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This issue developed with assistance from the Bushfire Cooperative Research Centre

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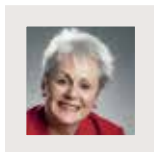
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### ABOUT THE JOURNAL

The Australian Journal of Emergency Management is Australia's premier Journal in emergency management. Its format and content is developed with reference to peak emergency management organisations and the emergency management sectors—nationally and internationally. The Journal focuses on both the academic and practitioner reader and its aim is to strengthen capabilities in the sector by documenting, growing and disseminating an emergency management body of knowledge. The Journal strongly supports the role of the Australian Emergency Management Institute (AEMI) as a national centre of excellence for knowledge

and skills development in the emergency management sector. Papers are published in all areas of emergency management. The Journal emphasises empirical reports but may include specialised theoretical, methodological, case study and review papers and opinion pieces. The views in this journal are not necessarily the views of the Attorney-General's Department.

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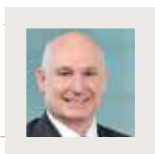
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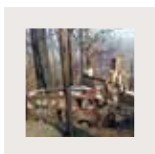
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# Introduction

**Hon Robert McClelland MP, Attorney-General, Australian Government  
Minister with responsibility for Commonwealth emergency management.**



The devastating fires of February 2009 were amongst the worst natural disasters in our nation's history. Tragically, 173 lives were lost as a direct result of the terrible fires on what has become known as Black Saturday. The shock and horror of this event reverberated around the globe with an unprecedented response in the form of donations and offers of assistance.

This special edition of the Australian Journal of Emergency Management is a collection of contemporary and expert writings on fire management with a focus on the Black Saturday fires.

My thanks to Naomi Brown, Chief Executive Officer of the Australasian Fire and Emergency Service Authorities Council, who has kindly written the foreword for this edition. Naomi has extensive experience in emergency management and a background in community education and engagement.

This past summer, our country has again experienced unimaginable destruction from disasters including vast areas of Queensland, Victoria and NSW being inundated by flood waters. With Queensland already on its knees following the floods, communities in the north of the state were devastated by Tropical Cyclone Yasi. Western Australia, South Australian, Tasmania and the Northern Territory have also been hit by disaster including floods, storms and tropical cyclones.

The Queensland flooding and Tropical Cyclone Yasi led to the Commonwealth Government's largest deployment of Australian Defence Force personnel since Cyclone Tracy virtually destroyed Darwin in 1974. This call-out supported local communities in disaster resilience.

The Australian Government's response to these unprecedented events will be a contribution of up to 75% of funding for relief, rebuilding and reconstruction, under the Natural Disaster Relief and Recovery Arrangements, including a two billion dollar advance to Queensland.

More recently, our regional neighbours in Christchurch, New Zealand and North Eastern Japan, have suffered the dreadful impacts of earthquakes and tsunami that have killed too many. Australia has assisted both of these nations in the aftermath of these terrible events by providing urban search and rescue experts, police and medical staff, all willingly offered by several States and Territories.

In February this year, the Council of Australian Governments (COAG) adopted the National Strategy for Disaster Resilience which identifies priority areas to build disaster resilient communities across Australia. Information about the COAG announcement and also the preceding Ministerial Council for Emergency Management Communiqué is summarised in this edition. More information can be found at our national emergency management website – [www.em.gov.au](http://www.em.gov.au).

I commend this special edition of the Australian Journal of Emergency Management to you and trust it will prove to be a valuable resource.

# Foreword

By Naomi Brown, Chief Executive Officer of the Australasian Fire and Emergency Service Authorities Council (AFAC).



The two plus years since the Black Saturday fires have been extraordinary for the Australian fire and emergency services. The events and their aftermath have affected many aspects of fire fighting, emergency management and administrative and reporting arrangements, investment in technology and policy making. The fire and emergency services have had to question themselves and of course for some, be questioned in the most public way. Most of all, the relationship between fire agencies and the community has probably altered forever; at least in some parts of Australia. This is not just the result of shock or disappointment, it is obvious that in the most dangerous of bushfires, fire agencies were not able to protect them all.

Society itself had been moving into an instant information era that had not been fully tested on fire services before this event. While fire agencies, like other authorities were becoming aware of social media and its role in disasters, the Black Saturday fires and subsequent major floods and earthquakes have demonstrated not just that we are all well past the age of authorities being able to control an 'official line' but that the expectation for instant accurate information by the public has well exceeded the capacity of any authority to meet it. This will be an ongoing source of tension and criticism for all emergency management agencies. Much effort by many and support from Governments has resulted in greatly improved systems and technology for information and warnings

to the public. This is a most welcome occurrence which will no doubt improve the flow of information to communities.

What is in great danger of being glossed over however, is the difficult work around understanding the context in which people live and their personal make up and predispositions which strongly influence how they will behave in a dynamic fire situation. One of the greatest learnings from the Royal Commission was the sheer inventiveness and determination of people who are faced with appalling life threatening situations. We have to keep reminding ourselves that in disasters people often rely on local resources and unofficial networks of communication. There is a great deal that could be done to foster community and household capacity but it requires people on the ground, interaction and the ability to listen to and work with communities rather than have centralised bodies determine what people need. Without a focus on all parts of this picture we are in danger of being in a situation of wondering why, with all of the information directed at people they have still not made the "right" choices and we are once again examining what went wrong after another tragedy.

A big job the fire and emergency agencies have now is to meet the community expectations of them. It has been a struggle to participate in the inquiry (for some), understand the recommendations and their implications, review planning and building codes, alter approaches and educational material, locate and publicise shelters all while ensuring readiness for the two fire seasons that have passed since that day. On top of this, the country has been more cursed with flood than fire in the last two years thus stretching resources and testing systems and communities like never before.

It is appropriate now to take time to absorb what we have learned from this dreadful event, the Inquiry following it and indeed, the subsequent events and disasters. We now also have a wealth of excellent research which has tackled questions posed by the tragedy. Our efforts must be on ensuring that all of this new knowledge is read, understood and translated into policy and practice. The contents of this edition of the AJEM are here to help you do that and I commend the articles to you.

# Ministerial Council for Police and Emergency Management - Emergency Management

**COMMUNIQUÉ** Canberra, 11 February 2011

An extraordinary meeting of the Ministerial Council for Police and Emergency Management – Emergency Management (MCPEM-EM) was convened in Canberra today. The Commonwealth Attorney-General, and State, Territory and New Zealand emergency management Ministers, along with the Australian Local Government Association, discussed the priorities for building the nation's resilience, in light of the unprecedented number, severity and scale of natural disaster events over summer.

In 2009, the Council of Australian Governments (COAG) agreed to adopt a whole-of-nation resilience-based approach to disaster management, which recognises that a national, coordinated and cooperative effort is needed to enhance Australia's capacity to prepare for, withstand and recover from disasters. The Emergency Management Council has endorsed the draft National Strategy for Disaster Resilience, which will be considered by COAG on Sunday, 13 February 2011.

The Emergency Management Council agreed that this disaster season confirms and reinforces the need for such an approach. The Council noted that it will be leading implementation of the National Strategy for Disaster Resilience on behalf of all Australian governments. The Council discussed those parts of the Strategy which have particular resonance at this time and agreed on a number of priority actions.

The Ministerial Council for Police and Emergency Management – Emergency Management **agreed** that it is fully committed to leading governments toward a national, integrated approach to building disaster resilience and the delivery of sustained behavioural change and enduring partnerships across Australia.

