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## Welcome from Editor

It is my pleasure to bring to you the compiled papers from the Science Day of the AFAC and Bushfire CRC Annual Conference, held in the Sydney Convention Centre on the 1<sup>st</sup> of September 2011.

These papers were anonymously referred. I would like to express my gratitude to all the referees who agreed to take on this task diligently. I would also like to extend my gratitude to all those involved in the organising, and conducting of the Science Day.

The range of papers spans many different disciplines, and really reflects the breadth of the work being undertaken, The Science Day ran four streams covering Fire behaviour and weather; Operations; Land Management and Social Science. Not all papers presented are included in these proceedings as some authors opted to not supply full papers.

The full presentations from the Science Day and the posters from the Bushfire CRC are available on the Bushfire CRC website [www.bushfirecrc.com](http://www.bushfirecrc.com).

**Richard Thornton**

November 2011.

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### Disclaimer:

The content of the papers are entirely the views of the authors and do not necessarily reflect the views of the Bushfire CRC or AFAC, their Boards or partners.

# Co-constructing Bushfire: Trust, Memory and Landscape on a 'Code Red' Day

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## Introduction

There is a growing number of studies of homeowner perceptions of and responses to bushfire, however, this research has failed to adequately explain why so many homeowners do not take mitigating actions that accord with the technical assessments of risk (Brenkert-Smith 2006). Australia's system of Fire Danger Ratings (FDRs), in which the highest rating is "Code Red" or "Catastrophic", has now been in place for two bushfire seasons. Research conducted in Victoria after the 2010 season found that only 54% of residents surveyed planned to leave their homes on a "Code Red" day (OESC 2010). There is an evident disconnect between the production of bushfire science and the way it is applied by people living in "at risk" communities. Failure to take actions deemed by fire authorities to be appropriate is usually characterised as a deficit in the public's understanding of bushfire. But as McCaffrey (2008) points out, householders may respond differently to bushfire based on how they interpret a diversity of factors which include environment and topography as well as more personal factors.

We argue that a new approach to research is required to understand the complex relationships between people, the landscapes they live and work in; the production and dissemination of the bushfire science intended to inform them; and how all of these factors influence the social meanings made of bushfire. Our interest is primarily in practice, what people actually *do* in relation to living with bushfire. Further, if the problem is framed as being a gap between expert and local understandings of bushfire, it is salient to understand how both experts and members of communities understand and use FDRs. In our analysis we draw upon the idea of ecological memory that is associated with resilience and complexity science to frame its use in conjunction with social memory in the landscape. We interpret the Bengtsson *et. al.* (2003) definition of ecological memory as providing a kind of 'toolbox' in which resides the ability of species, networks and the general environment's 'tools'—what we might understand as their seeds, genes, and adaptive capacities to create a similar system as existed prior to disturbance. Similarly, the resilience use of social memory originates with McIntosh (2002 in Folke *et. al.* 2002, p.72) and focuses on the accumulated experiences of management practices and 'rules-in-use' that enable social systems to monitor change in response to signals from the environment. We propose that both of these definitions are useful in considering how social and ecological memory interact in the monitoring of fire.

In this study we first interviewed residents of an "at risk" Victorian township about what they did on a "Code Red" rated day in January 2010 and how they interpreted FDRs. Second, we interviewed Victorian bushfire scientists about their roles in generating and disseminating the

science of bushfire and how they interpret FDRs in their everyday lives. In this paper we discuss preliminary findings from each of the studies.<sup>46</sup> First, we present a brief account of our methods. We then report initial results from each of the two case studies and discuss potential implications of these findings and finally, we make some recommendations for future research.

## Methods

The research was conducted as two complementary case studies. The purpose of a case study is to generate findings that can be generalised to theoretical propositions and as such do not represent statistical samples intended to be generalised to populations (Yin 2003). The goal of these case studies was to test and expand upon the ideas of social and ecological memory and how they contribute to people's everyday understanding of bushfire in the landscape.

