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Into the firing line: civilian ingress during the 2013 "Red October" bushfires, Australia

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Abstract

A major issue for bushfire management arises when residents decide to leave a safe area and enter the fire zone to rescue or defend their property, pets, loved ones or other assets. Here, we use statistical and narrative analyses of data from an online survey and semi-structured interviews with residents affected by the 2013 "Red October" bushfires in New South Wales, Australia. The survey results revealed that of the 58 % of respondents who were not at home at the time the threat became apparent, 65 % indicated that they attempted to get home prior to the arrival of the fire front. In doing so, many endangered themselves, their family, friends and emergency services personnel. This paper discusses the shortcomings of bushfire survival plans and official risk communication, which do not cater well for household units that are divided or unattended when a bushfire starts. Findings suggest that to enhance bushfire safety and preparedness, emergency managers should acknowledge and speak more directly to the specific constraints to action for particular social groups at the wildland-urban interface, including families with school-age children, commuters and absentee landholders.

Keywords

during, 2013, red, into, october, firing, bushfires, australia, line, civilian, ingress

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Into the Firing Line: Civilian Ingress during the 2013 'Red October' Bushfires, Australia

Abstract. A major issue for bushfire management arises when residents decide to leave a safe area and enter the fire zone to rescue or defend their property, pets, loved ones or other assets. Here we use statistical and narrative analyses of data from an online survey and semi-structured interviews with residents affected by the 2013 'Red October' bushfires in New South Wales, Australia. The survey results revealed that of the 58% of respondents who were not at home at the time the threat became apparent, 65% indicated that they attempted to get home prior to the arrival of the fire front. In doing so, many endangered themselves, their family, friends and emergency services personnel. This paper discusses the shortcomings of bushfire survival plans and official risk communication, which do not cater well for household units that are divided or unattended when a bushfire starts. Findings suggest that to enhance bushfire safety and preparedness, emergency managers should acknowledge and speak more directly to the specific constraints to action for particular social groups at the wildland-urban interface, including families with school age children, commuters and absentee landholders.

Key words bushfire, ingress/egress, interface communities, risk communication, household preparedness

1 **1 Introduction**

2

3 Bushfires (wildfires) are an integral and defining part of the history, ecology and culture of Australia. Residents
4 in at-risk communities have historically been encouraged to be well-prepared in recognition that there are
5 situations where fire authorities will be unable to provide timely and sufficient firefighting support to prevent
6 losses to life and property (Whittaker *et al.*, 2013; AFAC, 2012; Handmer and Tibbits, 2005). Disastrous
7 bushfires are predicted to increase in frequency and intensity in the future (Liu *et al.*, 2010; Bradstock *et al.*,
8 2009; Lucas *et al.*, 2007).

9

10 There is growing concern about the increasing numbers of dwellings in the wildland-urban interface (WUI)
11 (McCaffrey *et al.*, 2014; Mutch *et al.*, 2010; Chen and McAneney, 2005). Communities at the WUI typically
12 comprise a mix of residents attracted by favourable real estate prices, geographical location, infrastructure and
13 high amenity values, which make it possible for city careers to be combined with 'rural' lifestyles (Wilkins *et*
14 *al.*, 2009). However, their lifestyles and environmental values can conflict with bushfire management. The daily

15 commute to work in the city, for example, prevents many residents from being at home during the day should a
16 bushfire start. It also reduces the time available to carry out property maintenance (Eriksen and Gill, 2010).

17

18 The expansion of the WUI and, with it, greater proportions of absentee landholders, isolated properties, and a
19 commuting culture reliant on cars, presents both emergency managers and residents with a wicked problem¹:
20 what are the implications for individuals, households and emergency services when residents are not at home
21 when a fire starts? This paper combines the results of an online survey and in-depth interviews with
22 homeowners affected by the 2013 ‘Red October’ bushfires in New South Wales (NSW), Australia, to better
23 understand residents’ decisions and actions when they, or other members of their household, were away from
24 home when the fire threat became apparent. Specifically, this paper is concerned with a post-fire analysis of the
25 factors participants indicated determined and influenced their decision to leave a safe area and enter the fire
26 zone, and the outcomes of such actions.

27

28 **2 Bushfire safety: managing intentions and actions**

29

30 2.1 The policy context

31

32 Residents in high fire danger areas of Australia have historically been encouraged to make a considered choice
33 to either prepare to stay and defend their property or else prepare to leave early. This longstanding community
34 safety policy position, known (until 2010) as the ‘Prepare, Stay and Defend, or Leave Early’ policy (PSDLE),
35 drew credence from research into bushfire fatalities and house loss, which show that the likelihood of
36 successfully defending a house is significantly greater when houses are well prepared and residents are able-
37 bodied and mentally prepared (Handmer and Tibbits, 2005; Lazarus and Elley, 1984; Wilson and Ferguson,
38 1984). There is abundant evidence that evacuating late is dangerous (Krusel and Petris, 1999; Miller *et al.*, 1984;
39 McArthur and Cheney, 1967). Nearly one-third (32%) of bushfire-related fatalities between 1901 and 2008
40 occurred as residents fled the fire, making it the most common activity at time of death (Haynes *et al.*, 2010).

41

42 The PSDLE policy was subject to critical review following the 2009 ‘Black Saturday’ bushfires in Victoria
43 where 113 people perished in their homes (AAP, 2009a, 2009b). The ensuing Victorian Bushfires Royal

¹ In public policy terms, a “wicked problem” is a problem that cannot clearly be defined or solved (APPC, 2007). Trying to manage this problem may inadvertently create other problems.

