

FIRE NOTE

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PREDICTING BUSHFIRE PREPAREDNESS FROM BUSHFIRE EXPECTATIONS



▲ This study in the Perth Hills examined the link between why residents choose to prepare for a bushfire and the types of preparatory actions undertaken. *Photo: Department of Fire and Emergency Services*

SUMMARY

This *Fire Note* outlines community preparedness research conducted into the bushfires that occurred in the Perth Hills in February 2011. Surveys were mailed out to affected communities two weeks after the fire, examining the link between several potential predictors of why residents prepare for a bushfire (perceptions of risk, safety responsibility, reliance on an official warning, the ongoing availability of essential services), and four different types of bushfire preparedness activities. These activities were defence preparation, evacuation preparation, general resilience of the house and psychological planning.

Results showed that all predictors had baseline relationships with all types of preparedness activities. However, when examining their unique predictive power (i.e., looking at which of these relationships could not be easily explained by other factors) some predictors were shown to be more important than others. Perceiving the threat of bushfire to be more severe was a more important predictor of higher levels of all types of preparation than perceiving the threat as more likely, which did not uniquely predict any type of preparedness behaviour. Residents who felt they would be able to rely on an official bushfire warning and residents who expected to lose electricity were both important in predicting general resilience of the house. The former predicted lower resilience, and the latter predicted higher resilience. Additionally, expecting to lose water services was important in predicting higher levels of psychological planning.

ABOUT THIS PROJECT

This *Fire Note* is based on a journal article accepted for publication by *Risk Analysis*. It reports on the *Information processing under stress: community reactions* project, conducted under the Bushfire CRC theme *Communicating risk*.

AUTHORS

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CONTEXT

Fire agencies are seeking to understand if and how individuals and households prepare for a bushfire. They need to know if individuals and households prepare in different respects to an equal extent, and the factors that influence bushfire preparedness.

Following the 2009 Black Saturday bushfires, a national bushfire awareness campaign, 'Prepare. Act. Survive.' was implemented throughout Australia. In Western Australia, brochures outlining the 'Prepare. Act. Survive.' message were distributed to residents of high bushfire risk areas.

In this context, this field study investigated two questions:

1. How do the sections of the Western Australian 'Prepare. Act. Survive.' brochure that aim to make residents' bushfire expectations more accurate (e.g. bushfires can start suddenly and without time to issue a warning) relate to actual bushfire preparedness?
2. Do these relationships vary across different types of preparedness?

The communities targeted for this research were affected by bushfires in the Perth Hills in early February 2011. The bushfire at Red Hill directly affected half of the surveyed area, and could have easily affected the other half, had weather conditions changed. There was minimal property damage. In contrast, the bushfire at Roleystone and Kelmscott destroyed 71 homes and further damaged 39 properties. This region comprised a mix of small and medium-sized urban blocks. A similar demographic across age and gender was found in both regions.

BACKGROUND

The devastation caused by bushfires is well documented. It is known that the success of an individual or household bushfire survival plan relates to the preparatory actions undertaken prior to a fire season. The 'Prepare. Act. Survive.' brochure aims to increase preparatory actions by residents of

bushfire prone areas. This project examines the link between perceived risk, perceived safety responsibility and preparatory actions outlined as recommendations in the 'Prepare. Act. Survive.' brochure. In addition, the intention was to gain a more precise picture of the interaction between these hazard expectations and several specific types of preparatory actions: preparedness to defend, preparedness to evacuate, resilience of the house/property, and preparedness through psychological planning.

BUSHFIRE CRC RESEARCH

Two weeks after the bushfires, the Bushfire CRC research team from the School of Psychology at the University of Western Australia mailed out 3000 surveys to affected communities, focusing on the link between householders' awareness of expectations raised in the Western Australian 'Prepare. Act. Survive.' brochure and the number of preparatory actions that households had completed prior to the fires. Each survey contained a cover letter explaining the intentions of the project. A total of 1003 completed surveys were returned, providing a strong response rate of just over 33%.

