Background briefings on emerging issues for fire managers from AFAC and Bushfire CRC.

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FIRE NOTE

TOPICS IN THIS EDITION
- RISK
- COMMUNITY SAFETY
- NATURAL ENVIRONMENT

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LIFE ON THE EDGE – LIVING WITH RISK

▲ Defence mechanisms. Landscaping provides an attractive outlook and reduces the fire risk.

SUMMARY

Householders living in fire-prone bushland areas recognised the high fire danger on their doorsteps, but many may treat fuel hazard reduction as a low priority.

This study explored how householders perceived the value and risks of living in or near bushland and analysed the complex mix of hazards, risk, benefit and value perceptions that influenced the way they approached fire hazard.

The researchers interviewed householders in four fire-prone communities in rural NSW to determine their perceptions of forest fuel hazards and capture insights on the qualities in the natural landscape that they valued. These insights were combined with data obtained from comprehensive statistical modelling of fire risk and estimated probability of house loss within these communities.

The study revealed that nearly all residents preferred a low-fuel, open forest in adjacent bushland for bushfire hazard reasons. Most also preferred the low-fuel forest for amenity. However, most houses were exposed to adjacent fuel hazard levels that placed them at a relatively high level of potential risk. The study also identified a sub-set of residents who could accurately identify hazard, but who didn't necessarily take action on their perceptions of risk. This was due to a variety of reasons, such as their personal estimation of the chance of fire reaching their properties and their competing lifestyle priorities, such as time, money and resources.

ABOUT THIS PROJECT

This *Fire Note* summarises some aspects of the research from the *Social construct of fuels in the interface project 1* within the Bushfire CRC theme, *Understanding Risk.*

AUTHOR

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CONTEXT

This research examined whether landscape features, such as dense bush and vegetation, which attract people to live in, or near, bushland, are the same features that pose the greatest bushfire hazard.

BACKGROUND

Increasing numbers of people are choosing to live in fire-prone landscapes where they face the risk of losing their homes and property. There are a number of factors which contribute to the appeal of living at this Wildland Urban Interface (WUI), and one of the major attractions is the actual 'wild' or bushy character of the landscape.

Evidence gained from research into past bushfires shows that the management of the zone immediately around a house is critical to minimising bushfire risk. This zone includes the house, its construction and condition, the garden and, to a lesser extent, surrounding vegetation for up to one kilometre. Residents can improve the chance of protecting their home significantly through adequate risk reduction and preparation initiatives. These measures include removing vegetation touching the house and reducing potential fuel sources in the 'home ignition zone' (within 30metres of the house), as well as purchasing firefighting equipment and developing a survival plan.

The removal of vegetation to reduce fire risk can also reduce the perceived amenity value for some residents, resulting in a potential conflict in values.

BUSHFIRE CRC RESEARCH

This research investigated whether people were reluctant to remove the vegetation around their homes in an effort to retain the natural amenity and character of their properties, and whether this left them inadequately prepared for bushfire.

The methodology

The research team used a combination of interviews and empirical modelling to investigate the nexus between risk and

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amenity. In the first part of the project, they conducted semi-structured interviews with 65 residents in four fire-prone rural bushland NSW communities: Mount Wilson, Bilpin, Bowen Mountain and Wamboin. Participants completed a questionnaire, prior to each interview, which collected demographic data and captured a sense of the qualities they valued most about their immediate landscape and environment. These qualities included features and benefits such as "peace and quiet", "lifestyle" and "feeling close to nature". A large amount of interesting data was captured via the interview process, but remains beyond scope of this specific *Fire Note*.

Participants were also asked to view and rank, by order of preference, a series of five photos of local forest, which each showed increasing densities of ground and shrub cover. They were asked to rank the photos according to their preference in three key areas: minimising fuel hazard, aesthetics (how pleasant the scene was to view) and recreation (which scene where they would most like to spend leisure time).

In the second part of the project, the researchers applied a statistical model to examine historic house loss within NSW during the period 2001-2009. This was used to build on key house loss research from Black Saturday (Victoria 2009) (Gibbons *et al.* 2012; Price and Bradstock 2013).

In particular, the researchers assessed whether factors affecting the NSW losses, which occurred in much milder weather conditions, were consistent with those derived from studies of Black Saturday losses. A total of 309 damaged and 618 unburnt houses, which had been exposed to one of 28 fire events in which house losses occurred, were examined. The model was developed through Principal Component Analysis and a Generalised Additive Mixed Modelling approach. It was applied to the properties of the residents interviewed to calculate a relative estimate of the risk of loss to bushfire.

▲ Examples of the images used to assess perceptions of increasing fuel hazard.