44 Commission concluded that, with the exception of ‘catastrophic fire events’ where no property is considered
45 defensible, the central tenets of PSDLE were theoretically sound but difficult to enforce in practice (Handmer *et*
46 *al.*, 2010; Teague *et al.*, 2010). Notably, the Commission asserted that the PSDLE approach rested on an
47 unrealistic assumption that all people would either immediately, and exclusively, ‘stay and defend’ or ‘leave’
48 the area early. The policy did not address the reality, supported by research prior to and following ‘Black
49 Saturday’, that many people wait to see what will happen when a fire threatens before fully committing to a
50 course of action (McLennan *et al.*, 2013; Whittaker and Handmer, 2010; Reinholdt *et al.*, 1999). Furthermore,
51 whilst contingency planning was an element of the policy position, it did not translate well into official advice
52 (McLennan and Handmer, 2012; Teague *et al.*, 2010). The Commission’s recommendations led to a revised
53 approach – ‘Prepare. Act. Survive.’ (PAS) – with similar core principles to the PSDLE policy but with greater
54 emphasis on the importance of both physical *and* mental preparedness, and that leaving early is always the
55 safest option (AFAC, 2012).

56

57 2.2 Survival plans and official advice

58

59 Fire authorities across Australia have devised Bushfire Survival Plan booklets and planning templates to assist
60 residents in physically and mentally preparing themselves and their properties for a bushfire threat (Eriksen *et*
61 *al.*, Accepted). Their design embodies the precepts of PAS and, as such, readers are prompted to prepare for
62 either defending a well prepared property, or for leaving early. Although there are prompts for contingency
63 planning these documents are essentially based on the assumption that all residents will be at home when a fire
64 starts. This ‘complete household’ as focus for risk communication was criticised following the ‘Black Saturday’
65 bushfires:

66

67 Much attention and effort has been focused on developing policies and procedures to assist people who
68 are in their homes in the event of a bushfire. However, less attention has been given to the needs of
69 those who are not at home when bushfires threaten, including travellers, visitors and tourists, and those
70 located at work, in hospitals or other health facilities, or in schools, kindergartens or child care centres.
71 (Teague *et al.*, 2009, p.206.)

72

73 Official crisis communication during bushfires (alerts, television and radio reportage, etc.) is explicit in
74 instructing against “unnecessary travel” during bushfires. Yet, when exactly is travel “unnecessary” given that
75 acceptable levels of “risk” differs between households, individuals and emergency services? Outside of advice
76 concerning evacuation, only four references to advice against “travel” during bushfires were found in official
77 preparedness literature. The NSW Rural Fire Service (RFS) (NSW RFS, 2013 p.4) advises developing a habit of
78 paying attention to local radio and TV on hot, dry, windy days, to assist with daily planning to avoid areas with
79 an increased risk of a bushfire. The South Australia (SA) Country Fire Service (CFS) (SA CFS, 2014b) advises
80 that on severe (Total Fire Ban) days, people should, if possible, avoid travelling into bushfire prone areas. The
81 Queensland (QLD) Fire and Emergency Service (FES), and West Australia (WA) Department of Fire and
82 Emergency Services (DFES) provide the most contextual advice on travelling home during a bushfire. The QLD
83 FES (2015 p.11), for example, prompts readers who plan on leaving early to consider and write down, what they
84 will do if they have sent their children to school that day: “Think about whether or not you will have to travel
85 from work into the fire zone”. In advising against travelling near a bushfire, the document also states “You
86 should never take a journey into areas where the fire danger is catastrophic or extreme. You should consider
87 postponing or finding alternative routes if necessary. If you can smell or see smoke in the distance, it is best to
88 U-turn and drive away from the danger” (QLD FES, 2015 p.8). The WA DFES (2014a) informs readers that
89 they may not be able to get home if away when a fire starts because of road closures. In the context of planning
90 to stay and defend, readers are also prompted to consider and write down what they will do if “you cannot return
91 to your home to actively defend your house (roads blocked)?” (WA DFES, 2014a p.38).

92
93 In contrast to most official agency planning advice, Towers’ (2013) template for involving children in planning
94 and preparation of family survival plans, is built on the assumption that a household will most likely be divided
95 when a bushfire threat eventuates due to education and employment commitments. This is an important
96 addition, as the limited identified travel-specific advice points to a dearth of official material to assist residents
97 who are regularly absent from their properties, such as commuters, households with school age children, and
98 ‘weekenders’. The detailed material available to assist residents devise a plan to either ‘stay and defend’ or
99 ‘leave early’, means that residents who may be well-prepared for defending their property or for leaving early if
100 at home when a fire breaks out, may be ill-prepared for the dangers of travelling towards the fire front to get
101 home and implement these plans under intense stress and time-pressure. Only in the most recent round of
102 updates by the SA CFS (2014a p.7), NSW RFS (2013 pp.16-17) and Australian Capital Territory (ACT)

103 Emergency Services Agency (ESA) (2013 pp.16-17) does official advice incorporate prompts to readers to
104 consider school policies for emergency situations, such as bushfires, or if children are home alone. These
105 revisions, however, do not advise against travel during a bushfire or provide advice on how to plan for these
106 scenarios.

107

108 2.3 Survival intentions and associated movement

109

110 Civilian ingress during bushfires is a surprisingly under-researched topic. Though a large body of scholarship is
111 concerned with better understanding residents' survival related decisions under threat from an imminent, or
112 potential, bushfire, research has mainly focused on the factors likely to determine at-home residents' decisions
113 to 'stay and defend', 'leave early' or 'wait and see' (McNeill *et al.*, 2014; McLennan *et al.*, 2013; Whittaker *et*
114 *al.*, 2010). This is despite evidence from studies of residents' responses to an actual fire threat, which provide
115 noteworthy exceptions to this general trend. For example, post-fire analyses of residents' preparedness and
116 actions during two bushfires in 2011 at the WUI of Perth, WA, found that a number of residents were not at
117 home when the fires were initially reported (most were at work) and that the majority sought to return home
118 once informed of the threat (Heath *et al.*, 2011; McLennan *et al.*, 2011). Similarly, a majority (83%) of study
119 participants who were not at home when the fire threat became apparent in North Warrandyte, Victoria (VIC) in
120 1991 attempted to return home (success rate of 62%) (Beringer, 2000). Data collected from multiple fire events
121 by Reinholdt *et al.* (1999), similarly revealed that 'return to rescue' and 'unsuccessful attempt to return' were
122 two of the main ways people responded to knowledge of a fire threat.