In delivering on this commitment, MCPEM-EM agreed to task the National Emergency Management Committee (NEMC), as a priority, to:

1. review and report on the effectiveness of arrangements between all Australian jurisdictions for communication, situational awareness, liaison and response to natural disasters
2. examine and report on the effectiveness of Commonwealth and state/territory relief and recovery payments
3. convene a forum to consider new and emerging technologies that could be harnessed to assist with preparedness, response and recovery to natural disasters, with an initial focus on floods
4. work with Treasuries on issues relating to arrangements for the insurance of the assets of:
  - a. Australian individuals and businesses for damage and loss associated with flood and other natural disasters, and
  - b. Australian governments for damage and loss associated with flood and other natural disasters, with a view to removing disincentives to take-up of private insurance and encouraging equity and best practice in maximising community and government self-reliance
5. work, in consultation with Geoscience Australia, to scope a potential work program to map areas of risk relating to riverine flooding, flash floods, storm surge and coastal inundation. That work should take into account existing knowledge and initiatives, currency of information and identified information gaps, and the need for consistent and robust methodologies
6. develop an Action Plan to work in partnership with the Australian Building Codes Board, Standards Australia, planning officials at all levels of government, and across other relevant public and private organisations to influence and effect land-use planning and building

# Council of Australian Governments Meeting

**COMMUNIQUÉ** Canberra, 13 February 2011

7. identify an evidence base to highlight the efficacy of essential public infrastructure improvement and mitigation, with a view to program changes that encourage betterment of infrastructure that is regularly damaged by natural disasters
8. review existing programs and prepare a draft strategy for MCPEM-EM's consideration for the efficient and effective coordination of volunteer effort in the immediate clean up stage post-disaster
9. develop and research examples of individual and community resilience initiatives which have mitigated damage and / or losses from natural disasters
10. work with Treasuries to review and report on Australia's legal structures regarding charities with particular reference to the application of taxation laws and to the principle of "charitable purposes" in the context of natural disasters, and
11. give particular attention to the emerging role of social media, as part of the work on communicating with, and educating people about risks, under the COAG National Strategy for Disaster Resilience.

Noting the value of the telephone-based warning systems, Emergency Alert and State Alert, and the work that is being undertaken on the location-based warning capability, the Emergency Management Council emphasised that these technologies can only supplement emergency warning and information that is delivered primarily through radio and television, and also through a number of other mechanisms.

The Emergency Management Council members noted the importance of achieving COAG's high level objectives following COAG's consideration of the National Strategy for Disaster Resilience. The Emergency Management Council reiterated its full commitment to a national, integrated approach to building disaster resilience and the delivery of sustained behavioural change and enduring partnerships across Australia.

The Council of Australian Governments (COAG) held its 30th meeting in Canberra today. The Prime Minister, Premiers, Chief Ministers and the President of the Australian Local Government Association attended the meeting.

Recent natural disasters have had a profound effect on the Australian community. All Australians have been affected by the tragic loss of life and widespread devastation experienced in many communities.

COAG acknowledged the tremendous efforts of volunteers, emergency services personnel and the Australian Defence Force in responding to the disasters, with many crossing borders to help out.

COAG recognised the challenges facing many communities in the rebuilding process that lies ahead and welcomed the generous package of assistance the Commonwealth and affected States and Territories have provided for individuals, businesses, local government and the restoration of infrastructure following recent natural disasters. COAG noted the establishment of the Australian Government Reconstruction Inspectorate, which, together with State arrangements, will strengthen accountability and rigour in the use of substantial public funding to be committed to rebuilding.

To improve Australia's ability to withstand and recover from future disasters, COAG adopted the National Strategy for Disaster Resilience and agreed to take immediate steps to implement it.

The Strategy focuses on the shared responsibility of governments, business and communities in preparing for, and responding to, disasters. It sets out concrete steps governments at all levels can take to reduce risks posed by natural disasters and better support communities to recover from disasters. Other actions will include steps to support improved risk-based planning decisions, the take-up of insurance and the provision and construction of resilient infrastructure.

The National Strategy for Disaster Resilience can be found on the Council of Australian Government website at [www.coag.gov.au](http://www.coag.gov.au).

# Opinion: ready or not? Can community education increase householder preparedness for bushfire?

**Alan Rhodes argues that we need to incorporate research findings on community capacity into our education and preparedness programs.**

## ABSTRACT

**The Black Saturday bushfires and the subsequent Victorian Bushfires Royal Commission identified many issues in relation to people's capacity to prepare for and respond to bushfires. Much of the advice to communities has changed, placing increased emphasis on the importance of education of the community. However, an evaluation of recent education programs has identified that little has changed in people's capacity to deal with the bushfire risk, and raised critical questions about the current approach. The paper argues that unless the lessons of research are incorporated into our approach it will be difficult to achieve the changes that are needed.**

## Introduction

The 7 February 2009 bushfires and the subsequent Victorian Bushfires Royal Commission (VBRC 2010) raised many questions about existing policies and practices in relation to the safety of the community from bushfire. Many changes have occurred since in the advice to people about how to deal with the bushfire risk. These are reflected in the new Bushfire Safety Policy Framework (Fire Services Commissioner, 2010).

Both the VBRC reports and the new policy framework continue to emphasise the role of community education in promoting understanding and appropriate action by the community at risk from bushfire. The new policy framework notes that engaging the community is a key strategy to increase people's understanding and that such engagement is critical to ensure people can make informed and appropriate choices.

Despite widespread agreement on the importance of community education and the Commission recommendation for the need to evaluate community

education, there is little assessment of the effectiveness of current approaches in achieving the goals of understanding of the risk, preparation and adoption of appropriate protective actions.

A recent evaluation was undertaken (CFA 2010) as a preliminary review of both the general approach and several of the key initiatives implemented following the Black Saturday fires. The findings challenge many of the assumptions that underpin the current approach and question whether many of the current programs can actually achieve their intended outcomes.

## Influencing behaviour

As a policy instrument, education relies on persuasion to influence people's decisions in dealing with the risk. There are many theories and models of behaviour change across various fields that identify predictors or factors that influence people's behaviour. Few of these theories have been developed to address people's response to natural hazards or more specifically, bushfire. Different theoretical perspectives and research approaches result in considerable divergence in such models both in the factors included in the models and their relative influence. Researchers in natural hazards including fire, have similarly identified multiple factors – individual, social and situational – in different configurations further complicating the picture for those seeking to understand how to influence people's response to the bushfire risk (Martin, Bender and Raish, 2007; Rohrmann, 2000; Duval and Mulilis, 1999; Weinstein et al, 1998, Lindell and Perry, 1992;).

Paton (Paton, 2003; Paton, Smith and Johnston, 2005; Paton, Bürgelt and Prior, 2008) has developed a tested social cognitive model of disaster preparedness that has the advantage of being developed in relation to several different natural hazards and has been modelled with data in the context of people's response to bushfires in Australia. A key strength of Paton's model is that it identifies factors that are precursors or motivating factors such as critical awareness and anxiety that predispose people to act or not. As in many similar models in other fields, Paton also identifies the



critical role of intention formation and in particular the importance of outcome expectancy and self efficacy in this respect. Finally the model crucially recognises the importance of both individual (e.g. perceived responsibility), social (sense of community, trust) and situational (timing) factors that link the formation of intention with the adoption of new behaviours. Even this brief summary highlights the variety and complexity of the factors involved and their interaction.

Paton et al (2005) also observed the existence of different processes that lead to preparedness for some people, whilst others follow a different reasoning path resulting in not preparing. This highlights what is also evident from reviewing the various models; that behaviour change is a *process* involving active decision making by individuals influenced by both personal and external factors triggering psychological processes that result in them making choices about how they will use their personal and social resources. People will follow different decision making pathways and their journey will be shaped by the interaction between their personal characteristics and the context of their particular social setting and the broader society. Such a perspective has great significance for how we understand the nature and role of community education programs (Paton and Wright, 2008) and how we go about evaluation of such programs (Pawson and Tilley, 1997)

## The nature of community education and engagement activity

Mileti, Nathe, Gori, Greene and Lemersal (2004) have identified characteristics and techniques of effective public hazard education based on a review of research and practice in the natural hazards field. The review also highlights that effective education creates 'uncertainty in the minds of people'. Risk communication needs to challenge people's thinking about the risk and their relation to it so that they re-evaluate their existing beliefs, attitudes and choices. Rohrmann (2000) also notes that the impact of risk communication is determined by a complex process of appraisal by individuals influenced by a wide array of personal and social factors. To be effective it has to facilitate people's evaluation of the risk communication content such that they not only comprehend it but integrate it into their existing perspective and accept it as valid and worthwhile. To translate it into action involves further processes of recalling it accurately and then having the capacity to implement it while overcoming any external barriers.

