unclear

11. Reading or Similar? Yes Some No Unclear

12. Insurance?: Yes No Under Unclear

13. Survivor Threat Rating Scale (see overleaf) (1-7): _____

14. Interview Quality: Bad Unexceptional Excellent

A. Preparation long term

0. ? or N/A	1. Nil	2. Minimal (tidied up), or (intent to leave)	3. Some (up to 2 of column 4) (up to 2 of column 4)	4. Extensive (a) alt. water source, (b) building maintenance, (c) alt. power, (d) sprinklers, (e) clothing, (f) implements, or (a) had evacuation plan (b) packed up documents before day, (c) had planned when to leave and where to go
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B. Awareness of fire danger weather

0. ? or N/A	1. Nil	2. Minimal Reported awareness	3. Some Evidence of vigilance	4. High Precautions on the day: listening to radio; checking websites; scanning environment
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C. Readiness if fire occurred on the day - Physical

0. ? or N/A	1. Nil	2. Minimal (e.g. tidied up or cleaned gutters), or (thought about packing valuables)	3. Some (up to 2 of column 4), or (had a few items packed)	4. Extensive (a) test equipment, (b) fill vessels with water, (c) lay out clothing, (d) hosed down property, or (a) bags packed by door (b) pets ready to go (c) readied car for leaving (d) readied other people (e) considered where to go
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D. Knowledge of fire

0. ? or N/A	1. Nil	2. Minimal (e.g. media)	3. Some (e.g. meetings)	4. Extensive (a) training, (b) practice, (c) reading
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E. Awareness of approaching fire

0. ? or N/A	1. Nil	2. Minimal (only aware of fire late)	3. Some (knew of fire in nearby locale)	4. Extensive (knew of fire, actively tracking progression)
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F. Readiness to Act if fire threatened

0. ? or N/A	1. Nil (caught by surprise)	2. Minimal (aware of a fire, failed to personalise, or lack of concern)	3. Some (aware of danger, some concern but uncertain about likely impact and action)	4. High (acknowledged threat, expected impact, immediate action)
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G. Sources of Information

1. Radio	2. Television	3. Internet	4. Phone Tree	5. Phone (friends, family, etc)	6. Personal visit	7. Environmental	8. Other
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H. Expected SPECIFIC (Official) warning?

0. ?	1. Yes	2. No
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Ha. Expected (Official) fire fighting assistance?

0. ?	1. Yes	2. No
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I. Decision Process Factors**(i.) Overall:**

- a. Prior commitment to plan: _____
- b. Trigger:
 - i. Official Warning (radio)
 - ii. Official warning (internet)
 - iii. Unofficial warning (friends, etc..)
 - iv. Environmental cues (smoke, flame)
 - v. Expectations negated
 - vi. Warning (other)
- c. Perceived threat
- d. Time/No alternative
- e. Family
- f. Pets/livestock
- g. Insurance
- h. Spousal disagreement
- i. Other: _____

(ii.) Survival-enhancing:

- a. Down-regulate fear/anxiety/stress
- b. Maintain attentional focus
- c. Action-survival link
- d. Information/communication
- e. Social support/assistance
- f. Outcome efficacy
- g. Personal efficacy
- h. Responsibility for others
- i. Other: _____

(iii.) Risk-amplifying:

- a. Panic/fear/anxiety
- b. Lose attentional control
- c. Actions not linked to survival
- d. Absence/defective information/Communication/warnings
- e. Lack of social support/assistance
- f. Lack of outcome efficacy
- g. Lack of personal efficacy (incl. Waiting for instructions)
- h. Dependents (elderly, children, disabled)
- i. Other: _____

Appendix C: Bushfire Survivor Threat Rating Scale

Scale Level	Qualitative Description	Behavioural Indicators	Notes
LEVEL 7	Extreme threat to life: odds were about even for surviving vs perishing	Interviewee injured or seriously affected ; companion(s) in the incident perished or were seriously affected physically	Injury NOT necessary if other factors indicate an extreme threat. House destroyed or damaged. Had to seek last resort shelter at some time—in a vehicle or using other features of the environment.
LEVEL 6	Severe threat to life; any significant worsening of the situation might well have lead to death or serious injury	Interviewee (and companions) were not injured (or only minor) but: the house they were defending was destroyed and they had to seek shelter; or the house was damaged and at some time they had to take shelter for a period; or the vehicle in which they were escaping/sheltering sustained fire related damage or other impact damage.	House may have survived with some damage—there was a very real possibility that the house may have been lost if something else had gone wrong—it was “touch and go”—if the house had gone, they would have been in real trouble.
LEVEL 5	Serious threat to life: failure of a vital aspect of the defence, shelter, or escape procedure, or “survival system” might well have lead to serious injury or death	The house being defended suffered some damage; the vehicle in which they were travelling had to drive through flames and/or dodge debris	Unexpected problems had to be solved—pump stopped; a point of vulnerability developed for the house.
LEVEL 4	Significant threat to life: a sudden change in the situation might well have resulted exposure to threat of physical injury: change in wind direction, increase in ember storm intensity, surprise ignition of a fuel source as an emerging threat.	The house had to be actively defended, flames had to be extinguished; the vehicle had to be moved away from a heat source; the conditions were extremely hot while sheltering	Default for “stayed and defended”
LEVEL 3	Moderate threat	Had to remain vigilant that the house was not impacted by fire or embers, had to shelter for up to half an hour in a vehicle from radiant heat, embers, smoke	Default for “left late, in danger”
LEVEL 2	Low threat	Saw smoke within 2 km, saw flames, observed embers falling.	Default for “left late, no danger”.
LEVEL 1	Minimal threat	Saw smoke in the distance; relocated to a safe place with no danger; was aware of fires in the general area.	Default for “left early”.
LEVEL 0	No threat	Not present on the day	

Note: Pre-existing medical/physical conditions may modify assignment of a threat level, as may psychological (as distinct from physical) impacts of the fire.