

ABSTRACT

'How do Residents in Bushfire Prone Areas View the Bushfire Risk of their Local Area and their Homes?'

This paper is part of a larger research project investigating people's perception of the bushfire risk of their own property. It analyses the 46 survey responses from residents living in Mount Wilson and Pretty Beach, NSW, Australia. It looks at two issues: resident's perception of the bushfire risk of their local area and their own property, and in response to this perception of the local bushfire risk, which parts of their home would they seek shelter in during a bushfire and which parts would they avoid. The paper concludes that: the residents' perception of risk did not match the NSW RFS determinations; the residents' perception of risk did not seem to correlate closely with the construction of their house but seemed to correlate more with the characteristics of their immediate environs; there were commonalities in the spaces residents suggested they would take shelter in their own house during a bushfire.

Brown, Douglas

Faculty of Architecture, Design & Planning

University of Sydney

Bushfire CRC PhD scholarship recipient

Email: douglas.brown@sydney.edu.au

INTRODUCTION

Australian bushfire case studies (Blanchi and Leonard, Bushnell, Woolcott, McLennan) have looked at resident's bushfire preparation activities, their behaviour immediately prior, during and post a bushfire event plus assessed damage to homes. This paper seeks to add new knowledge by considering the two issues that have not previously been addressed by these case studies. The first examines residents' perception of the bushfire risk of their local area and their own (individual) property. The second seeks to find out which parts of their homes residents would seek shelter during a bushfire and which parts would they avoid.

The paper investigated residents' perceptions by conducting a survey of residents of Mount Wilson and Pretty Beach, NSW, Australia. Of the 78 households in Mount Wilson, 28 completed the survey. Of the 218 households in Pretty Beach, 18 completed the survey. These 46 responses from 296 households are part of a larger study undertaken between 2011 and 2012, where 175 responses were collected from eight villages with a sample pool of approximately 1,430 occupied dwellings (households) in either the Blue Mountains or the Central Coast of NSW, Australia.