Elsworth, Gilbert, Rhodes and Goodman (2009) discussed community safety programs for bushfire that were analysed as part of an extensive review of community education, awareness and engagement programs for natural hazards (Elsworth, Gilbert, Stevens, Robinson and Rowe, 2010). The authors identified that current practices could be described along a continuum from 'top down' information dissemination approaches to 'bottom up' community engagement and development strategies. By synthesising a broad range of initiatives they developed

a program theory model of such activities identifying typical outcomes, the key role of contextual factors and causal processes including engagement, to enable people to think through and discuss issues, form intentions, and make choices. The model also highlights that action also depends on more collaborative and collective processes to produce shared understanding. Both individual and collective processes are underpinned by generating credibility and respect in the relationship between authorities and the community that builds trust and confidence in people's own capacity, that is empowerment.

While the content and information communicated in programs is important, it is evident that for programs to be effective in influencing behaviour they must lead to the re-assessment of a person's existing perspective by using varied strategies that target particular factors influencing decisions. This perspective suggests that receiving information is not the primary mechanism in influencing behaviour change.

The notion that information dissemination can lead to change reflects a belief that people's choices are always rational and based on objective information or 'facts', often defined and provided by experts and authorities. However the role of biases and heuristics in people's decision making about risk is well known (Kahneman Slovic and Tversky 1982). Such influences on decision making frequently lead to choices based on subjective judgement, feelings and emotion. Slovic, Finnuccane, Peters & MacGregor, (2004) discuss dual process theories of thinking noting that while conscious appraisal of events leading to logical and evidenced decisions is important in some situations, an experiential mode of thought reliant on affect, experience and emotion is easier and more likely in dealing with complex and uncertain circumstances. The authors suggest that to be effective risk communication must account for 'risk as feeling'.

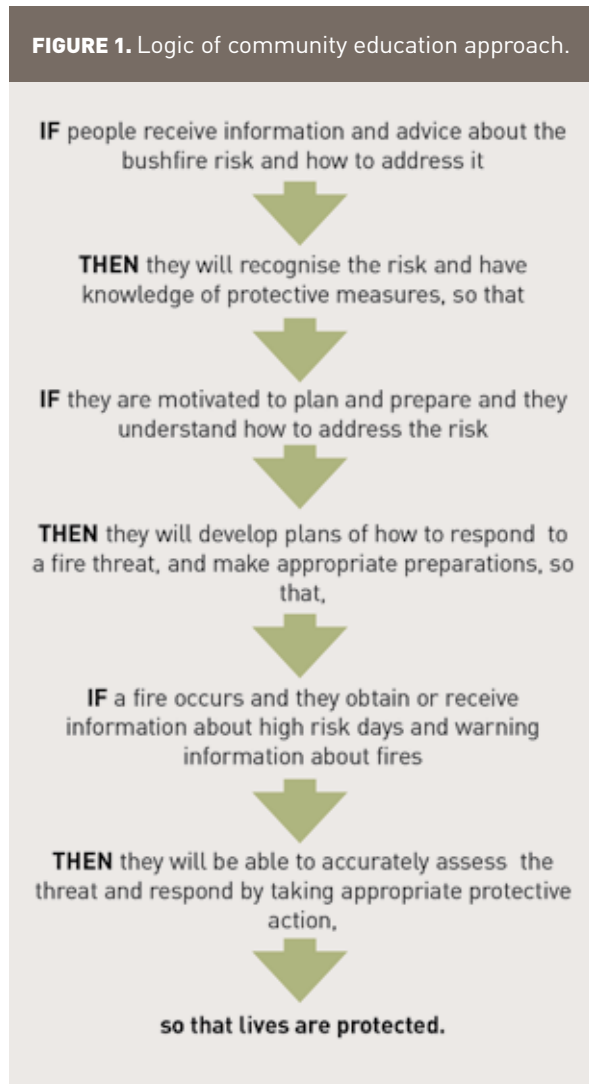
## Evaluation of the approach to community education

Following the Interim Report of the VBRC the Victorian government and agencies implemented a major program of initiatives to address the recommendations, including a number of community education programs. The evaluation study (CFA, 2010) focussed on the overarching approach to community education and several key initiatives intended to increase community understanding and action.

The study used a 'theory based approach' to articulate the implicit logic or 'theory' and assumptions which guide the approach and underpin the initiatives (Chen, 1990). The evaluation sought to test the implicit logic of the approach and assess the extent to which particular initiatives contributed to enhancing community householder preparedness (Pawson and Tilley 1997). The study employed a mixed methods approach using analysis of program documentation, several surveys of households in high fire risk areas, surveys of participants and users of particular initiatives,

community discussion groups, and interviews with program managers and practitioners.

The implicit logic of the approach is shown in figure 1 as a series of 'if...then' statements, typical of theory based, logic approaches to evaluation (Rhodes & Gilbert, 2008)



The initiatives were intended to address different parts of this logic by raising awareness of the risk, providing information on how to prepare, assisting people develop survival plans, informing people about changes to warnings and shelter options, and advising on protective action during a fire. The full program logic depicted a more complex model of the approach than is shown in figure 1, which included a detailed hierarchy of outcomes and a range of general and program specific assumptions. Several of the key assumptions inherent in the logic of the approach relate to the key role of information as a trigger to action, the role of awareness in motivating action and people's ability to understand and interpret information reliably.

## Key findings of the evaluation

The evaluation identified that people report high levels of awareness of the bushfire risk and that a significant majority of people feel both well informed and prepared, and indicate they have considered how they will respond if a fire occurs. However the study also identified that this awareness does not translate to realistic understanding of the risk or how to respond, and that self assessments of preparation do not necessarily match people's levels of preparation and planning.

Although the study was conducted in high risk locations, most people described the risk as moderate. Further, despite a belief by many people that they have a plan, more detailed investigation and analysis revealed that only 24% actually had a plan that could be considered even moderately comprehensive. Further, the level of preparation action varied greatly with most people reporting they had undertaken only a number of relatively 'easy to do' actions. Far fewer reported taking more significant measures such as covering gaps to prevent embers getting in, and even fewer had taken specific measures that would enable them to protect their property or themselves during a fire.

In terms of intended protective action, only 12% indicated they intended to either stay and defend their property while another 11% intend to leave early on high risk days. Nearly half (45%) intend to leave as soon as they are aware of fire that could threaten the area where they live and about one third intend to wait to see what happens during a fire but leave if threatened by the fire.

Although people indicated they were aware of the risk, were well informed and prepared, and had plans, the study revealed that in fact large proportions underestimated the risk and had only modest levels of preparation and planning, and in terms of intended action, the majority intended to rely on their judgements about the impending threat.

Nevertheless, the study revealed that a large majority (92%) of people received bushfire safety information in the previous 6 months. Nearly three quarters who received information indicated they read all or most of it. Nearly a third of surveyed households had attended a local bushfire meeting. Just over half indicated they felt they did not require any more information on bushfire safety. Further the evaluations of particular initiatives suggested that they were well received and seen as beneficial. Publications and meetings were assessed positively as were the on line tool to assess defensible space and the one-on-one property assessments. The majority of participants in these programs indicated they increased their understanding of the risk and how to deal with it.

On the positive side there were quite high levels of awareness and knowledge of new messages and initiatives such as the priority on leaving early, the importance of having a plan, Code Red fire danger ratings, and shelter options, even though all

these changes were only recently introduced and communicated over a common short time frame.

However most importantly, it should also be noted that despite high levels of awareness of the risk and the widespread access to, and approval of information, most people did not engage any further than receiving and reading in part, the information provided. Even amongst those who received information and participated in programs there was limited evidence that they made changes to their planning or preparation as a result.

## Implications

Information is important and the study identifies that various programs were very successful in reaching a wide audience, were well received and achieved significant levels of understanding of new messages in a short period of time. These achievements ought not to be underestimated.