123

124 Part of the problems is that questions relating to civilian ingress generally form only a small part of broader
125 post-fire studies with analysis rarely going beyond reporting of simple statistics and trends. A few notable
126 exceptions provide important insights to the motivating factors and implications of civilian ingress during
127 bushfires.

128

129 Focussing on the 2005 Wangary Bushfire, SA, Proudley (2010) explored what factors influenced decision-
130 making under threat within families. Interviews identified that the roles that people have within a family unit
131 play a major part in what they do, how they behave and respond during a crisis. A significant number of women
132 were found to be at home alone with infants on the day of the fire, and their heavy reliance on husbands and

133 partners for preparedness, planning and decision-making became a family burden. It not only placed pressure on
134 the partner at home to make survival related decisions, but it also put pressure on the absent partner to return
135 home to rescue or protect their family.

136

137 Similarly, research with fire-affected households in both Australia and the USA revealed how egress “only
138 portrays one side of the evacuation coin” (Eriksen, 2014 p.42). For many, getting home by travelling into the
139 line of fire was an equally pressing issue, despite official orders to evacuate. Eriksen (2014) highlights how the
140 need to care for children, elderly relatives, disabled people and other loved ones, including animals, instinctively
141 guides the intended and actual actions of residents absent from home in the face of a bushfire threat. In
142 attempting to get home during a fire, many people take risks, not only via daily commuting routes along narrow
143 winding roads through forests or on mountain slopes but also by diverting to little-known back roads to reduce
144 distance or dodge police blocks. Late evacuations are typically triggered by the appearance of flames or heavy
145 smoke nearby (Whittaker *et al.*, 2013), which heightens the risk of encountering dangers associated with a fire
146 front, such as flames, ember attack, thick smoke, falling trees and rushing traffic (Haynes *et al.*, 2010).

147 However, the very same environmental cues can trigger instinctive urges to “get home”. The anxieties
148 associated with a divided household and the dangers of travelling towards, or through, the fire front to collect
149 children from school or home is explicitly highlighted in Towers’ (2013) focus on the wellbeing of children
150 during bushfires. She highlights the possibility that schools will be closed on days of catastrophic fire danger
151 and advises that if people are unable to take time off work, it is important to make advance care preparations for
152 children.

153

154 The experiences and decision-making of non-resident horse agistors² during the 2003 Canberra bushfires, ACT,
155 reveal that the, then current, PSDLE policy also did not cater for the needs of non-resident agistors (Main,
156 2010). Many agistors left their residences in the comparably safer confines of Canberra’s urban areas and
157 intentionally travelled towards (and through) the fire front to rescue their horses on properties at the WUI. Many
158 agistors “rushed out to the paddocks too late and were stopped by roadblocks” (*ibid*, p.16). Main (2010 p.20)
159 asserts bushfire safety information for horse owners “assumes horse owners are also property owners”. This is
160 significant in the context of our study, as bushfire safety information more broadly assumes that the resident will
161 be at home at the time the fire threat eventuates (discussed above).

² An ‘agistor’ is a person who pays to keep their horse on someone else’s land (Main, 2010 p.2).

162

163 Although situated in broader discussions of bushfire vulnerability and resilience, the above studies' critical
164 engagement with civilian ingress illustrate that perceptions of 'tolerable' hazard and risk are complex, and
165 influenced by socio-demographic, economic and lifestyle factors alike. In the context of risk and crisis
166 communication, acknowledgement of this is crucial to inform and overcome disparity in perceived risk and
167 consequent actions between, and within, various divisions of the emergency services and individual household
168 members.

169

170 2.4 Fatality statistics

171

172 It is difficult to discern with certainty if recorded bushfire fatalities are the direct result of attempts to travel
173 through the danger zone to get home. It is equally difficult to discern whether anyone has died whilst defending,
174 leaving or sheltering after successfully entering the fire zone from a safe place. Few studies had specifically
175 examined the circumstances surrounding fatalities, outside of formal coronial inquiry. Notable exceptions are
176 Chambers and Bettingham (1967) and McArthur and Cheney (1967) who assessed civilian deaths during the
177 1967 Hobart bushfires (see also Haynes *et al.*, 2008), and Krusel and Petris (1999) who examined the
178 circumstances of civilian fatalities during the 1983 Ash Wednesday Bushfire. More recently, studies of bushfire
179 fatalities have drawn on longitudinal data sets, encompassing data from multiple fire events (Blanchi *et al.*,
180 2014; Haynes *et al.*, 2010).

181

182 Haynes *et al.* (2010) is the only study to explicitly identify fatalities caused by civilians attempting to 'get
183 home'. In analyzing the relationship between gender, age and activity at time of death, they distinguished when
184 a "victim left a safe area and deliberately entered fire zone in order to defend or rescue property or loved ones"
185 (p.187). Across the time period 1900 – 2008, 25 out of a total of 552 civilians were killed whilst "*en route to*
186 *defend or rescue*" (18 male, 3 female, 4 <18 years of age) (p.190). They highlight that the higher number of
187 fatalities "*en route to defend or rescue*" in the time period 1955 – 2008 (8 male, 3 female, 4 < 18 years of age),
188 compared to ten casualties (all male) in 1900 – 1954, may be explained by the higher prevalence and use of cars
189 since the 1950s.

190

191 2.5 Vehicle Safety

192

193 It is well documented that cars do not provide as good protection as houses do from radiant heat during
194 bushfires (Auditor General Victoria, 2003). Cars are the most likely mode of transport to be used by residents
195 seeking to outrun a fire front. Twenty-six of the 53 people killed in the 1967 Hobart bushfires died in or near
196 vehicles (Leonard, 2010). Sixteen of the thirty-two civilian fatalities in the 1983 Ash Wednesday fires were
197 vehicle-related (Krusel and Petris, 1999). Eight of the nine fatalities in the 2005 Wangary Bushfire (aka the
198 2005 Eyre Peninsula fire) perished in their vehicles (AFAC, 2008).