The Study Sites

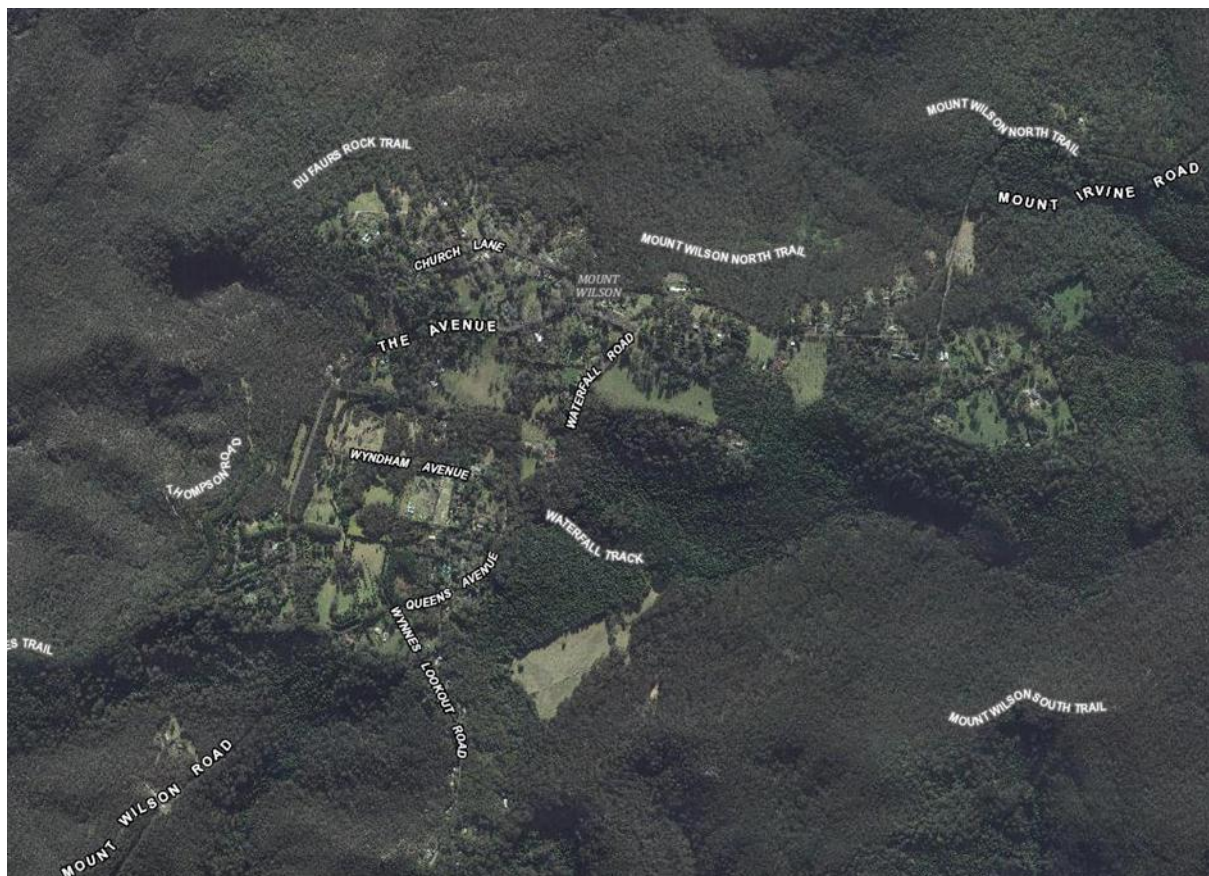


Figure 1: Map of Mount Wilson, Blue Mountains, New South Wales, Australia, showing streets. (NSW Government 2013)

Mount Wilson is surrounded by the Blue Mountains National Park. It does not have mains water or electricity. Access is limited and the population is approximately 300 with about 78 occupied dwellings.



Figure 2: Map of Pretty Beach, Central Coast, New South Wales, Australia, showing the streets. (NSW Government 2013)

Pretty Beach is a coastal village with a population of 533 people and 218 occupied dwellings. These figures include the neighbouring village of Hardy's Bay as the Australian Bureau of Statistics merge the two together as a single population (Australian Bureau of Statistics 2013). Pretty Beach experienced a bushfire one month before the survey was distributed. No property was damaged. Residents have access to a nearby Bay.

METHODS

The method used for data collection in both Mount Wilson and Pretty Beach was a survey made available electronically to residents on community email trees. There were 28 responses for Mount Wilson representing the 78 households. Pretty Beach returned 18 responses out of a potential sample of 217 households. The survey responses were collected electronically using the Survey Monkey software program. Data was analysed using Microsoft Excel 2010. This paper looks at the responses to seven of the 37 questions covered in the questionnaire. The individual questions and the responses are described in detail in the following two sections of the paper.

SECTION 1 Method

Resident's Perception of the Bushfire Risk of their Local Area and their own Property

This section addresses three questions related to residents' perception of their local bushfire risk: What is the resident's perception of the bushfire risk of their local area? How well do these perceptions match the bushfire risk as assessed by their state fire authority? What is the resident's perception of the bushfire risk of their own property? The following survey questions were used to test these issues:

- Question 6: How do you rate the risk of bushfire in this locality?
- Question 13: How do you rate the risk of bushfire to your current house?
- Question 14: Why do you give (your current house) that risk rating?

For both questions 6 and 13, the residents were required to select a response from the following options: Extreme; Very High; High; Medium; Low and Very Low. Question 14 asked why the residents gave that particular bushfire risk rating. Their responses were compared with the bushfire risk rating given for their area by the NSW Rural Fire Service, which is the state fire authority for all of New South Wales.

Supporting questions

To test the effect of previous bushfire experience and investigate whether residents in newer homes, which are more likely to be compliant with standards (Standards Australia 1999) / (Standards Australia 2009) and the Building Code of Australia (Australian Building Codes Board 2013) had the same or a different risk perception for their homes, the following questions were asked:

- Question 10: Have you ever experienced a bushfire that threatened the house you were living in? A Yes and No response box was given.
- Question 25: If known, in what year or decade was the house built? (e.g. '1962' or 1960s'). No response options were given.