The survey measured in a quantitative manner respondents' expectations regarding the recommendations in the 'Prepare. Act. Survive.' brochure. For example, threat likelihood was measured by asking residents how likely they thought it would have been for a fire to hit their suburb/community. Respondents could indicate their answer on a scale ranging from very unlikely to very likely.

Forms of preparedness included preparing for defence, preparedness for evacuation, increasing fire resilience of the house and psychological planning. These were

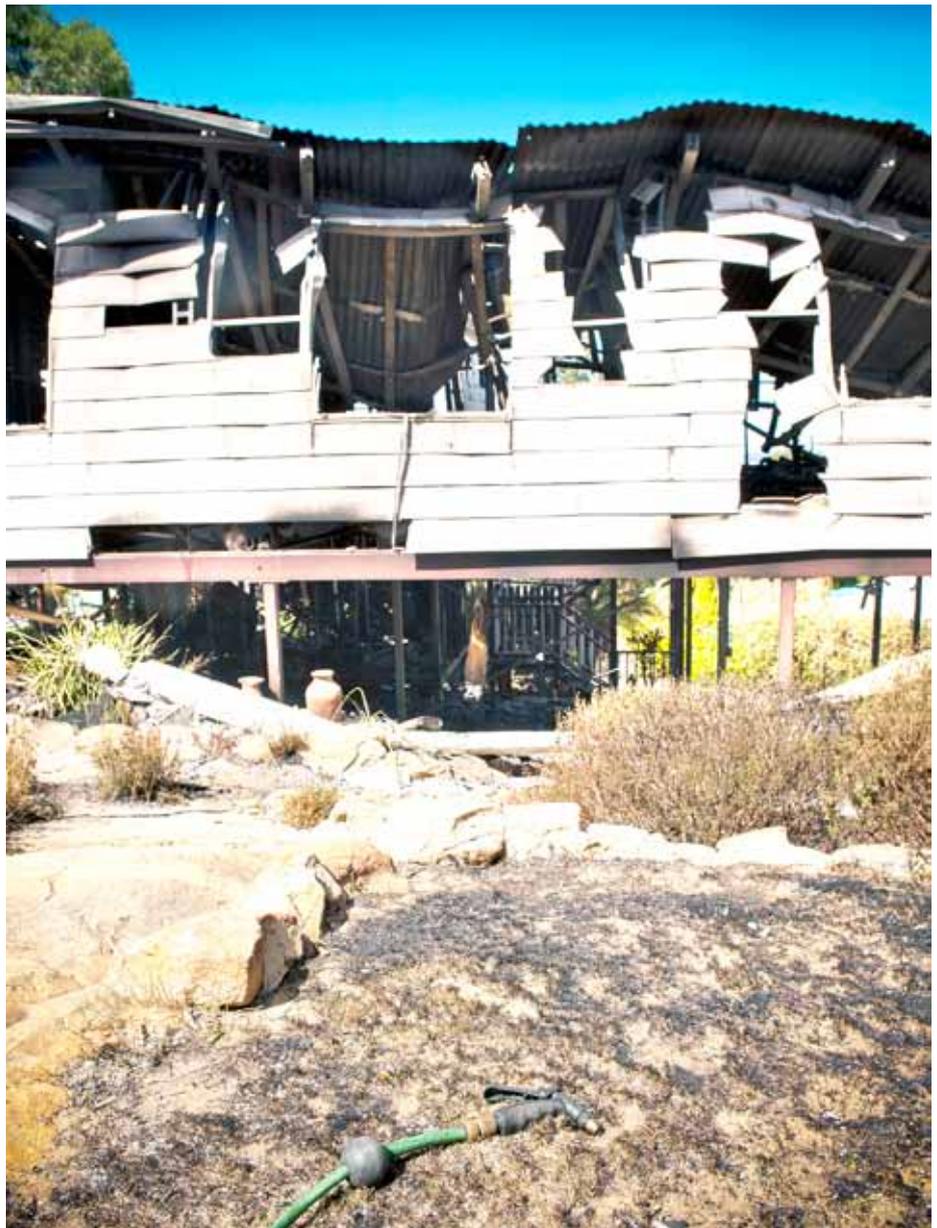
EXAMPLES OF ITEMS USED TO MEASURE THE FOUR TYPES OF PREPAREDNESS.