199

200 Despite this historical evidence, there are discrepancies in the official discourse on vehicle safety during
201 bushfires. The scholarship on vehicle tenability in bushfire burnover is concerned more with the tenability of
202 firefighting appliances and crew safety, than with civilians (Knight *et al.*, 2003; Mangan, 1997). Research
203 conducted in 2006 dispelled the myth that sheltering in cars is the “second best option” in providing a buffer
204 between people and radiant heat during a bushfire (Leonard, 2010 p.3). The Australasian Fire Authorities
205 Council (AFAC, 2008) accordingly updated its *Guidance for people in cars during bushfires* to highlight that
206 sheltering passively in vehicles can be extremely dangerous and needs to be avoided wherever possible.
207 However, Handmer *et al.* (2010) concluded in their review of fatalities in the 2009 ‘Black Saturday’ bushfires,
208 that the question of evacuation in cars warranted re-examination given that few people (7) died in cars during
209 the fire.

210

211 Regardless of such discrepancies, it is clear that driving even short distances during a bushfire can be extremely
212 dangerous, as noted by Krusel and Petris (1999, p.7):

213

214 Surviving witnesses mentioned the confusion, poor visibility, loss of orientation and conditions
215 hazardous to driving that were present prior to the arrival of the fire. Evacuation was made even more
216 difficult by the fact that people did not know where the fire was, and which roads provided access to
217 safety.

218

219 Such conditions are equally applicable to residents attempting to ‘get home’ by racing the fire front in their
220 vehicles. Routes of ingress and egress easily become bottlenecks when the threat of bushfire looms, or when the
221 movements of fast bushfires are difficult to track. In 1969 seventeen people perished on the highway between

222 Geelong and Melbourne, VIC, under such conditions. However, it is important to note that whereas those who
223 perished in 1969 were not attempting to get home before the fire arrival (rather they were taken by surprise by
224 the fast moving grass fire), those attempting to get home intentionally create a vulnerable situation where they
225 can block or be trapped in traffic, or are unable to outrun flames encountered *en route*.

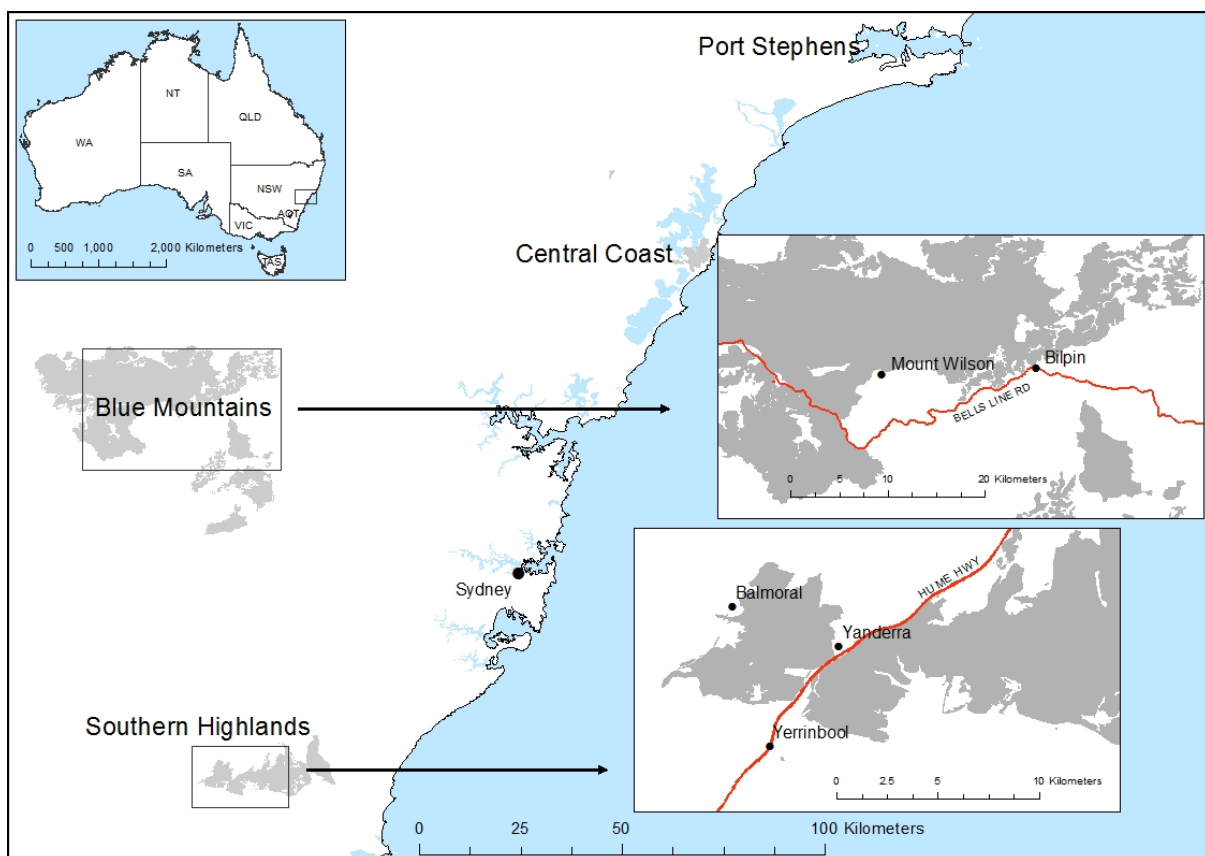
226

227 3 Study Context and Methods

228

229 In October 2013, approximately 100 bushfires burnt across eastern NSW, intensified by high temperatures and
230 strong winds. The most damaging fire activity occurred on Thursday 17 October but the severe weather
231 conditions meant the fires continued to threaten communities until Wednesday 23 October. The ‘Red October’
232 fires, as they came to be known, destroyed over 200 houses, with hundreds more damaged, in the Blue
233 Mountains, Southern Highlands, Central Coast and Port Stephens areas. This paper reports on the results of a
234 post-fire analysis of resident preparedness and decision-making in communities affected by the ‘Red October’
235 bushfires.