SECTION 1 Results

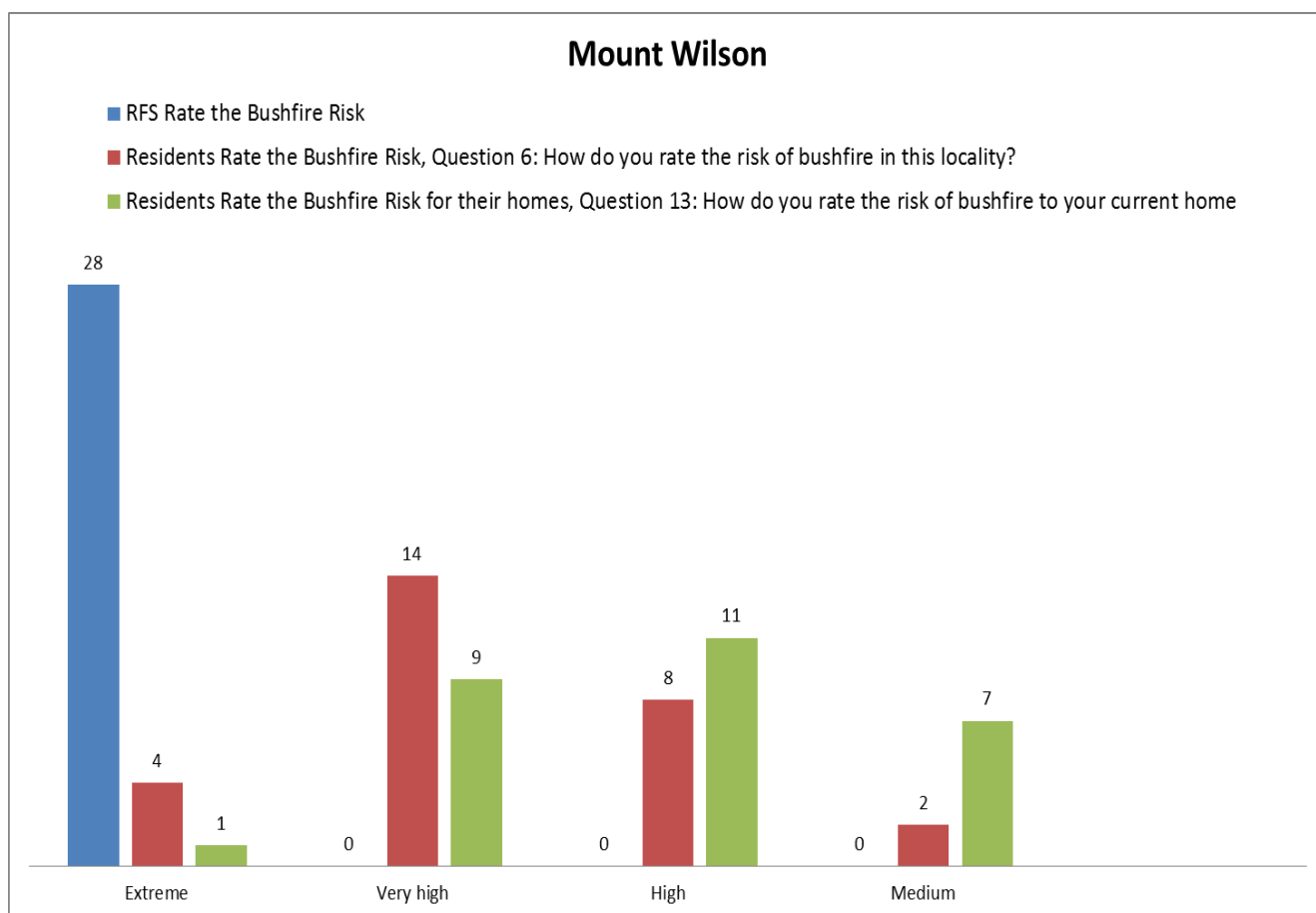


Figure 3: Comparison between the RFS Risk Assessment and survey respondents in Mount Wilson

NSW RFS Risk Rating for Mount Wilson

The NSW Rural Fire Service assesses the village of Mount Wilson as being of *Extreme* bushfire risk. It does this using the *Blue Mountains Bush Fire Risk Management Plan* (NSW Rural Fire Service 2010), map reference number 32, under the heading of Human Settlement/Residential for Mount Wilson/Mount Irvine – Dispersed.

Mount Wilson Residents Responses

The majority of respondents rate the Mount Wilson area as having a *Very High* (14 out of 28) or *High* risk rating (8 out of 28) with only four agreeing with the RFS's risk assessment. When residents view the risk that their own homes present they perceive the risk as *High* (11 out of 28), *Very High* (9 out of 28) or *Medium* risk (7 out of 28). To understand why residents gave their answers to Question 13 (How do you rate the risk of bushfire to your current house?) which is represented by the green bar

in Figure 3, we need to look at their responses to Question 14 (Why do you give the risk that rating?). The *High* category of risk received 11 out of 28 responses, nine focussed on the lack of hazard reduction for years, proximity to the National Park, bushland, steep slopes and the closeness of trees to their homes, while only two of them made reference to their house ('Brick house on slab' & 'Old house with lots of gaps'). The *Very High* category was the next most popular with 9 out of 28 respondents. Eight respondents focussed on the surrounding areas and its proximity to the National Park, steep slopes and the anticipated fire threat direction, while only one respondent gave the construction materials of their house as the reason ('Double brick and brick veneer house with a tile roof on pine trusses'). The 7 out of 28 respondents who attributed the risk as *Medium* noted that they had engaged in bushfire preparation activities which included regularly mown grass, cleared areas around house, no overhanging trees and for two respondents, sprinklers with access to water tanks and generators. Finally the single *Extreme* risk respondent gave their reason as there being 'no hazard reduction for years'.

In response to having previously experienced a bushfire that threatened their home (Question 10), 8 out of 28 respondents from Mount Wilson answered yes. Six gave their current home a lower risk rating than the local area and two gave their home the same risk rating as the area. In response to what year or decade the house was built (Question 25), 6 out of 28 Mount Wilson homes were built after the year 2000, four of these attributed their risk rating to the surrounding area: slope; vegetation and proximity to the National park and only two to the new construction of their homes.