The study does however challenge several of the key assumptions that underpin the common approach to community education with its reliance on information dissemination as the primary means of triggering change in attitudes and behaviour. Awareness and recognition that they are at risk does not necessarily motivate people to take action. Nor does having access to information about the risk or how to deal with it automatically lead them to implement measures to prepare, or to plan for the event of a fire. Nor do people necessarily interpret information or use it as intended by authorities.

These limitations were particularly evident in relation to the Code Red fire danger ratings. Although a large proportion had heard of the term Code Red and knew the advice was to leave early on such days, when two such days were declared in January only a tiny minority complied with the advice. Awareness of the risk, knowledge of key messages and information about what to do did not translate to compliance with the advice. Rather, as revealed in the discussion groups, people's intentions and their actions reflected their appraisal of the risk and their circumstances, and the warnings were interpreted and applied differently by people in making their decisions. Not only was the Code Red information interpreted and used differently, other factors such as whether there was actually a fire, their circumstances or the person's perception of their preparation, were more important in determining their response.

Rather than a trigger for action to prepare or respond appropriately to a threat, information from authorities is commonly treated as another input to people's judgements about the risk and their circumstances. People are not 'empty vessels' with no existing understanding of their circumstances or priorities, passively waiting the input of information from expert authorities. While such information is important at times in increasing knowledge and understanding, it does not necessarily trigger changes in attitudes or

behaviour. Rather people choose whether to receive and pay attention to such information, they choose how much of it to accept and how to interpret it, and they choose how to apply it. They do so as active processors of information and ideas from various sources of which authorities are but one. People make choices about how to act, guided by their values, beliefs, priorities, experiences and capacities and influenced by those around them in their household, neighbourhoods and the wider community context.

Further, people do not progress, step by step, guided by expert information from awareness, to understanding, to having a plan, then preparing, so that finally they can respond if a fire occurs. Rather they live in their particular circumstances with an existing orientation to the risk that reflects the relationship between themselves and the risk, and how they understand it and intend to respond to it. This orientation is influenced by many factors – individual, social and situational, and guides their decision making with all its bias and use of fallible heuristics in interpreting information, assessing the risk and deciding what to do.

## Enhancing the approach to education and engagement

It is contended that the logic of the approach considered in this study is typical of much, but certainly not all, of the community education activity in relation to bushfire and other natural hazards. A number of such activities were reviewed by Elsworth et al., 2010 and depicted in the 'top down versus bottom up' model as predominately 'top down' approaches focussed on achieving fidelity of implementation of centrally designed and managed programs. Inherent in this approach is a reliance on core information and messages to be delivered through media campaigns, publications or other programs.

There are limits to what community education can achieve in terms of community preparedness, given that ultimately people choose whether they will engage, accept and adopt the information and advice. However, to the extent community education reflects only the 'top down' approach, it is a narrow conceptualisation of activities that can influence people's behaviour in relation to a risk. Such an approach is characterised by a didactic style reliant on dissemination of information generated by experts and authorities. Whilst appropriate for achieving some objectives, as previous research and this study highlight, it is unlikely to bring about the desired change in attitudes and behaviour.

A broader notion such as Education and Engagement Activities is required that not only involves communication of information where necessary, but also includes processes that actively engage people in *reassessing their existing orientation to the risk*. The approach needs to acknowledge 'risk as feeling' by accounting for experiential modes of thinking, while sensitively challenging people's beliefs and choices that

underpin their existing orientation to the risk. It needs to use multiple strategies that lead them to question and re-assess their response to the risk by addressing the factors influencing people's decisions and actions. Finally, it should incorporate notions of empowerment to enhance individual and collective capacity to act through 'bottom up' community driven initiatives supported by authorities if required. While examples of such education and engagement activities already exist, the challenge is to enhance and extend them and move beyond the dominance of narrow notions of information dissemination. If we want the community to share responsibility for dealing with the risk, then we should not judge their willingness to do so, or the efficacy of our efforts, based on an approach that insufficiently accounts for the findings of research and the needs of the people we wish to engage.

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## About the author

**Alan Rhodes** is responsible for CFA's community education and engagement programs including the joint agency Fire Ready Victoria strategy to increase community preparedness for bushfire. He is also responsible for CFA's community research and evaluation section and has conducted several studies of major bushfires throughout Australia. He recently appeared as an expert witness at the South Australian coronial inquest into the 2005 Eyre Peninsula bushfire. He is also a researcher with the Bushfire Cooperative Research Centre working on the stay or go project and the evaluation of community safety programs.

# Opinion: Co-operative wildfire arson investigation: a new approach.

**Richard Woods discusses a landmark course on wildfire arson investigation methods for Australia and New Zealand.**

## Background

Traditionally, people assumed the investigation of deliberately-lit wildfires was an issue solely for police agencies to address. While a task force approach in some States (eg. Strikeforce TRONTO in New South Wales, Operation Nomad in South Australia), has enhanced wildfire investigations, this method relies heavily on police to solve crimes. In addition, several States and Territories have had successful prosecutions of wildfire arsonists in recent years, but the challenge of successfully prosecuting persons responsible for deliberately lighting wildfires continues across Australia.

More importantly, the majority of wildfires that breakout across Australia do not result in property loss, injury or death, hence there is a tendency for them to not be thoroughly investigated; particularly when 'wildfire arson task force arrangements' are not in place. Agencies generally do not give high priority to investigating these 'nuisance fires' due to workload priorities of police and fire agencies. However, as statistics indicate, wildfires mostly occur at the hand of arsonists and do not develop into major conflagrations—due to the conditions at the time (e.g., prevailing mild weather, fuel condition, fire agency intervention etc. State and Territory fire agencies respond to 'minor' fires on a regular basis. Consequently, wildfires make up a large percentage of these agencies' response costs.

Furthermore, experience has shown that the collation of wildfire arson intelligence is often 'siloed' between fire and police agencies. For example, fire occurrence information is often not readily shared between rural fire agencies; urban fire agencies and police agencies, due to differing information management systems and processes.

The issues outlined above result in the camouflaging of the wildfire arson problem. Consequently, agencies employ limited co-ordinated effort to investigate these (mostly 'minor') deliberately-lit fires. Ultimately this creates a challenge for investigation collaboration and has a direct influence on conviction rates...

*"Between 2001-2005 in Victoria: 55 persons were convicted of arson (structural & wildfire). Between 2001-2005 in New South Wales: 26 persons were convicted of wildfire arson. Both States had 27,000 bushfires between them in 2004. If half were due to arson, the identification and conviction rate is 4:1000 fires." (data from Australian Institute of Criminology).*

Additionally, the Federal Attorney General's Forums on Wildfire Arson in 2009/2010 identified the need for Police and Fire Services Investigators to share intelligence and mutually approach the investigation of wildfires as a significant priority.



**The North American Wildland Fire Investigation course helps agencies share investigation methodologies.**



**Deliberately lit fires do not usually result in property loss, injury or death.**

## **Overseas experience leads to the adoption of a new training course**

The North American Wildland Fire Investigation Case Development Course was developed to provide Police and Fire Service fire investigators with an understanding of serial wildfire arson and how to tackle it in a joint approach context. Developed by the National Wildfire Co-ordinating Group (NWCG) and well received in the USA and Canada, this newly adopted course has been directly responsible for the successful conviction of a number of serial wildfire arsonists in cases across both of these countries (some serial cases extending over 12 years). The underlying focus of the course was to encourage police and fire service investigators to work together, sharing information and identifying offenders.

Based on a similar challenge faced in North America between fire and police agencies, the course identifies ways in which the skills of agency investigators can be combined to lead to more thorough investigations. Course presentations apply joint approaches to serial wildfire arson investigations and involve the use of real-life serial arson cases, using intelligence made available to investigators at the time of the fires and exposure to the brief of evidence and conviction of a serial arsonist in the USA.