236



237

238 **Fig. 1.** Map of study areas (black dots with names) and proximity to the footprint of the 2013 ‘Red October’
 239 bushfires (areas shaded grey), NSW, Australia (map drawn by B. Horsey, 2014).

240

241 The study was conducted across a number of study sites (Figure 1), using data collected through an online
 242 survey (Horsey and Penman, 2014) as well as semi-structured interviews (McLennan *et al.*, 2014; Wilkinson *et*
 243 *al.*, 2014). Basic characteristics of the survey and interview participants are outlined in Table 1. The online
 244 survey was created via Survey Monkey[®] and advertised through the email lists and social media of the NSW
 245 RFS, as well as social media of the authors and their institutional affiliations. Due to the infinite number of
 246 potential viewers of social media, it is not possible to determine a total response rate for the online survey. The
 247 online survey consisted of 108 questions that covered a range of topics, including previous bushfire experiences,
 248 household preparedness, actions before and during the fire, and information sourcing. This paper specifically
 249 draws on the survey questions that identify whether respondents were at home at the time the fire threat first
 250 became apparent, and their consequent actions, including whether they attempted to get home and if they were
 251 successful in their attempt (see Tables 2 and 3).

252

253 **Table 1:** Characteristics of the survey and interview participants

	Online Survey	Southern Highlands Post-Fire Interviews	Blue Mountains Post-Fire Interviews
Localities	Blue Mountains, Southern Highlands, Central Coast, Port Stephens	Yanderra, Yerrinbool and Balmoral (‘Hall Road Fire’)	Bilpin and Mount Wilson (‘State Mine Fire’)
Number of interviews	-	25	18
Number of research participants	589 (212 male, 377 female)	30 (14 male, 16 female)	23 (14 male, 9 female)
Number not at home	287	11	10
Number who attempted to returned home	185	9	9

254

255 The long duration of the ‘Red October’ bushfires, and the fact that some communities were on alert for several
 256 weeks before they were affected, meant that many residents ‘came and went’, for work and lifestyle reasons, a
 257 number of times before the fire posed a threat to their properties. The design of the online survey made it
 258 difficult to capture respondents’ movements across the multiple days of the event. To give greater validity to the
 259 conclusions drawn from the online survey, we triangulated the survey results with narratives documented in
 260 semi-structured interviews with residents affected by the bushfires in the Southern Highlands (McLennan *et al.*,
 261 2014) and Blue Mountains regions (Wilkinson *et al.*, 2014).

262

263 A total of 589 complete surveys were returned between December 2013 and February 2014. The majority of
264 these came from residents affected by the Links View (n = 254), Hall Road (n = 154), Mount York (n = 60) and
265 State Mine (n = 51) fires in the Blue Mountains and Southern Highlands regions. Fewer surveys were completed
266 by residents affected by fires on the Central and North Coasts (n = 70 total). Pearson's Chi-Squared test of
267 contingencies was used to evaluate the statistical significance of survey components. All analyses were
268 conducted using the 'R' statistical package software. Women more commonly responded to the survey (64%)
269 and the majority of all respondents were between 35 and 54 years of age (52%).

270

271 The semi-structured interviews aimed to elicit in-depth narratives of residents' direct experience of the
272 bushfires. In December 2013, residents of five communities were interviewed on their properties. The study
273 areas were chosen due to their proximity to the recent bushfires: Yanderra, Yerrinbool and Balmoral in the
274 Southern Highlands, affected by the Hall Road Fire, and Mt Wilson and Bilpin in the Blue Mountains, affected
275 by the State Mine Fire (Figure 1). In the communities of Yanderra, Yerrinbool and Balmoral interviewees were
276 selected via door knocking along streets delineating the WUI located in closest proximity to the fire.
277 Participation was voluntary as well as dependent on residents being at home at the time of the door knock. In the
278 communities of Mt Wilson and Bilpin, interviewees were purposefully selected based on their participation in
279 research that had been conducted with residents in both locales during May-June 2013 as part of a broader
280 project examining risk and amenity (Gill *et al.*, 2015). No further attempts were made to recruit further
281 participants in any of the study areas due to budgetary and time constraints. With the participants' permission,
282 all of the interviews were audio-recorded and later transcribed verbatim.

283

284 Given the survey advertising and interview recruitment methods, both samples are potentially biased towards
285 people with direct personal bushfire experience and/or already interested in fire management to some extent.
286 Therefore, the data does not represent a completely randomised sample, and represents a more optimistic
287 scenario for the extent of planning. The qualitative interview data were subjected to systematic coding and
288 analysis in QSR NVivo 10.0, a computer-assisted qualitative data analysis software program. An iterative
289 process of identifying appropriate codes was followed to capture *a priori* and emergent themes. The interview
290 quotes used in this paper are verbatim and have been chosen because they reflect attitudes, beliefs and concerns
291 shared by the participants in this study.

292

293 **4 Research Findings and Discussion**

294

295 4.1 Racing the fire front

296

297 More than half (58%) of survey respondents were not at home at the time the fire threat became apparent (Table
 298 2). This corresponds with broader societal trends, with a growing number of Australians choosing to combine
 299 city careers with rural lifestyles at the WUI since the 1960s (Wilkins *et al.*, 2009). Improvement in road systems
 300 has furthermore contributed to Australia becoming a nation reliant on cars (ABS, 2013). Employees are now
 301 commuting for longer, in traffic that is more congested, to reach their place of work (Flood and Barabato, 2005).
 302 More women (46%) than men (35%) were at home when the fire threat eventuated³ (see also Haynes *et al.*,
 303 2010), which is consistent with Flood and Barabato’s (2005) observation that, on average, men spend more time
 304 travelling to and from work each week than women.