RESEARCH OUTCOMES

Identification of bushfire hazard

Notably, all residents interviewed for the study were able to accurately identify different levels of fuel hazard. For example, they correctly ranked images with the lowest actual fuel hazard score as 'low risk'. This outcome contrasted with the findings of some previous studies, which found that a major barrier to fire preparedness was the residents' inability to perceive hazard. The researchers suggest that the ability to identify hazard demonstrated by participants in the current study may have been due to their personal experience with fire. For example, 91 per cent of the residents interviewed had seen fire burning vegetation and 77 per cent had experienced fire directly (their house was threatened in the past or they had helped defend a neighbour's house). This represented a much higher level of experience with fire than indicated in some previous studies. Media reports from recent catastrophic fire events, as well as advertising and community engagement activities within their local areas, may have also assisted with increased awareness of fire hazard and risk.

The outcomes for ranking of aesthetics and recreation were much more varied than for bushfire hazard, with a large group of people preferring forest relatively free of under-storey and a smaller group preferring dense forest for both values. This reflected a diversity of attitudes toward the amenity and hazard posed by neighbouring forest among the residents.

Modelled risk

The model, which best described the risk of loss due to fire, consisted of four key variables: slope, proximity, distance to nearest water body and ground cover. The risk of loss increased with slope, where houses were close together (seven metres apart), but this effect was minimal where houses were further apart (50 metres). The risk of loss also increased where the distance to the nearest water body (swimming pools, ponds, dams) increased, and when vegetation cover within the garden was high (within 20 metres of the house).

▲ Bowen Mountain: a community with relatively high fire risk.

Risk and amenity/recreation trade-offs

The risk model was developed to estimate the relative chance of loss (given the hypothetical occurrence of a fire) for the houses in the study. The mean predicted probability of house loss for the 65 houses was 0.43, indicating a substantial potential risk should a fire occur. There was considerable variation in risk among houses, and in particular there was a higher risk in Bowen Mountain than within the other three communities. This was largely due to the close proximity of houses and higher garden vegetation cover within this location.

The study then tested whether the relative risk of house loss was related to householder perceptions of value (from the pre-interview questionnaire). The statistical modelling of the probability of house loss identified community (Bowen Mountain, Mt Wilson, Bilpin or Wamboin) and high lifestyle values as key factors possibly influencing risk.

This was consistent with previous work that identified lifestyle priorities as having a major influence on choices to prepare for bushfire risk. Given that residents demonstrated that they understood the fire hazard, this finding could indicate that hazard is not their highest priority when making decisions about managing their properties.

There are a number of reasons why fire hazard might be generally high, and particularly high among certain groups of people, despite the fact that they recognise fire hazard. First, people may be willing to knowingly tolerate the existence of hazardous vegetation on their properties because they perceive that the chance of fire reaching their property is low. Second, residents may not act on their hazard because of motivational barriers, which might be psychological, practical or financial: the 'dilemmas of everyday life' (Eriksen and Gill 2010).

Among all the other tasks required to live and enjoy their lifestyle, bushfire preparedness may be low on the list. Many of these residents may be amenable to maintaining their surrounding vegetation in an open, low fuel state, and this concurs with studies undertaken within the US (McAffrey *et al.* 2013). Thus, the key to improving preparedness relies less in educating people about how to reduce hazard and more in assisting them to take action.

Risk factors

The research identified four factors that influence the risk of house loss in bushfire: slope, garden vegetation, distance to other houses and distance to water bodies. These are not surprising, but add to a growing body of knowledge that highlights similar factors from fires in varying weather conditions and regions.

The findings reiterate the importance of the home ignition zone (within 30 metres of the home) as the critical area for risk reduction.

END USER STATEMENT

People value living close to bushland and this research gives useful insights into how they view and approach bushfire hazards on their properties.

This study is the first I'm aware of that investigates the connections between assessed risk, perceptions of risk, and amenity values in the context of bushfire management.

The results improve our understanding of why some people are aware of the bushfire risks where they live and yet do not take action to safeguard their properties. The findings reveal that most householders in these high bushfire risk areas recognise the fire hazards, but place a higher priority on other management and lifestyle issues for their properties.

This suggests that fire agencies need to do more than just educate about removing fire hazards to motivate action. Providing detailed risk information and offering physical support for fuel reduction activities on properties (among other options) may further encourage people to make fire preparation and management a higher priority or overcome some of the barriers to taking action.

– Mike Wouters, Senior Fire Ecologist, Department of Environment, Water and Natural Resources, South Australia

▲ Most research respondents could identify hazardous fuel conditions in forest, and most favoured forest with relatively low bushfire hazard for aesthetic and recreational value.