Broadly, the objective of the course is to provide students with tactical skills that will assist them to:

- gain comprehensive knowledge of administrative and management functions related to the investigation of serial wildfires;
- provide skills in advanced investigation methodology using data analysis tools;
- identify the necessary follow-up actions in a wildfire arson case and identify investigative roles based on the analysis of fire related intelligence;
- review case file information and develop an investigative strategy;
- identify and apply specific investigative strategies and administrative functions associated with the management of a serial arson investigation team or task force; and
- prepare, collect, organise and disseminate all relevant investigative data.

## Australian/New Zealand adoption

In 2009 the ACT Rural Fire Service (ACTRFS), recognised that the North American course could assist in addressing the wildfire arson issue in Australia and New Zealand. The ACTRFS hosted a pilot course in Canberra later that year.

Three USA based trainers, Paul Steensland, Retired Senior Special Agent, US Forest Service, Alan Carlson, Chief Investigator with Calfire and Jeff Bonebrake, Oregon Department of Forestry, assisted in the delivery of the pilot course along with Supt. Richard Woods of the ACT Rural Fire Service.

A sample group of Police and Fire Agency Investigators from across Australia and New Zealand attended with a view to verifying the content for local application. These representative groups included: the New Zealand Rural Fire Service; Fire and Emergency Service Authority of Western Australia; Australian Institute of Criminology; Victoria Police; South Australia Police; Country Fire Authority Victoria; Tasmania Fire Service; Country Fire Service South Australia; Queensland Fire & Rescue Service; Department of Conservation Western Australia; Australian Federal Police; ACT Fire Brigade; NSW Rural Fire Service; and the Australian Government's Attorney General's Department (AGD).

Attendees provided an overwhelmingly positive response to the course and a number of key issues and initiatives were identified to ensure the on-going suitability of the course in the Australia and New Zealand environments:

1. Overseen by the ACTRFS, the Australian Government's Attorney General's Department (AGD) would allocate funds for the course's future development in 2010/11 to suit Australian jurisdictional arrangements. At the same time the course was endorsed as part of the National Bushfire Arson Reduction Plan arising out of the 2009 AGD National Bushfire Arson Workshop.
2. A Working Group formed to validate necessary changes. This group consists of former students of

the ACT pilot course (Aus/NZ Fire/Police), ACT ESA Training Staff, Australasian Fire and Emergency Service Authorities Council (AFAC), Australian Institute of Criminology (AIC), AGD Staff and ACTRFS Operations Manager Supt. Richard Woods, managing the project development.

3. Assisted by the ACT ESA Training Section, the refinement of course content in accordance with the recommendations from the pilot course was developed by a Queensland based fire training consultant.
4. After the finalisation of the course content, a second pilot course to be hosted by the AGD at the Australian Institute of Emergency Management at Mt Macedon Victoria, in April 2011. This would be managed by the Working Group along with two specialist trainers from the USA, funded by the AGD. A sample representation from across Australia and New Zealand Fire and Police Agencies will attend this course.
5. After this second pilot course, the finalisation of the content for Australia/New Zealand use.

The revised content is based on the original intent of the course and will promote best practice from across Australian/New Zealand wildfire arson investigation models and will include:

- The importance of co-operation in Wildfire Arson Investigation
- Case organisation & documentation
- Behavioural evidence analysis
- Aims and objectives of a multi agency wildfire investigation
- Investigative tools and crime scene management
- Introduction to wildfire arson
- Interviewing questions and techniques
- Protocols governing suspect searches in wildfire arson cases
- Case presentation best practice.



Group attending the pilot course at AEMI.



Formal education session at pilot course.



Interaction between agencies in pilot course.

## Funding

The hosting of the course by the ACT Rural Fire Service and the need for its subsequent refinement was acknowledged and endorsed at the 2010 Australian Government's Attorney General's Bushfire Arson Prevention Forum and reaffirmed as a priority for development as an Action Point in the 'National Work Plan to reduce Bushfire Arson in Australia'. The Federal Attorney General's Department subsequently allocated funds via the National Emergency Management Projects to develop the course in 2010/11 to enhance its content and application.

## Consultation

A number of key briefings and information overviews on the course and proposed development have been provided to key stakeholders across Australia and New Zealand. These have included AFAC, the NSW, Queensland and Victorian Association of Fire Investigators Conference in Sydney in 2010, the Australia New Zealand Policing Advisory Agency and the 2010 Federal Attorney General's Arson Prevention Forum. Finally, the second pilot course will provide an opportunity for key feedback from investigators at the State and Territory agency level.

## Summary

No similar course is currently available in Australia. The final version of this training course intends to provide State/Territory fire and police agency wildfire investigators with an opportunity to be exposed to best practice methodology and the latest in wildfire investigation techniques. As a 'specialist short course'

it will be offered to specialist investigators from fire and police agencies managing serial wildfire investigations.

The problem of wildfire arson is very real across Australia and New Zealand. Importantly, the community expects it to be addressed and for arsonists to be detected and placed before the courts. Enhancing the skills of fire and police agency investigators in this challenging field, will ultimately benefit their ability to detect and prosecute wildfire arsonists. This course will go a long way to making our wildfire prone communities safer from this crime.

## About the author

**Richard Woods** is Operations Manager of the ACT Rural Fire Service. As Manager for Fire Investigation for NSW Rural Fire Service he is instrumental in Strikeforce 'Tronto' investigating the cause of major bushfires across NSW. He has also held positions in the Shoalhaven district and was a Police Officer in NSW for over 9 years. He has been involved in study tours and presented training and conference papers in North America. More recently he has been working with the Federal Attorney Generals' Department in Canberra tasked to develop National Bushfire Arson Prevention standards.

He is the current Chair of the International Association of Arson Investigators, Wildland Arson Committee; Australian representative of the North American based National Wildfire Co-ordinating Group Wildland Fire Investigation Team and is a former President of the NSW Chapter [47] of the International Association of Arson Investigators. Richard can be contacted at [richard.woods@act.gov.au](mailto:richard.woods@act.gov.au)



# Opinion: Fire Services Commissioner for Victoria

**Craig Lapsley, Fire Services Commissioner for Victoria.**



The establishment of a Fire Services Commissioner as an independent statutory appointment reporting directly to the Minister for Police and Emergency Services, adds a different dimension to fire management in Victoria.

The focus of the Fire Services Commissioner is on developing an integrated fire ready force, an integrated network of partner organisations outside the traditional emergency services organisations and a fire ready and safe community.

The potential to improve the way Victoria's three fire services operate together was a key theme highlighted throughout the 2009 Victorian Bushfires Royal Commission and the Fire Services Commissioner Act 2010 is explicit in pursuing interoperability as the way business is conducted in Victoria.

One of the key mechanisms in achieving this is focused on ensuring the operating systems and practices between Victoria's three fire agencies are interoperable, so that when the state's fire agencies prepare or respond together they can do so seamlessly and with optimal effectiveness.

Interoperability is a complex issue and much more complicated than turning a toggle on a radio. It is about creating an attitude and environment of cooperation to deliver the highest level of service to the community.

An interoperability model has been developed to document the five pillars that are fundamental in achieving this. The pillars of the interoperability model are Governance, Doctrine, Enablers (Technology), Training/Exercising and Application and Usage (Service Delivery).

**Governance** is the cornerstone of the model, and establishes the authority and expectations for the agencies to operate as a joined up unified force. The Fire Services Commissioner's Act establishes this setting.

**Doctrine** is the principle of operations that underpin the mode of operation. In an interoperable model, these are the beliefs that are commonly held and shared and that augment the governance.

**Enablers** include the systems and technology that support the agencies to work together. The interoperability model supports common systems to deliver common situational awareness through common data, information and intelligence. Training and Exercising are the pillars that strengthen relationships, enhance performance, and form a key ingredient in delivering on interoperability. **Training and Exercising** must extend past the agency level and include private sector partners and the community

Finally, the **application and usage** (service delivery) is the key measurable that will ensure effective and efficient delivery to the community by the agencies with the aim of building community capability and capacity to improve their resilience and preparedness.

It is also about partner agencies, organisations being embedded into any preparedness or operational activity and driving and supporting relevant improvement. And it is about the fire services working together striving to continually improve and adapt service delivery.