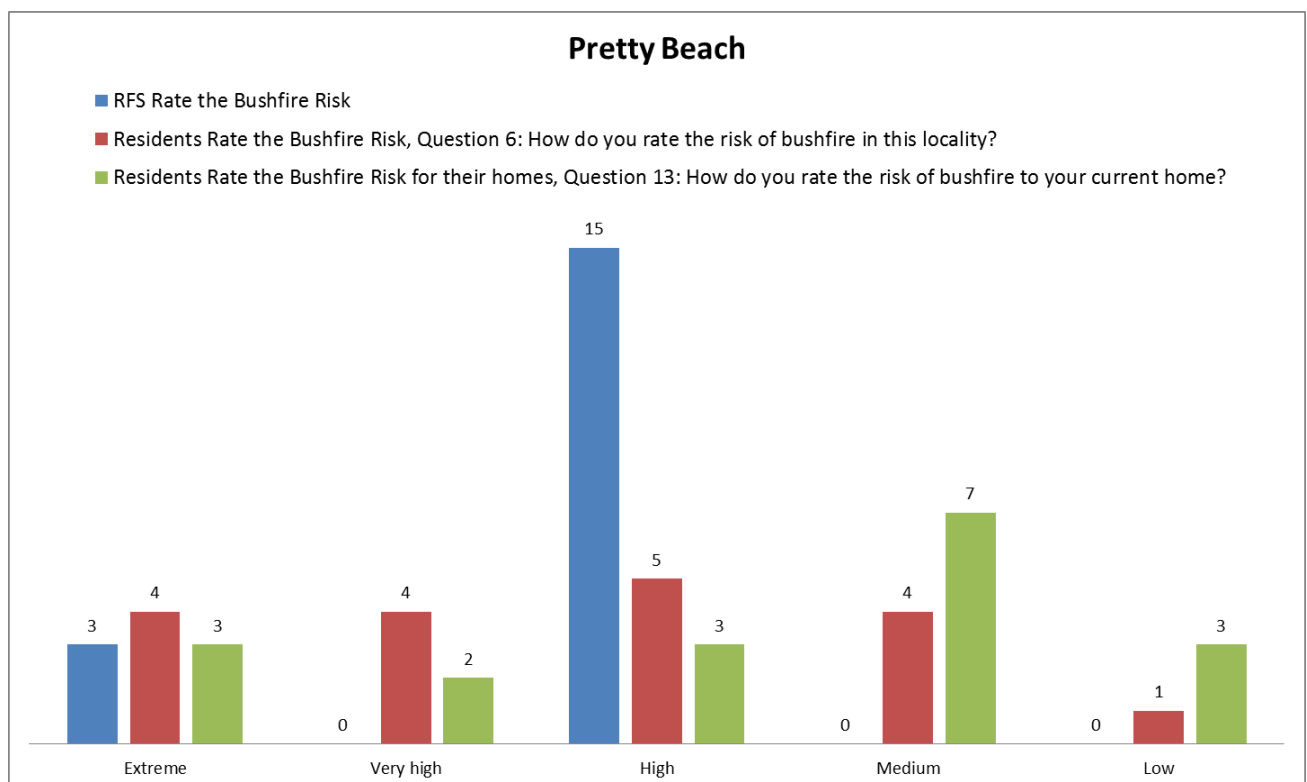


Figure 4: Comparison between the RFS Risk Assessment and survey respondents in Pretty Beach

NSW RFS Risk rating for Pretty Beach

The NSW Rural Fire Service assesses the village of Pretty Beach as primarily being of *High* bushfire risk, although it includes a few properties of being of *Extreme* risk. It does this using the *Gosford Bush Fire Risk Management Plan (NSW Rural Fire Service 2011)* map reference number 219, where it has been categorised as one residential asset along with its neighbouring villages of Hardys Bay and Wagstaffe (map reference number 85).

Pretty Beach Residents Responses

The way that residents rate the risk of bushfire in their area and to their home is generally spread across all five risk categories. For *Extreme*, *Very High* and *High*, residents view the risk to their homes as lower than the surrounding area but for the *Medium* and *Low* risk categories they view the bushfire risk to their homes as higher than the area in which they are located. For just the risk rating they attribute to their homes, the *Medium* risk rating had the highest number of responses (7 out of 18), with *Extreme*, *High* and *Low* each registering three responses. *Very High* had the lowest number of responses (2 out of 18).

As with our Mount Wilson example, to understand why residents gave their answers to Question 13 (How do you rate the risk of bushfire to your current house?) represented by the green bar in Figure 4, we need to look at their responses to Question 14 (Why do you give the risk that rating?). Four of the seven *Medium* responses cited not being damaged by the recent bushfire as their reason for giving this risk rating. Others gave their location as being a bit removed from bushland, with good vehicle access, largely surrounded by residential blocks and roads, or with an open space in the surrounding area. Neighbours with well watered and mown lawns were also mentioned. Only one respondent gave the construction of their home as the reason for attributing this risk rating. Two of the three *Extreme* responses gave reasons that directly reflected the recent bushfire; such as 'Because the fire came to within 5 metres of our house', while the third gave proximity to the National Park. Answers from the three *High* respondents were mixed: ranging from the risk they had received from the RFS, to the 2012 construction of their home and a range of reasons that highlighted the neglect of maintenance by neighbours and public ignorance potentially resulting in bushfires by visitors to the area. The three *Low* responses all gave factors relating to the immediate environs of the building but not the building construction elements, as the reasons for allocating this risk rating. Both *Very High* responses were in relation to the threat posed by bushland and the proximity to the National Park.