305

306 **Table 2:** Comparison of civilian ingress during the ‘Red October’ bushfires, by gender⁴

	Were you at home when the fire threat became apparent?			Did you try and get home?			Were you successful in getting home?		
	Yes (%)	No (%)	Total (n)	Yes (%)	No (%)	Total (n)	Yes (%)	No (%)	Total (n)
Men	35%	65%	172	58%	42%	112	89%	11%	64
Women	46%	54%	324	69%	31%	173	75%	25%	118
Total	42%	58%	496	65%	35%	285	80%	20%	184

307

308 Of the 58% (n = 288) of survey respondents who stated that they were not at home at the time the threat became
 309 apparent, 64% (n = 185) indicated that they attempted to get home prior to the arrival of the fire front. Almost
 310 eighty percent (n = 147) of these attempts were successful⁵. As reflected in the interview quote below,
 311 landholders expressed an array of expectations of the ease with which they would be able to get home in time:

312

313 I was in Melbourne when you had the really bad weather here and things took off, but I had a couple of
 314 days. And then I had a day to prepare once I got back just to make sure everything was right... [My

³ X-squared = 5.5359, df = 1, p-value = 0.01863

⁴ More women than men were home at the time (p-value = 0.01863); women were marginally more likely to try and get home compared with men (p-value = 0.06723); men were more successful at getting home than women were (p-value = 0.04436).

⁵ The discrepancy between reported n values in the text vs. Table 2 is due to some respondents not answering all survey questions.

315 wife] didn't do anything, because, well first of all it's my job, and secondly it wasn't about to, you
 316 know, consume her and the house. It was some distance away; you could see it over there on the ridge
 317 so we knew we had some time. (Works locally, male, Bilpin, State Mine Fire)

318
 319 Fires can ignite, move and impact upon property rapidly leaving residents with little or no time for adequate
 320 preparation (Penman *et al.*, 2013). Many study participants did not appear to question the distance from which
 321 they, or other members of their household, worked or studied, and the time it would take them to cover this
 322 distance to get home in the event of a fire. Indeed, there was an *expectation* expressed by many interview
 323 participants that they would be able to get home before the fire affected property:

324
 325 I just didn't anticipate the roads to be blocked so early. I thought I'd have a reasonable opportunity to
 326 get back and help her [my wife] with things. But yeah, the fire moved in so quickly that [it] sort of took
 327 everyone by surprise a bit... The expectation was that I would get back in time. That I could help her
 328 move everything out and yes, we're probably cutting it fine but the fire just beat us, it moved in too
 329 quick. It was pretty hopeless. (Commuter, male, Yanderra, Hall Road Fire)

330
 331 I work over at North Sydney so I was just buried in traffic for hours, I wasn't getting back any time
 332 soon.... It takes me an hour and a half even if the roads are good to get back. And by the time I'd
 333 gotten to Campbelltown, the traffic was already starting to bank up. (Commuter, male, Yanderra, Hall
 334 Road Fire)

335
 336 The majority of interviewees reported being "surprised" by the speed of the fast moving fire. Several were also
 337 "surprised" by the extent and seemingly early set up of road blocks preventing access to threatened areas. Table
 338 3 examines the relationship between the time taken to get home, and the time between first learning of the fire
 339 and actual impact.

340
 341 **Table 3:** Comparison of time between first knowledge of the fire, actual impact, and travel time to return home.

(n = 177) ⁶	How long after you first learnt of the fire did it threaten your home or the area close to your home?
------------------------	--

⁶ Eight responses (of the 185 respondents who indicated that they attempted to get home once they found out about the fire) were removed from this analysis, as they did not answer both follow up questions.

How long did it take you to get home?	< 15 mins	15 – 30 mins	30 – 60 mins	1 – 2 hours	> 2 hours
Unsuccessful	35%	38%	28%	17%	10%
< 15 mins	18%	24%	11%	8%	9%
15 – 30 mins	12%	5%	11%	17%	18%
30 – 60 mins	12%	19%	25%	17%	21%
1 – 2 hours	12%	9%	14%	21%	21%
> 2 hours	12%	5%	11%	21%	21%
Total (n)	17	21	28	24	87

342

343 Analysis of survey respondents who reported that the fire threatened their homes within one hour of first
 344 learning of the threat (n = 66), reveals that several travelled through potentially dangerous environments. Forty-
 345 six percent (n = 30) successfully returned home within that first hour. Most then had less than 60 minutes to
 346 activate their survival plan. As indicated in the interviews, for some residents this involved rescuing loved ones
 347 and assets and leaving the area under threat (see Sections 4.2 – 4.5).

348

349 4.2 Roadblocks and rationales for travel

350

351 Twenty percent of survey respondents reported that they were unsuccessful in their attempts to get home after
 352 learning of the bushfire threat. The interviews provide greater insight into these difficulties with several
 353 participants encountering roadblocks on route, which they described as adding an additional level of anxiety and
 354 distress. The roadblocks (more so than the fire) were (in their opinion) what separated them from their family
 355 and prevented them from assisting with last minute preparations, rescuing pets or livestock, or actively
 356 defending their home. In attempts to bypass the road-blocks many interviewees described travelling on
 357 unofficial back roads to get home. These roadblocks had been put in place by authorities to keep people out of
 358 the fire zone – an area considered dangerous because of the active and unpredictable movement of the fire front:

359

360 [Female participant]: We've got a business in Lithgow, where the fire started, which was interesting.
 361 On that day [our daughter] was also working and we were both in Lithgow. The fire had started there
 362 the day before, so we knew about it but we wouldn't have gone to Lithgow that day if we'd realised
 363 how quickly that was going to change everything. I tried to get out the back way and couldn't get
 364 through, couldn't get out of Lithgow. Because I had to get back to get [our daughter from work]... So
 365 then I had to go the long way around and I drove through Winmalee, only about ten minutes before the
 366 fire started there. [My husband] rang me and said he got through Little Hartley.