Everything the fire services – and emergency service partners - do must be measured by the value that is ultimately added to community safety and this involves understanding how emergency services can best help the community member who stands knee deep in water at his back door or who has a fire at their back fence.

After 30 years in emergency services management and emergency response with the CFA, VicSES and

Department of Human Services, I'm a strong believer in the integration of the community into all levels of emergency management in an all hazards, all agencies approach.

A resilient community is one which is involved, which has well rehearsed emergency plans, which works together with local leaders. And providing the community with the information they need, and in a way they understand so they can prepare and make their own informed choices has to be our priority.

As part of the 2010/11 fire season, the provision of community information and warnings was elevated to the same importance as the operational aspect of fighting fires. In some instances, it's importance actually surpasses firefighting efforts.

Strategic control priorities were issued to incident controllers to provide guidance and outline that protection and preservation of life is paramount - including the safety of emergency services personnel as well as community members.

Secondly, the strategic control priorities outline the need for community information and warnings that are timely, relevant and tailored to help the community make informed decisions about their safety.

While the 2010/2011 Victorian fire season was relatively mild, the strategic control priorities had also been adopted for flood and storm by the Victoria State Emergency Service.

Other Australian states are watching Victoria with interest as a result of the events of February 7

2009. As the incidence of natural disasters increase Australia-wide, the importance of interoperability and a community that has capacity and feels confident in their own ability will only become more important.

### About the author

Beginning his career as a volunteer firefighter, **Craig Lapsley** rose through the ranks of the Country Fire Authority (CFA) to become a Deputy Chief Officer.

He has both interstate and interagency experience, having overseen state operations in the NSW Fire Brigade and also transformed the Victorian State Emergency Services (SES) from a government department to a statutory authority

In 2007, Craig left the CFA to become Director Emergency Management, Health and Human Services, playing a lead role in Victorian recovery efforts following the 2009 Black Saturday bushfires.

Craig became Victoria's first Fire Services Commissioner in 2010, a role recommended by the Bushfires Royal Commission. An independent statutory position, the Commissioner is the State Controller for major fires in Victoria and the most senior operational firefighter in the state.



# Disaster waste management following the 2009 Victorian bushfires

Charlotte Brown, Mark Milke and Erica Seville examine the waste management decisions made after the Black Saturday bushfires.

## ABSTRACT

The 2009 Black Saturday Bushfires in Victoria, Australia, killed 173 people and affected 430,000 hectares of land. Before communities could begin to rebuild, tonnes of burnt and potentially hazardous debris had to be removed. Interviews were carried out with professionals involved in, and community members affected by, the debris waste management process. The data collected indicated that although there had been little prior planning for how to deal with disaster waste on this scale, there was a collective response to move with urgency towards a common goal: to remove public health hazards and to get communities into the rebuilding process as quickly as possible. Five key decisions were made during the clean-up process: the establishment of the Victorian Bushfire Recovery and Reconstruction Authority; full government funding for building demolition; the single waste classification; the appointment of a single managing contractor; and the construction of a new landfill cell. For each key decision the following are analysed: the decision-making process; delays; organisational considerations; legal implications; and environmental, economic and social effects. Overall the demolition and debris removal response was successful, however, the response would have benefited from greater prior planning. Planning is necessary to give decision-makers the tools and information necessary to make timely, effective and coordinated decisions after any given event. A full report, including additional references and interview details, is available at [www.resorgs.org.nz](http://www.resorgs.org.nz).

## Introduction

The 7 February 2009 “Black Saturday” bushfires in Victoria, Australia, were the most devastating bushfires in Australian history. 173 people were killed in 78 communities and over 430,000 hectares of land and 2000 properties were destroyed (VBRRA, 2009).

Due to the intense heat of the fires (up to 1200°C) (Victorian Bushfires Royal Commission, 2009), many of the affected buildings were reduced to piles of twisted metal, masonry rubble and ash. The waste matrix included mixed ash, concrete rubble and bricks, partially burnt dimensional timber and fence posts (treated), metal, vegetation and trees, household hazardous wastes (including asbestos), vehicles and corpses (removed by the Coroner). The Commonwealth and State governments elected to pay for and facilitate demolition and removal of all building related debris in the affected areas.

This research looks at the waste management process during the recovery phase of the bushfire response. This case study will be used by the authors as part of a wider study on disaster waste management systems. The aim of the wider study is to develop a strategic and integrated approach to planning for and responding to disaster waste.

There is a full length case study report, including additional references and interview details, available at [www.resorgs.org.nz](http://www.resorgs.org.nz).

## Disaster waste management background

Depending on their type and severity, and the nature of the built environment, disasters can create large volumes of inert and hazardous debris. Recent natural disasters such as the 2010 Haiti earthquake (Booth, 2010, Johnson and Correa, 2010, Kahn, 2010), Hurricane Katrina 2005 (Luther, 2008, USEPA, 2008, Brown and Milke, 2009), and the 2004 Indian Ocean tsunami (Basnayake et al., 2005, Petersen, 2006) have all generated volumes of waste which overwhelmed existing solid waste capacities and required extraordinary management approaches.

Disaster debris can impede rescuers and emergency services reaching survivors; inhibit provision of lifeline support; pose a public and environmental health hazard; and hinder the social and economic recovery of the affected area. Poor management of a clean-up effort can result in a slow and costly recovery which is potentially risky to public and environmental health in both the short and long term.

The first and most comprehensive national guidance on disaster debris management was the USEPA's "Planning for Disaster Debris" (USEPA, 1995) which was updated in 2008 (USEPA, 2008). Outside the US, understanding of the need to plan for debris management is growing (Johnston et al., 2009, JEU, 2010).

Due to the destructive nature of fires, there is typically less debris than other disasters (USEPA, 1995). There are few documented accounts of waste management following fire events, those reported include the 1991 Oakland firestorm (State of California, 1997), 1993 Malibu, California, coastal fires (USEPA, 1995), 2000 Cerro Grande wildfires (USEPA, 2008) and 2003 Cedar and Pines Fires, San Diego (County of San Diego, 2005). A range of waste management options were employed across these disaster responses (largely due to varied environmental and public health hazard assessments), including private property clearance by property owner; local government facilitated cleanups; a combination of insurance, federal and local government funding; and mixed efforts to recycle.

## Case study approach

The case study analysis follows the principles set out by Yin (2009) in *Case Study Research, Design and Methods*. The framework for the analysis is to form a case description of the waste management process using strategic decision points as the unit of analysis. These decision points determined the path and in turn overall success of the waste management process and it is likely that many of these same decision points will also be faced by future disaster waste managers. Being able to anticipate what decisions will have to be made, what the likely impacts of the decision will be, how to better make these decisions and what information is needed to do so will help position communities to respond better in the future. The analysis was informed by both interviews and the study of pre and post-disaster literature.

For each key decision, the analysis focused on: the decision-making process (how and why the decision was made); the delays associated with the decision; the organisational aspects of the decision; the legal constraints; and the environmental, economic and social effects. The ultimate aim of this case study is to use these categories and the technique of pattern matching (Yin, 2009) in a cross case study analysis of waste management programmes. The analysis will determine the major drivers and barriers for waste management decisions and will lead to a framework for future disaster waste management.

Interviews for this case study were conducted with professionals and community members both involved in and affected by the waste management following the Bushfires. The interviews were carried out in August 2009 and March 2010, six and 13 months after Black Saturday respectively.

In total, eight professionals (including contractors, private waste firms, council waste managers, government regulators and disaster managers) and 14 community members were interviewed using a semi-structured interview approach.