In response to having previously experienced a bushfire that threatened their home (Question 10), 9 out of 18 Pretty Beach respondents answered yes. Five of these gave the risk to their home as lower than the surrounding area and four gave it the same bushfire risk rating. In response to what year or decade the house was built (Question 25), 5 out of 18 Pretty Beach homes were constructed after 1999. Four made reference to the bushfire risk of the surrounding area with only one respondent attributing their risk rating as resulting from the material construction and new design of their home.

Discussion

When comparing the bushfire risk level residents gave their local area, for both Mount Wilson and Pretty Beach, it was either the same or one level lower than the bushfire risk they gave to their homes. This pattern is the same irrespective of what year the house was constructed or if residents had previously experienced a bushfire. There were two exceptions to this, one in Mount Wilson and one in Pretty Beach, where the risk was perceived as either two and three levels lower for their homes. Both lived in brick houses and both were renting. The Mount Wilson resident was on a 252 hectare property and presumably didn't have the issue of neighbours' overhanging trees. It appears that landscape and vegetation rather than the materials used in construction of the house determine residents' perception of the bushfire risk of their homes.

For residents in Mount Wilson the bushfire risk they allocated for their local area did not match the risk allocated for that area by the local state fire authority (NSW RFS). Half the respondents gave the next rating level down and a quarter the level below this. Pretty Beach respondents allocated the bushfire risk to their local areas almost evenly across five risk rating scales (from *Low* to *Extreme*) while the NSW RFS allocated it as either *Extreme* or *High*.

SECTION 2 Method

In Response to their Perception of the Local Bushfire Risk, which Parts of Their Homes Would Residents Seek Shelter in During a Bushfire and which Parts would they Avoid.

This section addresses the following issue: What parts of their homes and immediate environs impact on residents' perception of safety and vulnerability during a bushfire? The following survey questions were used to test this issue:

- Question 29: If you had to stay in your home during a bushfire, which part of the house will you take shelter in while the bushfire passes? Why there?

- Question 32: If you had to stay in your home during a bushfire, which part of your house would you avoid as the bushfire passes? Why there?

Both these questions were open ended; no options were provided.