Defence item: I/my household had obtained and prepared equipment such as ladders, buckets, and mops to put out spot fires. – Yes/No/Not Applicable.

Evacuation item: I/my household had an evacuation route mapped out. – Yes/No/Not Applicable.

House resilience item: I/my household had cleared leaves, twigs, and long grass for a distance of about 20-30 metres around the house. – Yes/No/Not Applicable.

Planning: I/my household had thought about what each person would need to do in case of a bushfire. – Yes/No/Not Applicable.



▲ The Roleystone/ Kelmscott bushfire destroyed 71 homes and further damaged 39 properties. Photo: Department of Fire and Emergency Services

measured by asking people to indicate which preparatory actions they had completed at the time of the fire. Some examples of items used to measure the four types of preparedness are listed in the box below.

The end scores were the percentages of completed actions for each subtype of preparedness after factoring out the actions that were not applicable to their household. Surveys were complemented by qualitative interviews to ensure important types of expectations had not been missed.

RESEARCH OUTCOMES

The outcomes of the combined quantitative and qualitative research showed that expectations regarding the severity of a bushfire threat predicted all four types of preparatory actions, with higher threat perceptions predicting higher preparedness. However, even though expectations relating

TYPES OF PREPARATORY ACTIONS SURVEYED

- Defence preparation
- Evacuation preparation
- General resilience of the house
- Psychological planning

to the likelihood of bushfire risk were associated with all types of preparedness, this factor did not uniquely predict any type of preparedness after controlling for the other factors.

Residents who perceived themselves as more responsible for their own safety were more likely to have carried out all types of preparedness, but this factor had no unique predictive power above and beyond the other factors. In contrast, residents who were more inclined to expect that they



◀ Results showed that residents of the Perth Hills who expected to lose electricity during a bushfire were more likely to prepare their property to a higher level of resilience.

Photo: Department of Fire and Emergency Services

could rely on an official warning were generally less likely to carry out preparatory actions, and this factor uniquely predicted general resilience of the house.

Expected obstacles, such as loss of utilities, were linked with the four types of preparatory actions to varying degrees. When examining their unique predictive power, expecting to lose water predicted higher psychological planning, whereas expecting loss of electricity predicted higher house resilience.

Male residents indicated having completed more preparatory actions than female residents. In addition, there was a positive relationship between age and all types of preparation, with older residents reporting having completed a higher percentage of preparatory actions for each type of preparedness.

A significant difference was found in the type of preparatory action undertaken by those living in the more rural north eastern areas (Red Hill and Gidgegannup), compared to the south eastern regions (Roleystone, Kelmscott and Armadale). In the north east, residents undertook, on average, more defence, evacuation, and resilience actions, and engaged in more psychological planning than those in the south east.

A little less than 50% of residents surveyed had expected to lose access to their water supplies. During the fire, approximately 20% lost access to water. Over 80% of residents expected to lose access to electricity, with over 70% reporting actual loss of electricity.

Residents in Gidgegannup reported a higher level of expectancy with respect to losing

QUOTES FROM INTERVIEWS RELATING TO SURVEY MEASURES

Protection Responsibility: *“Expected and was waiting for state wide alert which was not received till two hours after we evacuated.”*

Planning: *“We believe we are pretty well prepared and would stay to defend the house in most circumstances. The house is not ideally located or structurally secure for extreme fires, so we have a back up location nearby at our stables where we would retreat to if necessary.”*

Some residents did not expect to lose some services, such as water and electricity:

“Returned to house and began helping husband water house down then water was cut off. Called water board to complain but water supply was NOT restored.”