Our first study was undertaken as a pilot study for a larger project, and was located at Halls Gap, a town in Victoria's Wimmera district listed by the State Government as being especially vulnerable to bushfire. Halls Gap is a tourist town located on the edge of the Grampians National Park. It has a permanent population of about 280 people (ABS 2011). Most residents are either tourism business operators, are otherwise dependent upon tourism, or are retired. This small population can be augmented by thousands of tourists on popular weekends (some of which occur during the height of the summer fire season). It has a recent history of bushfire. In 2006, a lightning strike ignited a fire that burned 130,000 hectares of the National Park and its surroundings. The fire surrounded Halls Gap, but fortunately no homes were lost (Witham 2006). During June and July 2010, semi-structured interviews were conducted with 13 residents representing a mix of the township's major demographic groups. The interviews were conducted "in place" in the participants' homes or workplaces, adding depth and richness to the analysis of the relationships between the people and their landscapes. The question of interest for this paper is how did residents understand and use FDRs in their decision making on the "Code Red" day in January 2010?

The second case study was of scientists doing bushfire research at Victorian universities and fire agencies. Six participants were selected by purposive and snowball sampling. They represent diverse scientific disciplines including fire ecology, forestry, psychology and meteorology. Semi-structured interviews were conducted to ascertain their views on a range of issues related to the production and communication of bushfire science. In this paper we focus in particular on their views about the usefulness of FDRs and how they would personally use FDRs to make decisions during a bushfire.

All of the names used in this report are pseudonyms.

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<sup>46</sup> Completed analysis will be published in two articles currently in preparation:  
Reid K & Beilin R, (forthcoming), "Where's the fire? Co-constructing bushfire in the everyday landscape"

Beilin R, Reid K. And Karim R. (forthcoming) "Signposting fire"

## Preliminary Findings

### The Halls Gap Case Study

Based on the recently published research (OESC 2010) it would be anticipated that around half of the residents of Halls Gap would have left their homes on the day declared "Code Red" in January 2010. Of the 13 participants in this study only one reported leaving her home, although she did not leave the township. Jennifer described packing her car in readiness to leave. On the day however, she made the judgement call that it would be safe to stay with friends whose home she described as being located on the main road, adjacent to a swamp. Jennifer said her decision was based upon her realisation, after the 2006 fire that she should not be on her own on a day of bad bushfire weather. So there is a social element to Jennifer's decision, the security of being with friends. However, we also observe an element of local ecological and landscape understanding. Jennifer's friends' home is thought to be safer because it is on a main road and near a swamp; perhaps implicit in this is a means of protection from a fire or of escape or refuge. While none of the other participants in this study reported leaving their homes on the "Code Red" day, the common theme that emerges in our data is the role that local ecological memory and experience of the local landscape played in informing people's action.

Part of the Halls Gap local bushfire narrative is that the township is *relatively* safe. This was in part attributed by participants to the history of bushfire in the area wherein fire has come very close to, but not into the township. But there is also a particular way of understanding the local landscape and weather evident in the data. Glenda, a local tourism business operator explained:

*"Here in Halls Gap we're actually relatively safe...you might laugh at that, but the fire can enter from the south and it can enter from the north. It's not going to come over the hills, over the mountains that fast. The last fires in 2006 came over the mountains, there's no wind behind it to push it, because wind just doesn't blow down mountains. So the town has to be defended at two points which makes it easier to defend."*

Nested within this broader understanding of bushfire in the Halls Gap landscape is the commonly expressed view that the township is most vulnerable to bushfire coming from the north-west. Peter, also a local tourism business operator, puts it most succinctly:

*"Knowing which way the wind is heading, you don't have to rely on weather forecasts or ABC radio to tell you which way the wind's blowing and how hot it is...and we know in this area here that if a fire is coming from the north-west on a very hot windy day, then you must consider evacuating."*

So while there is a general understanding that Halls Gap is not highly vulnerable to bushfire, participants in this study do not live in denial of the potential for bushfire. Rather, the local social and ecological memory of bushfire in their landscape can lead to a complex and nuanced understanding of factors. These in combination, can anticipate the likelihood of high bushfire danger. We argue therefore, that participants' decision to stay in town on the "Code Red" day in January 2010 does not imply that they would never leave. Furthermore, we contend that a decision to stay on a "Code Red" day does not mean the message of the

FDR has been unheard, ignored or misunderstood. John explained his decision to stay as being based on what was going on around him on the day.