SECTION 2 Results

Mount Wilson Responses

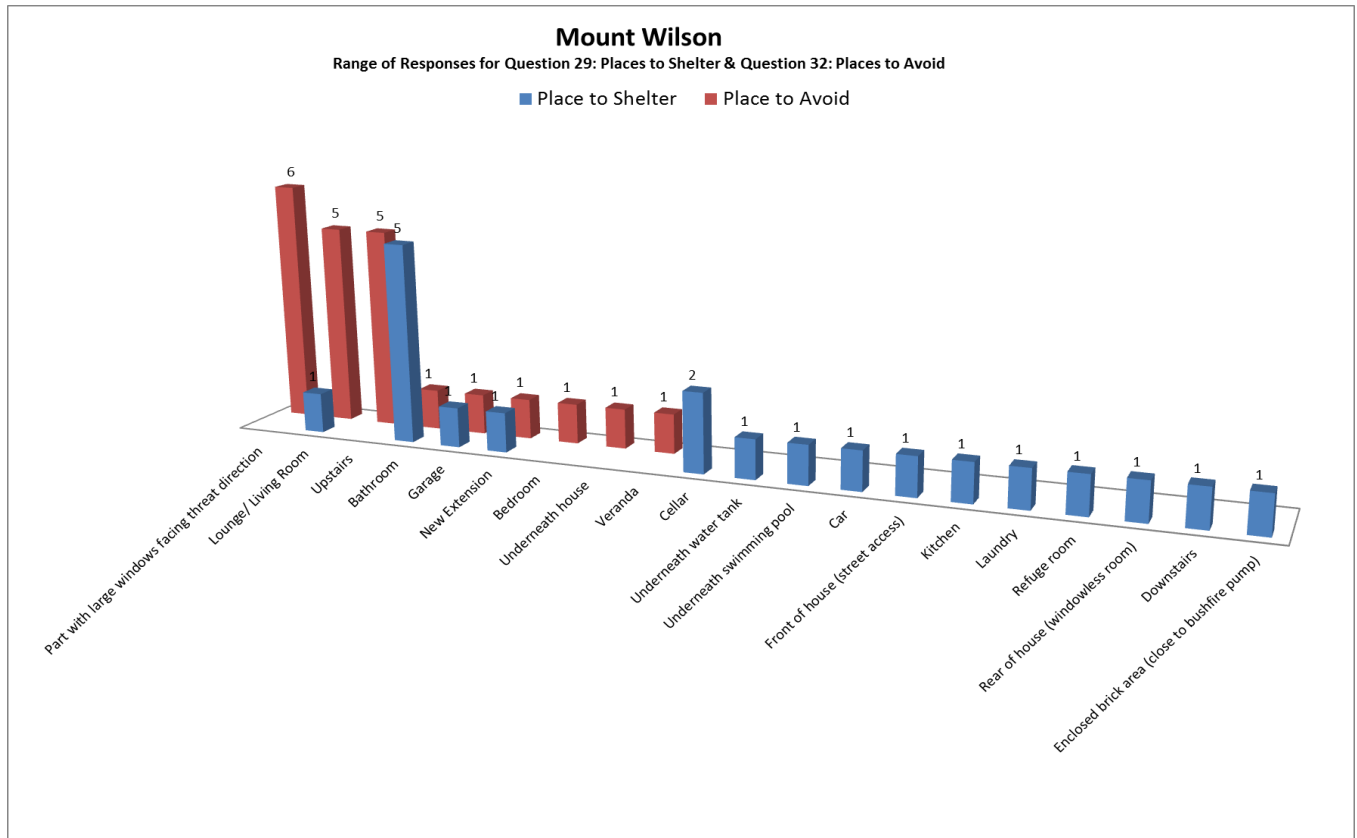


Figure 5: Mount Wilson - Range of Responses for Question 29: Places to Shelter & Question 32 Places to Avoid.

Within the Mount Wilson sample there are fifteen different types of response to Question 29 (If you had to stay in your home during a bushfire, which part of the house will you take shelter in while the bushfire passes? Why there?). The bathroom had the greatest number of responses (5 out of 28), although one respondent viewed the bathroom as a place to avoid. While with the garage and the new extension there was an equal distribution of those who viewed these places as either safe or vulnerable (1 out of 28 for both). For Question 32 (If you had to stay in your home during a bushfire, which part of your house would you avoid as the bushfire passes? Why there?), there were nine different types of response. The most popular was the category of avoiding any part with large windows facing the anticipated bushfire direction (6 out of 28). This was followed by the lounge/living room and upstairs (both have 5 out of 28 responses). The lounge/living room was also for one other respondent a place to shelter.