## Analysis

A flow diagram summarising the decision-making associated with the waste management process is shown in Figure 1. The diagram is a chronological account (although not to scale) and shows the events that occurred (star shape), the activities that took place (rectangular boxes), the decisions that were made (diamonds) and any delays that occurred (a pair of vertical parallel lines). The diagram is also divided into 3 levels (local authority, state government and individual) to indicate who undertook the decisions and/or activities. Arrows are used to show the flow through the diagram

### Decision 1: Establishment of VBRRRA

Due to the scale of the disaster, the Commonwealth and Victorian Governments elected to establish the Victorian Bushfire Recovery and Reconstruction Authority (VBRRRA) to "guide the recovery and rebuild process" (VBRRRA, accessed 2010). The decision to form this authority was not directly related to management of the bushfire waste, however, it is included here as VBRRRA forms the umbrella of the entire disaster recovery system, of which debris management forms a part.

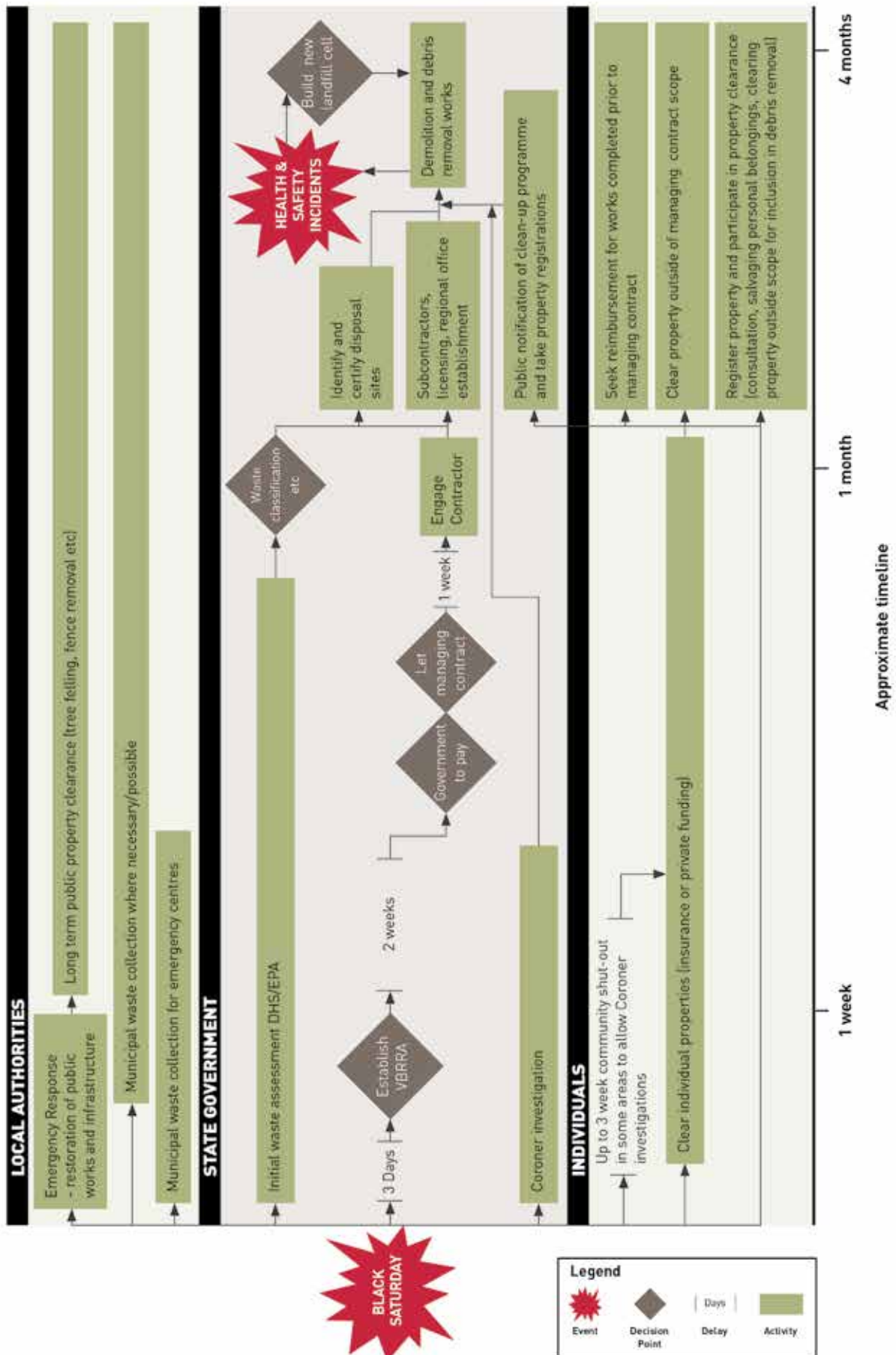
Overall the timely establishment of VBRRRA played a positive role in the waste management process. VBRRRA took overall responsibility for the waste management programme, gave a focal point to the community for waste management issues and initiated the coordination of the appropriate regulators and contractors to implement the project. The main weakness of this approach was the limited longitudinal involvement of specialised waste management personnel in the strategic development of the waste management approach. If VBRRRA had not been established, waste management would have been the responsibility of the already overwhelmed local government authorities.

### Decision 2: Government funding

Two weeks after Black Saturday, the Commonwealth and State Government of Victoria elected to jointly pay for and facilitate the demolition and debris disposal of private and public buildings destroyed by the bushfires – a responsibility which would ordinarily rest with private property owners and municipalities, respectively.

Justification for the decision to fund the demolition and debris removal was to clear debris and hazardous

FIGURE 1. 2009 Victorian Bushfires waste management decision flow chart.



materials from bushfire affected properties and to help start people rebuilding (The Premier of Victoria, 2009) and in turn benefit the economic recovery of the community.

The decision required political and financial support which took time to establish. However, if no funding had been provided significant delays in the demolition and debris removal would have arisen. In particular, it would take time for insurance payouts, charitable donations and possibly government grants to be assessed and awarded before individual property owners could facilitate clean-up works. These delays would also have potentially exacerbated any negative environmental, social and economic impacts.

In general, government funding of private property demolition and debris removal in this case was very successful. The initiative had the desired effect of facilitating a timely and well coordinated community wide clean-up operation. There are two possible disadvantages of providing government funding. The first is the potential for setting a funding precedence for future disasters such that the community expect government assistance and do not insure for management of disaster waste. The second is the limited scope of the government funding programme. In the Bushfire case, individual property owners were responsible for any clean-up works outside the scope of the government funded and facilitated (refer Section 4.4) clean-up works. There was a general reluctance to carry out the work due to an expectation that the government should or would provide additional funding. There were also reported instances of illegal dumping from residents unwilling to pay the high disposal costs. There appeared to be limited efforts by local authorities to provide public information on and facilities for appropriate management of waste not covered by the government scheme.

### **Decision 3: Single waste classification and management procedures**

To expedite debris removal and minimise hazards to people and the environment, the Victorian Environmental Protection Agency (EPA) and the Department of Human Services (DHS), based on limited site testing, elected to classify all bushfire waste as a single classification. The classification assumed the waste was Construction & Demolition waste plus other contaminants, including Class B (non-friable) asbestos. Provisions under Section 30A of the Victorian Environmental Protection Act, 1970 and Section 55 of the Dangerous Goods Act (Victorian Government Gazette, 2009), 1985 were activated to formalise the classification. The combined regulations stipulated stream-lined handling, transportation and disposal methods for management of the bushfire waste.

Coroner investigations in the affected area and the time taken to decide that the government would fund the clean-up meant EPA and DHS had approximately four weeks to establish processes for waste handling, transportation and disposal. However, in another event, a four week delay in establishing waste management procedures may not be acceptable, especially if significant acute hazards existed in the waste matrix and threatened residents, or if debris management were required for search and rescue activities (such

as after the 2011 Christchurch Earthquake). If no over-arching classification had been made, each site would have had to be independently assessed or tested for contaminants causing significant delays, public concern and increased disposal costs (for contaminated materials).

The single waste classification expedited the speed of the cleanup works with both minimal environmental and health and safety risk to waste handlers and the public. The legal arrangements that allowed for the waste classification were straightforward to implement and effective despite the absence of clear guidance on how emergency waivers should be assessed.