367 [Male participant]: We've been going up and down there for 22 years. I know all the little hidey holes
368 so we got through. (Commuters, Bilpin, State Mine Fire)

369

370 The heightened anxiety felt when separated from their family and pets prompted many to drive into the fire
371 zone, despite official advice to the contrary. Such narratives provide insight into rationales for travel during the
372 heat of the moment when what would ordinarily be perceived as an unacceptably hazardous action is
373 outweighed by the urge to protect others:

374

375 My wife and the two boys were all here apart from me, I was still at work... My wife was here because
376 she was crook and it was just dumb luck she was actually at home because the boys normally come
377 home and unlock the house themselves, so there's nobody here until about five o'clock at least. It was
378 just luck that there was somebody here, that [my wife] could pack up some stuff and organise the kids
379 and liaise with the police and so on to get things done. Otherwise I'm concerned about how it would
380 have unfolded. Because they blocked off the roads very, very early so we didn't have a chance to get
381 back and no matter how much you spoke to the police about the fact that, "Look, I need to get back
382 there, I don't intend on staying, I just need to get back because the kids are here." (Commuter, male,
383 Yanderra, Hall Road Fire)

384

385 [My wife] didn't want to go at all... over the whole 8 days she left and came back probably three times.
386 So three separate nights, and yeah, so we pushed it to the limit. So the kids were here too, but on those
387 three days they had to go, so they all went... We just judged the risk on the day. (Stay-at-home dad,
388 Bilpin, State Mine Fire)

389

390 Although the resident in the latter quote was at home when the fire threat became apparent, his narrative is
391 representative of a number of interview participants, particularly those with young children or pets, who
392 reported multiple accounts of ingress and egress prior to the dissipation of the fire threat. In this particular case,
393 the anxiety of family separation resulted in multiple accounts of the wife and children evacuating and returning
394 to the house. This again demonstrates the crucial role children play in the decision-making of households
395 members separated during bushfires (Towers, 2013).

396

397 4.3 “Preparation” vs. “Response”

398

399 The adaptive capacity of households relies heavily upon residents having an appreciation of the potential risks
400 embedded within extreme weather warnings, as well as the foresight and ability to act upon such warnings in the
401 days, weeks and months prior to a bushfire. The 2009 Victorian Bushfires Royal Commission (Teague *et al.*,
402 2010) found that despite widespread public warning that high temperatures and winds would likely create
403 catastrophic fire conditions on 7 February 2009, many people living in bushfire prone areas had no grasp of the
404 implications such severe weather conditions could have on the fire threat. Prior to the events of October 2013,
405 many of the residents we surveyed and interviewed had taken considerable measures to actively prepare
406 themselves and their property for bushfire but in the majority of cases, pivotal preventative action was not taken
407 until the fire threat was imminent. This is consistent with research more broadly, which shows that even when
408 residents have several days warning of a potential fire threat, many wait until there is an actual and immediate
409 threat before taking action (Tibbits and Whittaker, 2007). By then, time is insufficient to adequately prepare the
410 property and oneself physically and mentally for the task at hand (Penman *et al.*, 2013).

411

412 I just started to prepare the house as best I could. Got up, cleaned the gutters, and put some water in the
413 gutters and stuff like that. Luckily, the power had come back on momentarily, which allowed me to get
414 the hose going and water and stuff. (Works locally, male, Balmoral, Hall Road Fire)

415

416 By the time the fires came I had about four inches of water in the bottom of our dam, it was completely
417 empty. (Works locally, male, Bilpin, State Mine Fire)

418

419 We'd been overseas and had been here very little in the previous three months and so all of the winter
420 leaves left over from autumn, all the kindling that had fallen around the shed and around the water
421 tanks. I mean, there's mess still here that I never got down to clean up. So I had a mad day just working
422 so hard to try to get all of the stuff ready. (Retiree, male, Mt Wilson, State Mine Fire)

423

424 Several interview participants on town water had not envisaged or planned for power outages and did not have a
425 generator or back-up water supply. Others with independent water supplies did not have sufficient reserves (in
426 their opinion) to defend their property. Furthermore, whilst it was important for many study respondents to get

427 home - especially those who had pre-arranged firefighting mechanisms in place to protect their homes - some
428 explicitly expressed that they felt it was essential they be there to make 'last-minute-tune-ups' to the property. It
429 was envisaged that these "preparations" would precede active defence:

430

431 The thing that I'd say that was fortunate was the coincidence that I happened to be here and was able to
432 implement all of those correction methods, prevention methods. (Retiree, male, Mt Wilson, State Mine
433 Fire)

434

435 I think we were pretty well set up. I did have to clean out a wasps nest out of my tickers, you know, the
436 sprinklers? I've got two boom sprays towards half the backyard. There were wasps' nests in them. And
437 I had to make sure the pumps all worked. (Commuter, male, Bilpin, State Mine Fire)

438

439 Even those who planned on leaving early did not adequately prepare to do so. Many had not considered what
440 they would pack or what they would do if they were not at home at the time of the fire to grab packed
441 belongings:

442

443 We both got the notification on our phones when we were at work. I rushed home. My first instincts
444 were to take care of the animals and put them in the car, and then pack up all our important things like
445 our certificates and passports and things that we couldn't replace that well. By that time I had been
446 packing up for about an hour. (Commuter, female, Balmoral, Hall Road Fire)

447

448 The consistent reference by interview participants to the importance of being able to get home to implement
449 modifications to the house and grounds (including packing to leave again) reflects the practical aspects of
450 preparedness emphasised in risk communication (such as checklists). However, it is important to note that these
451 actions were actually responses triggered by the immanency of the fire threat. This confusion over what being
452 "well prepared" for bushfire means on paper and in practice has become a recognized public policy issue. In the
453 wake of the 2009 'Black Saturday' bushfires, for example, Handmer *et al.* (2010) found that many of the people
454 killed were undertaking "response" actions rather than "preparations" prior to impact of the fire. To reduce the
455 number of lives and houses lost during bushfires Eriksen and Prior (2013) and Penman *et al.* (2013) emphasise

456 the need for risk communication to clearly define and explain *why* practical household preparation tasks need to
457 be completed on a regular basis.