Pretty Beach Responses

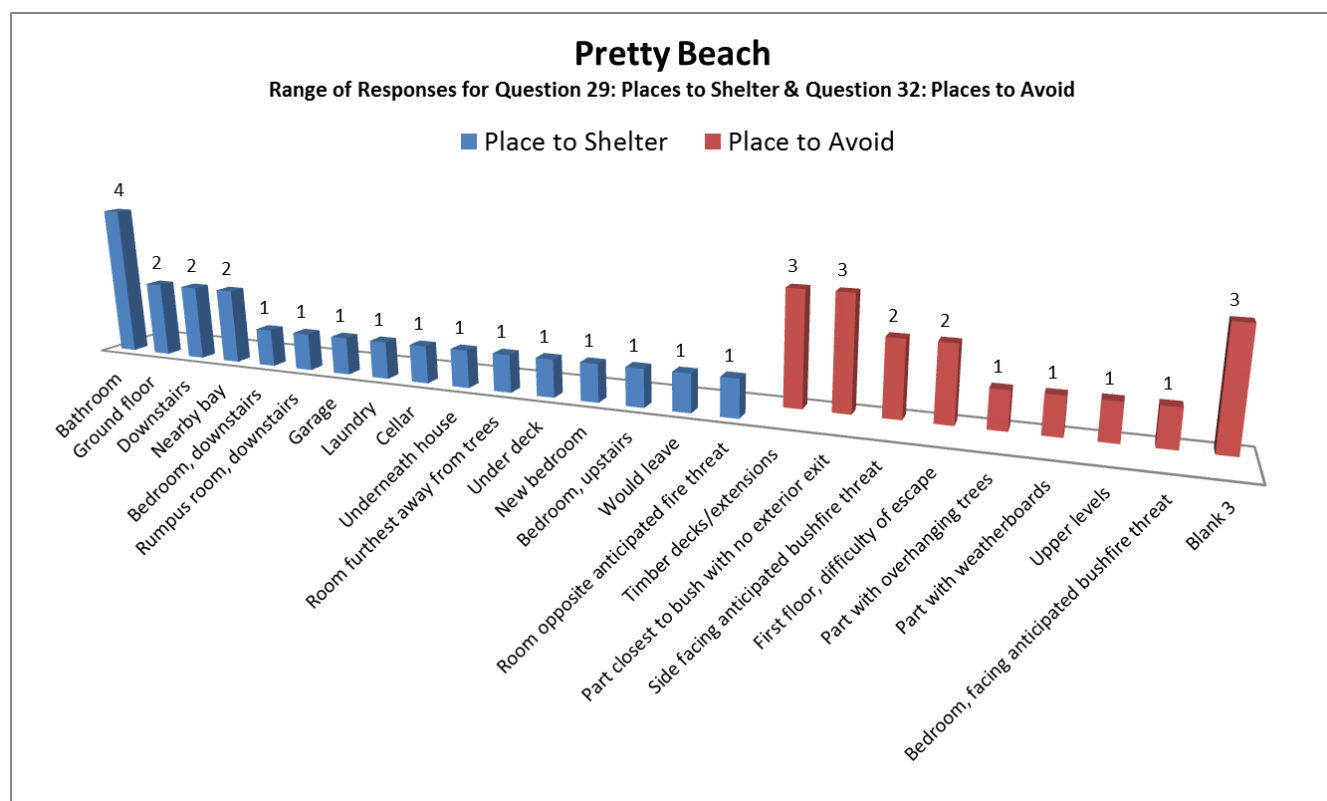


Figure 6: Pretty Beach - Range of Responses for Question 29: Places to Shelter & Question 32 Places to Avoid.

In the Pretty Beach responses to Question 29 (If you had to stay in your home during a bushfire, which part of the house will you take shelter in while the bushfire passes? Why there?) the section of the house that residents intended taking shelter in was given rather than specific rooms. Where rooms were identified it was in relation to the floor they were on and its proximity to the direction of the anticipated bushfire threat. The four bathroom examples illustrate this: bathroom (lower level); bathroom (middle of house); bathroom (level not given) and bathroom with external door. Similarly this occurs with the four 'downstairs' examples: downstairs (easy escape); downstairs bedroom (easy escape); downstairs rumpus room (adjacent to paved area) and downstairs. For Question 32 (If you had to stay in your home during a bushfire, which part of your house would you avoid as the bushfire passes? Why there?) the places residents intended to avoid during a bushfire were mainly the parts of their house exposed to the anticipated direction and threat from bushfires. Upper levels were perceived as places to avoid as they were considered more difficult to escape from.