“Without power my remote control to open my double garage door would not work. The manual alternative was a cord which I could only just reach (and I) did not have sufficient strength to haul the door open. Tried standing on a chair but my lack of height and strength could not get the door to retract in to the garage roof and it just slid down back to the closed position.”

services, across all service types, than any other region. However, in these particular fires, fewer people in Gidgegannup actually lost electricity than elsewhere (48% less than the region wide average), due to the spread of the fires.

An article containing the full details of this research has been accepted for publication by the journal *Risk Analysis*, which can be made available to those interested upon request to the author of this *Fire Note*.

HOW COULD THE RESEARCH BE USED?

Almost all of the hazard-related expectations raised by the ‘Prepare. Act. Survive.’ brochure were linked with at least one type of preparatory action. This supports the idea of raising these expectations. However, not all expectations uniquely predicted all types of preparatory actions, and one did not predict any: perceived threat likelihood

was not a significant unique predictor of preparedness. This may be due to the situation in the studied communities, namely that likelihood judgments tended to be very high. Perceptions of threat likelihood have been shown to have less impact on human behaviour as soon as likelihood reaches a certain threshold. When this is the case, severity of the threat becomes a better determinant (Weinstein, 2000). Whether or not communications should focus on threat likelihood or threat severity thus depends on whether or not this likelihood threshold has been reached. In other words, community education initiatives need to tailor their emphasis on expectations of threat across different communities, depending on how aware the communities are of threat likelihood.

In addition to testing the different expectations in the ‘Prepare. Act. Survive.’

- ▶ The research showed that residents who perceived themselves as responsible for their own safety were more likely to have carried out all types of bushfire preparedness activities.



brochure, this research shows that bushfire preparedness is a multidimensional construct, and that different expectations may influence different types of preparedness. While further research is needed to increase the understanding of why households choose the style of preparation that they do, and at times prepare better on one dimension than on the others, communications like the 'Prepare. Act. Survive.' brochure would benefit from emphasising this multidimensional approach in setting out their communication strategy.

FUTURE DIRECTIONS

The research outcomes have been presented nationally and internationally. The research formed the construction of a follow-up field study that was conducted in Western Australia during the 2011/2012 fire season. This study, distributed to residents on two occasions (before and after the fire season), aimed to address the primary limitation of the research described in this *Fire Note*, namely that it is correlational in nature, and therefore does not consider the possibility that changing

END USER STATEMENT

The impact of the Perth Hills bushfires was devastating in some of the communities affected, so it was extremely important that the research was timely, focused and sensitive to the needs of the participants. As emergency service organisations across the nation strive to increase community resilience, this research project provided an invaluable insight into a number of important human factors, in particular the link between hazard-related expectations and preparedness. It also reinforced the need to continually review the paradigms upon which we base and shape our community safety initiatives. It is a timely reminder of the important role of post implementation evaluation.

– **David Caporn, Executive Director, Department of Fire and Emergency Services, Western Australia**

expectations will actually cause an increase in preparedness. The only way to conclude this is by first changing expectations and then recording any changes in preparedness levels, achieved by distributing surveys on two occasions. This follow-up study attempted to increase awareness of a possible loss of services at a specific point of time (paralleled by a control group). This study investigated whether changing expectations in the desired direction actually leads to greater preparedness. Results of this study will be published in a Bushfire CRC report.

FURTHER READING

McNeill I, Dunlop P, Heath J, Skinner T, and Morrison D, *Expecting the unexpected: predicting physiological and psychological wildfire preparedness from perceived risk, responsibility, and obstacles*, *Risk Analysis*, in press.

Weinstein N, 2000, **19(1)**, Perceived probability, perceived severity, and health protective behaviour, *Health Psychology*, 65-74.

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AFAC is the peak representative body for fire, emergency services and land management agencies in the Australasia region. It was established in 1993 and has 35 full and 10 affiliate member organisations.