In practical terms, the results provide an empirical basis for formulating advice for householders. The models could be converted into maps of risk, if a suitable means were found to map the fine-scale features in the models (for example water-bodies and garden density). Such maps would quantify the likelihood of house loss given exposure to a fire (of unknown intensity). By combining such a map with other empirically derived maps of the probability of ignition and fire spread to the WUI, a total fire risk map could be developed.

The models could be used to estimate the benefit gained from altering any of the determinants, such as reducing garden density or increasing the separation between houses when planning future developments in similar environments.

HOW COULD THE RESEARCH BE USED?

Implications for bushfire hazard reduction

All research respondents could identify hazardous fuel conditions in forest, and most favoured forest with relatively low bushfire hazard for aesthetic and recreational value. This indicates that people could be amenable to actions to reduce fuel hazard on or adjacent to their properties, as has been found in the US. This would only pose a conflict for a minority of people who valued lifestyle and favoured dense forest. The fact that there was a relatively high fire risk in these communities was probably due to competing demands on residents' time and resources, or their underestimation of the chance that a fire could reach the vicinity of their property.

Fire agencies face two challenges. The first is dealing with people who want to live among dense forest in terms of assisting them to manage fuel sources and other fire preparation methods. The second is reducing the risks among people who are willing to do so, but face some barrier. The solution may be to offer practical assistance in managing fuels and preparing houses.

FUTURE DIRECTIONS

The statistical models developed for this research provide an explanation for only a small proportion of the variation in house loss. One of the main reasons is that the researchers may not have known what house defence activities were undertaken.

The role of timely deployment by firefighters was cited by many residents as an important reason for the relatively minor impact of the State Mine fire that threatened Bilpin and Mt Wilson in 2013.

Further research into the factors that contribute to successful house defence is a priority for the future.

REFERENCES / FURTHER READING

Eriksen C, Gill N (2010), Bushfire and everyday life: Examining the awareness-action 'gap' in changing rural landscapes. *Geoforum* 41, 814-825.

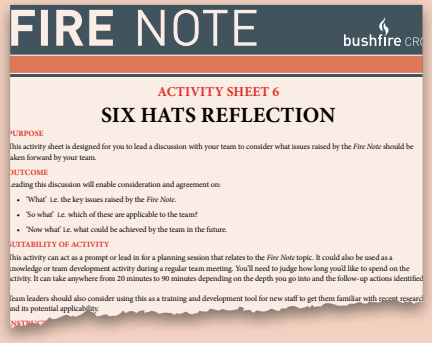
Gibbons P, van Bommel L, Gill AM, Cary GJ, Driscoll DA, Bradstock RA, Knight E, Moritz MA, Stephens SL, Lindenmayer DB (2012), Land Management Practices Associated with House Loss in Wildfires. *PLOS One* 7, e29212.

McCaffrey S, Toman E, Stidham M, Shindle, B (2013), Social science research related to wildfire management: an overview of recent findings and future research needs. *International Journal of Wildland Fire* 22, 15-24.

Price OF, Bradstock R (2013), Landscape scale influences of forest area and housing density on house loss in the 2009 Victorian bushfires. *Plos One* 8, e73421.

NOW WHAT?

What three things stand out for you about the research covered in this *Fire Note*? What information can you actively use, and how? Tools are available at www.bushfirecrc.com/firenotes to help, along with activities you can run within your team.



FIRE NOTE

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ACTIVITY SHEET 6

SIX HATS REFLECTION

PURPOSE

This activity sheet is designed for you to lead a discussion with your team to consider what issues raised by the *Fire Note* should be taken forward by your team.

OUTCOME

Leading this discussion will enable consideration and agreement on:

- 'What' i.e. the key issues raised by the *Fire Note*.
- 'So what' i.e. which of these are applicable to the team?
- 'Now what' i.e. what could be achieved by the team in the future.

SUITABILITY OF ACTIVITY

This activity can act as a prompt or lead in for a planning session that relates to the *Fire Note* topic. It could also be used as a knowledge or team development activity during a regular team meeting. You'll need to judge how long you'd like to spend on the activity. It can take anywhere from 20 minutes to 90 minutes depending on the depth you go into and the follow-up actions identified.

Team leaders should also consider using this as a training and development tool for new staff to get them familiar with recent research and its potential applicability.

INSTRUCTIONS

Fire Note is published jointly by the Bushfire Cooperative Research Centre (Bushfire CRC) and the Australasian Fire and Emergency Service Authorities Council (AFAC). This Fire Note is prepared from available research at the time of publication to encourage discussion and debate. The contents of the Fire Note do not necessarily represent the views, policies, practices or positions of any of the individual agencies or organisations who are stakeholders of the Bushfire CRC.

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AFAC is the peak body for Australasian fire, land management and emergency services, creating synergy across the industry. AFAC was established in 1993.