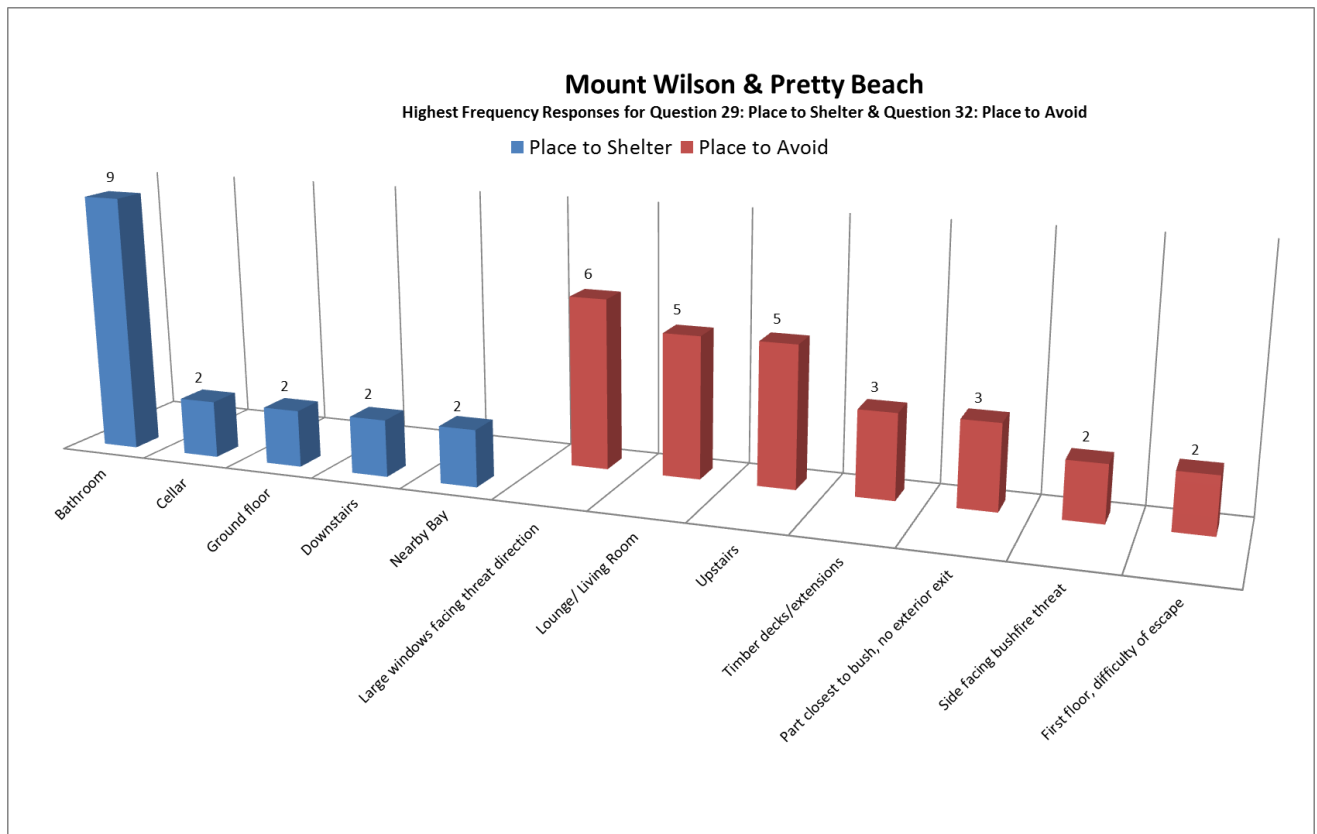


Figure 7: Summary of Highest Frequency responses for both Mount Wilson and Pretty Beach

Discussion

When individual responses with frequencies of two or more, for both 'Place to Shelter & Place to Avoid', for both Mount Wilson and Pretty Beach are represented (see Figure 7), the following findings appear. The most popular place to shelter was the bathroom (9 out of 46). The cellar, ground floor, downstairs and nearby ocean all had the same response rate (2 out of 46). The range of responses for 'place to avoid' was greater with seven different responses. The most popular response was the part of the house with 'large windows facing the anticipated bushfire threat direction' (6 out of 46). The lounge/living room and upstairs each had 5 out of 46 responses. Timber decks/extensions and the part closest to the bush each had 3 out of 46 responses and the side of the house facing the bushfire threat and the first floor each had 2 out of 46 responses. Lower or ground levels were favoured as places to shelter during a bushfire while upper levels were perceived as places to avoid as they were considered more difficult to escape from.

CONCLUSION

Residents living in Mount Wilson and Pretty Beach give their area a lower bushfire risk rating than their state fire authority. When allocating the risk rating to their own homes they either matched the risk rating they had allocated to their area or gave it the next lowest ranking. There were two exceptions to this, one in each location. The residents in each case were renting and lived in brick homes. There was no difference between the way that residents living in recently constructed homes (presumably AS 3959 compliant) versus those living in older homes attributed the risk to their homes. It was not the materials used in the construction of their homes that residents used to ascertain the bushfire risk of their home; rather it appeared to be factors in the surrounding area. These factors included slope, proximity to bushland and the direction of the anticipated bushfire. While there was a large variety of answers for the parts of their house respondents would seek shelter in during a bushfire, the bathroom was the most popular with a number of others focussed on the ground floor to facilitate escape. Places to avoid could be categorised as falling into three groups: spaces with large amounts of glass; upstairs spaces (limited escape) and parts/sections closest to the direction of the anticipated bushfire threat. For many residents of Pretty Beach surviving the recent bushfire was a strong factor and appears to have masked the potential protection the nearby ocean could provide as an escape option during a bushfire event.

REFERENCES

Australian Building Codes Board (2013). National Construction Code series : guide to volume one : Building Code of Australia. Class 2 to Class 9 Buildings. Canberra, A.C.T, Australian Building Codes Board.

Australian Bureau of Statistics (2013). "2011 Census data." from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/Census?opendocument#from-banner=GT>.

Blanchi, R. and J. Leonard (2005). Investigations of bushfire attack mechanisms resulting in house loss in the ACT bushfire 2003. Melbourne, Australia, Bushfire CRC: 3–6.

Bushnell, S., A. Cottrell, et al. (2006). Thuringowa Bushfire case study - technical report, School of Tropical Environment Studies and Geography, James Cook University: 127.

McLennan, J. D., P. Kelly, L. Elliott, G. (2011). Lake Clifton Fire 10 January 2011: Field Interview Task Force Report - Community Bushfire Safety. Melbourne, Victoria: 38.

NSW Government (2013). SIX (Spatial Information Exchange) Maps, Land & Property Information, NSW Government

NSW Rural Fire Service (2010). Blue Mountains Bush Fire Risk Management Plan (Approved 17/09/2010). Blue Mountains Bush Fire Management Committee (Policy No.1/2008), NSW Rural Fire Service 97.

NSW Rural Fire Service (2011). Gosford Bush Fire Risk Management Plan (Approved 18 July 2011). Gosford District Bush Fire Management Committee (Policy No.1/2008), NSW Rural Fire Service: 70.

NSW Rural Fire Service and Woolcott (2010) NSW Rural Fire Service: bush fire readiness study report 2010. 67 slides

Standards Australia (1999). AS 3959-1999 (Incorporating Amendments Nos.1). Construction of buildings in bushfire-prone areas. Sydney, Australia, Standards Australia International: c35.

Standards Australia (2009). AS 3958-2009 (Incorporating Amendment No.1-3) Construction of buildings in bushfire-prone areas. Sydney, Australia, Standards Australia: c190.