458

459 4.4 Leaving work: the consent of employers

460

461 Several interview participants described seeking permission from their employers before leaving work on the
462 day of the fire. For some, the pressure of ensuring their manager was informed of their decision to leave work,
463 and that this action was justified, caused delays:

464

465 I was at work and basically had to go up to my boss and say, “Look, I’ve got a message, there’s fires in
466 our area so I’ve got to go”, and lucky enough what I was working on at work wasn’t critical to be done
467 that day. So that was my first instinct, “Oh, can I leave my work? Are other people dependent on what
468 I’m doing?” (Commuter, female, Balmoral, Hall Road Fire)

469

470 Such incidences amongst commuters who worked in the city raises the question: what role should employers
471 play in preparing their employees for bushfire? Whilst the SA Country Fire Service (SA CFS, n.d.) and VIC
472 Country Fire Authority (VIC CFA, 2014) distribute detailed information kits pertaining to bushfire safety and
473 preparedness for businesses, for the most part, these documents do not look at preparing employees for bushfire
474 beyond the workplace. Employers could play an active role in promoting bushfire safety education specific to
475 the needs of commuting employees. This would also ensure that a conversation has taken place between the
476 employer and employee with regards to the company’s policy on leaving work to attend to a bushfire and
477 employees knowing their rights to do so (or not).

478

479 4.5 Caring for pets via neighbourhood networks

480

481 Several interview participants described anxieties relating to pets as a motivating factor for getting home. In
482 their absence, many friends and neighbours attempted to rescue and defend pets and livestock, some by leaving
483 a safe area:

484

485 The neighbours were actually the ones that got my horses out. You know, I was stuck trying to get home.
486 And they got the horses out to another friend's property. (Commuter, female, Yanderra, Hall Road Fire)
487
488 We rushed back. Everyone was gathered outside the fire station. There were fireys [sic. firefighters]
489 everywhere. I was in a panic 'cause the neighbours were crying because they said, "We tried to get [your
490 dog] but you were out". And I said, "Yes, but I always leave the door open just in case". I do. On a day like
491 that, I would leave the door open, but they didn't know and they hadn't tried the door so that's when the
492 neighbours said, "Come on, we'll go and get him". I said, "No, I'm going to run down and get him. I don't
493 want you going in your car." She said, "You can't run down". Anyway, we came to the top of the road...
494 and the fireys let us through. I was quite surprised. I just said, "My dog's down there". He said, "Go straight
495 there, get him, come straight back." That's what I did and then we all sat or stood and watched the fire go
496 through. (Retiree, female, Balmoral, Hall Road Fire)

497

498 These narratives bring to light the benefits of communicating with neighbours prior to a fire breaking out.
499 Although no physical harm came to the people and pets involved in the above example, had neighbours known
500 that the back door was left open in the event of extreme fire weather, they may have been able to rescue her dog
501 as they evacuated the area, averting the need to return to the fire threat. This provides another example as to why
502 risk communication needs to clearly explain the importance of preparing a bushfire survival plan that involves
503 and has been discussed with family, friends, and neighbours alike in case of contingency planning.

504

505 **5 Conclusion**

506

507 Though official advice is explicit in instructing against "unnecessary travel" during bushfires, to date there has
508 been no consistent advice on how to adequately prepare for and cope with the known issue of residents, who are
509 not at home when a bushfire starts, leaving a safe area and entering the fire zone to rescue or defend property,
510 pets and loved ones. What constitutes a "tolerable" hazard and risk, and to whom, is a grey area of bushfire
511 resilience literature. While it is widely agreed that physically and mentally prepared people can defend well-
512 prepared houses in less than catastrophic conditions if they are at home to implement their survival plan, much
513 less focus has been placed on the matter of residents placing themselves and others in danger in order to return
514 to their property upon learning of an imminent threat.

515

516 One reason for prompting debate on this matter is the emphasis in this paper on the infeasibility of travelling
517 under threat through the vegetated terrain that often defines WUI landscapes. This problem is exacerbated with
518 the high level of residents who commute on a daily basis to the city, thus attempting to return via limited and
519 congested routes, which are simultaneously relied upon by emergency vehicles and evacuating residents
520 travelling at speed. Fast-moving bushfires furthermore decrease the likelihood of anyone having sufficient time
521 to return home or find a structure suitable for shelter *en route*. History has shown that most bushfire fatalities are
522 the result of people being caught out while travelling either on foot or in vehicles (Haynes *et al.*, 2010). Several
523 studies have documented the dangers associated with late evacuation (as referenced in Sections 2.3 and 2.4),
524 reinforcing the importance of clearly communicating about how to plan for timely evacuation. Far less emphasis
525 has been placed on the similar dangers involved in “getting home” during a bushfire, in part because official
526 advice against entering a fire zone leaves little room for debate about the alternatives that residents resort to.
527 Yet, as this study and other research have repeatedly shown, a significant proportion of WUI residents attempt
528 to return home upon learning of a bushfire threatening their home and/or family. To simply ban residents from
529 returning home during a bushfire with roadblocks or mandatory evacuation orders is therefore a simplistic and
530 short-sighted solution to an overtly complex and ongoing issue. It highlights the need for further research that
531 compares different types of communities, residents’ planned action with their actual movements during a
532 bushfire threat, and their rationales for or against travel in or out of a fire zone.

533

534 Effectively translating the ‘Prepare. Act. Survive.’ policy into practice therefore remains a challenging work in
535 progress. There is room for improvement in terms of official documents and planning templates accommodating
536 the increasingly common occurrence of residents being away from home when the fire threat eventuates.
537 Bushfire safety advice needs to be more detailed and flexible to assist residents with diverse backgrounds and
538 lifestyles, including parents, commuters, and absentee landholders, to make informed decisions of the likely
539 benefits and costs associated with attempting to get home in uncertain and dangerous conditions. The wicked
540 problem of civilian ingress during bushfires requires innovative solutions that can be successfully worked across
541 agencies and residents if the risk of people entering the fire zone unprepared is to be avoided. For example,
542 packing a box with vital belongings (documents, photos, medication, clothes) and taking it to work on
543 catastrophic and extreme fire danger days could be a standard part of commuting through bushfire-prone
544 landscapes. Employers could play an active role in promoting bushfire safety education specific to the needs of

545 commuting employees. Creating contingency plans for children, the elderly, people with disabilities, and pets
546 that involves neighbours, schools, employers, family or friends, could ensure that alternatives to travelling
547 towards, or through a fire front, have been considered and agreed upon before the threat eventuates.

548

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