*"I wasn't all that concerned on that Code Red day. Just based on what was happening around me. I wasn't ignorant of the warnings going out, and I was paying attention and I was listening in, but I wasn't panicked to the point where I thought, I've gotta go."*

What John describes is taking action in response to the FDR. He may not have left his home but the actions he took were to pay attention to the FDR, evaluate them in the context of what he could see and feel in his landscape and to stay tuned in to events as the day unfolded. This is highly significant because it means that past behaviour (in relation to staying or leaving) is not necessarily indicative of future action. For example, at Halls Gap many participants observed that a contextual factor they take into account is wind speed and direction. Declaration of "Code Red" on a day when there was a strong northerly wind may lead to quite different action by residents from what they did on January 11<sup>th</sup> 2010 – a day described by some participants as just an ordinary hot summer day. Moreover, we argue that the discrepancy between the "Code Red" rating and participants' observations of the local weather conditions accentuates an underlying lack of trust in FDRs. Many participants expressed cynicism about the motivations behind the implementation of FDRs. While recognising the political imperatives of action after the Black Saturday bushfires, many participants felt that the introduction of FDRs was more about government being "seen to do something" rather than effective policy. One participant also questioned the process "down in Melbourne" by which fire weather forecasts and FDRs are issued, reflecting both a lack of trust in the transparency of the process and the lack of local context.

In summary, the preliminary findings from the Halls Gap case study are that participants have a nuanced understanding of vulnerability to bushfire that is understood in both social and ecological terms. Furthermore, decisions not to leave home on the "Code Red" day should not be construed as a lack of action. For most participants the declaration of "Code Red" was a trigger to closely monitor conditions and sources of information, and most people were able to articulate the set of conditions under which they would be most likely to leave. One participant went so far as to acknowledge that if there had been a bushfire on that day, and her family found that their exits were blocked, that they would do what they could to survive and otherwise accept their fate. In the final analysis most participants' decisions to stay while monitoring conditions did not mean that they thought they could defend their place in the face of Black Saturday-type conditions. Finally, there is an apparent lack of trust in the FDRs which may be related to the lack of local context and transparency in the way in which they are generated and used by government and agencies.

### **Case Study Two: the bushfire scientists**

Most research into people's responses to communication of science-based information about bushfire focuses on members of the public who are assumed to have limited expertise or scientific understanding. In this second case study we investigate how the 'experts', scientists and other individuals working in bushfire-related disciplines respond to FDRs.

Some of the fire scientists working with the McArthur Forest Fire Danger Index (FFDI) that underpins the FDR were concerned that the apparent simplicity of the FDR was "intoxicating" (Olivine, fire ecologist) and could be meaningless if it wasn't correlated with a

spatial sensibility in the landscape. Jasper (whose work involves assessing bushfire impacts on property and business) pointed to the 2011 Perth fires that followed a long period of drought. He noted that the FFDI was not very high at all on that day but the landscape conditions were significant in combination with strong winds. In general there was apprehension from the fire ecologist, a meteorologist and risk analyst that the FDR was being "stretched" (Sapphire, meteorologist) because the underpinning FFDI is being inappropriately applied to contexts for which it was not designed.

There is also recognition from an agency psychologist working in community engagement that the scientific basis of the FDR is hidden from the communities who are meant to respond to its message. This creates a lack of trust in the "Code Red" message which may in turn have a negative impact on trust in the agencies responsible for its communication. It is difficult to establish or retain credibility when the key message is not accepted (Slovic 1999). Amethyst, a fire ecologist likened the difficulties experienced in providing trusted information to the situation of the 'boy who cried wolf'.

In addition to seeking their views on the production and communication of FDRs, we also asked the scientists how they use them in their everyday home lives during the bushfire season. The fire experts all have a nuanced understanding of the fire danger as represented by their actions on the days of a fire alert, or by their intended actions. This is understood in social terms (fire ecologist Jacinth for example described how he discussed joint risk with many of his neighbours) and in ecological terms shaped by their disciplinary background. Jasper, who lives in a bushfire prone area, described his use of FDRs as limited, noting that:

*"How I use it [FDR] is that initial decision...if it's a catastrophic code red, I will stay, work from home, and if it's... FDI [FFDI] 70 or more probably tend to stay at home... that's the limit of my use of it, it's just for that initial decision."*

Implicit in this response is Jasper's understanding of the McArthur Index that underpins the FDRs. He knows that an FDI of 70 or more is significant. On a high risk day his inclination is to stay close to home. Some of the interviewed scientists who reside in areas classified by the government as "at risk" commented that their homes were in safe parts of town, or that they were confident in their ability to stay and defend. Amethyst, who lives in one of the bushfire-prone areas, described the social confusion he experienced on Black Saturday. He went out to purchase parts to fix broken sprinkler and due to police roadblocks was nearly unable to get back to his home and family. As a result of this experience he has decided that in future he will leave home on "Code Red" days.

In summary, the analysis of this particular question in relation to the scientists' personal use of FDRs is strikingly similar to the Halls Gap study. The FDR provides some background (or the basis of an "initial decision"), but their overall decisions take account of the broader landscape and wider social context.

## Discussion and conclusion

In this paper we build on the definitions of ecological and social memory and show how they interact in the everyday construction of bushfire in the landscape. Fire is a physical reality, and the response to it is a social reality—a construction for example of 'hazard'. The landscape is the place where these social and ecological systems entwine. Together they create a mediated platform for very local decision making. The physical is interpreted through the social understanding of landscape experience and assessed alongside the rules-in-use around fire; and this social understanding is created in response to information and experience of the physical landscape before, during and after fire. We conclude that if people do not engage with FDRs in the way that governments and fire authorities intended, it is not because the science is too complex to be understood, but that the message is too simple to be meaningful.

The results of our two case studies suggest that cues to decision making are found within our social and ecological memory and in the accompanying landscape. There is also evidence that people's interpretations of the cues to understanding this interaction evolve with experience. If we harness resilience definitions of ecological memory, it points to the emergence of an integrated and dynamic response, a continuum rather than a point in time. Social memory acts as a mediator or interpreter of this continuum, which means it has limitations associated with the spectrum of information that is available. For example, understanding the components of the forest that 'emerges' after fire suggests that what germinates or responds to fire is subject to the heat and length of the fire. It would not be the same all the time. Studies in the Won Wron forest in Victoria by Victorian naturalists have indicated that repeat burnings of *Xanthorrhoea sp.* in logging coupes eventually leads to its demise. It is not fire resistant in the longer term when fire cycles are short and young seedlings have not developed their tough stems to tolerate burns (pers comm. Robyn Watson, 2001). This suggests a need to constantly revisit and reconceptualise the integration of local fire knowledge within a historical and scientifically constructed understanding of the particular landscape. The findings of this study indicate that people make meaning of bushfire via cues they take from landscape and ecological memory and we propose that this will be a fruitful theme for future investigation. And if, as these preliminary findings also suggest, that landscape context mitigates decision making for both experts and lay members of the community, then research and engagement with communities can incorporate respect for local knowledge actively engaged in understanding the social interpretation of ecological information rather than being based on the assumption of a "knowledge deficit." Working with communities to co-construct meanings about bushfire becomes the co-construction of bushfire knowledge.

## Acknowledgements

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