### **Decision 4: Centralised demolition and debris removal contract**

Three weeks after Black Saturday, the State government let a single "managing contract" to coordinate and to manage subcontractors for demolition and debris removal works. The contract included all public and private buildings destroyed in the bushfires. Individual property owners were not required to participate, other than salvaging of personal belongings if desired.

The contract was awarded to an Australian building contractor called Grocon. Approximately 70% of subcontracts (and 50% of the labour) were sourced from the local community.

Despite the initial delays associated with letting the contract (which were in parallel with Coronary investigations), the centralised demolition and debris removal contract accelerated waste removal and demolition works and led to quality work. If property owners had been required to facilitate their own clean-up, it would have been extremely difficult to ensure rapid and safe debris removal.

The majority of respondents agreed that the centralised demolition and debris removal contract, implemented by Grocon, for debris removal was a success. The centralised demolition and debris removal contract allowed for efficient removal (within the six month completion target) and streamlined and consistent health and safety and environmental procedures across all affected areas. Organisational structures were simple and economy of scale for the physical works (including resource allocation) was also possible. The major drawback to the centralised demolition and debris removal contract was the limited community consultation and use of non-local labour.

### **Decision 5: Construction of a new landfill cell**

The majority of the bushfire waste went to existing municipal waste landfills a significant distance from the affected area. However, due to several incidents involving waste-laden trucks travelling on a dangerous stretch of road, an urgency developed to find an alternate disposal site. An area at an existing landfill site (owned by Murrindindi Shire) was identified. A landfill cell was designed (at a lower specification than other landfills receiving the bushfire waste), consented and constructed in just 10 days. After construction and operation of the cell by Grocon, it was capped

and handed back to Murrindindi Shire. The 30 year maintenance requirements for the landfill cell remain with the Shire.

The essence of this decision was whether or not an additional facility with a potentially higher environmental risk, should have been used to reduce an occupational health and safety hazard. It is unclear how these potential effects were assessed, traded-off and justified and who carries the liability for this decision.

The fast design, construction and consenting process showed good collaboration between organisations. The new landfill significantly reduced health and safety risk to the public and the truck drivers and reduced haulage costs. However, the execution of the new landfill siting and consenting could have been improved. The assessment process and justification for the reduced environmental standards (based on a health and safety risk) was unclear and seemingly undocumented. In addition, the expedited processes used for consenting has the potential to introduce future liability issues at the site.

## Communication

An overriding theme within all the above decisions is communication, including: gathering information to assist in decision-making; facilitating decision-making (inter-agency communication); informing the public on how decisions were made; and educating on individual's responsibilities.

In general, the inter-agency communication was reactionary – due to the absence of a plan - but effective. Roles and responsibilities were undefined and overall responsibilities for various aspects of the waste management process were unclear and established in an ad-hoc fashion. Despite this the necessary outcomes were achieved.

Communication of the waste management decisions with the public, however, was less effective. The State Emergency Recovery Plan (Emergency Management in Victoria, 2005) outlines that community communication plans should be established 'as soon as practicable' in the recovery process. Despite this no community-wide consultation was carried out prior to establishment or during implementation of the clean-up programme.

Effective communication may have short-circuited some of the community dissatisfaction. Health and safety concerns and potential environmental impacts would have also been mitigated for individual clean-up operations.

## Discussion

One common theme from the interviews was a general reluctance to plan for waste management for disasters. Other authors have also observed a reluctance to plan and effectively mitigate bushfire risk in Australia in general (Underwood, 2009). There are several possible reasons for this viewpoint:

- The perceived difficulty in planning for the unknown.

- The low frequency of such large scale disasters.
- The success of this particular debris management process (implemented without a plan in place).

Despite the relatively effective reactionary waste management response following this event, waste management planning is needed to reduce waste's lingering impacts (Solis et al., 1995, Reinhart and McCreanor, 1999, USEPA, 2008). A key step to improve disaster waste management is, consequently, transcending the paradigm that planning is not possible or useful.

A possible approach to flexible and transferable disaster waste management plans is to develop the plan around decision points. This can be achieved by anticipating: what decisions will need to be made; who should make the decision; what information will be needed; how the decision will be made; and how the decision will be communicated and then implemented. This approach may be considered more effective than instituting operational plans which may not be appropriate for every disaster situation. Future research is planned by the authors to test this hypothesis.

## Recommendations

In the Victorian context, the first and most important step is to prepare disaster waste management plans at municipal level. The plans must include clear pre and post disaster consultation and communication strategies. The plans must also be flexible enough to apply to the spectra of likely disaster events - writing a plan around decision points, as discussed above, is one possibility in ensuring plans are adaptable to different situations. The plans should:

- Establish an organisational structure with roles and responsibilities, and decision-making delegation that fits within the overall recovery framework. This should include solid waste professionals and community representatives.
- Determine a funding policy - for example a tiered approach based on disaster impact. Private property owner and government responsibilities should be well defined and the role of insurance included.
- Establish maximum acceptable environmental and health and safety risks for different levels of disaster impact and methods of assessing those risks. Consider whether legal provisions need to be bounded to reflect these standards.
- Establish strategies for the physical works, alongside the tiered funding strategy above. Consider state and local responses, property owner roles and responsibilities, contractor involvement and local labour use.

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## Conclusions

Overall the demolition and debris removal response following the Victorian Bushfires was successful. While the response was effective in this case the same approach may not be effective in another disaster situation. Planning is necessary to give decision-makers the tools and information necessary to make timely, effective and coordinated decisions after any given event.

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# Fostering community bushfire preparedness through engagement and empowerment

Mai Frandsen, Douglas Paton, and Kerry Sakariassen examine the community engagement initiatives of a Tasmanian Fire Service community development pilot program.

## ABSTRACT

In March, 2009, the Tasmanian Fire Service introduced a Community Development Pilot in an endeavour to use community engagement and empowerment to promote greater bushfire preparedness in four target Tasmanian communities. The Pilot was facilitated by an appointed Community Development Officer who through a 'grassroots' approach engaged the community to become more bushfire prepared through tailored programs and activities. Evaluation of this Pilot demonstrated that this community engagement approach can not only directly promote bushfire preparedness behaviour, but it can also, through ongoing support and facilitation from government fire agencies like the Tasmanian Fire Service, be community driven. This therefore ensures a greater likelihood of sustained community bushfire preparedness.

such as 'Community Fireguard'<sup>1</sup> makes a significant contribution to people's safety. Being actively involved with other community members and exchanging information and stories about bushfires are important precursors of the development of people's risk beliefs and the enactment of these beliefs in ways that facilitate community bushfire safety (e.g., Frandsen, 2010; Kneeshaw, Vaske, Bright, & Absher, 2004; McGee & Russell, 2003; Paton et al., 2008; Vogt, Winter, & Fried, 2005; Winter, Vogt, & McCaffrey, 2004). The Commission's recommendation went further and argued for bushfire preparedness to be seen as a 'shared responsibility' between communities, fire agencies, and governments (VBRC, p. 352). If the benefits of this goal are to be realised, it is first necessary to identify how the relationship between community and agency can be developed in ways that promote bushfire safety as a shared responsibility. Consequently, research into how communities and agencies can be engaged in reciprocal and complementary ways is required (Kumagai, Bliss, Daniels, & Carroll, 2004; McCaffrey, 2007; McGee & Russell, 2003; Paton & Wright, 2008; Winter, Vogt, & McCaffrey, 2004). One approach to achieving this is the subject of this paper.

## Background

That bushfires can exceed the capacity of fire-fighting resources makes facilitating household and community bushfire preparedness a crucial risk management goal. This goal cannot be accomplished simply by making information available to people (e.g., Martin, Bender, & Raish, 2007; Johnston et al., 2005; Lindell & Whitney, 2000; Paton, Bürgelt & Prior, 2008). Sustained hazard preparation is a function of how people interpret information in social and community contexts. This view was echoed by the 2009 Victorian Bushfire Royal Commission (henceforth Commission: VBRC, 2010) where evidence presented (p. 354) suggest that involvement in bushfire preparedness groups

## TFS community bushfire preparedness pilot

As a means of complementing the effective (Enterprise Marketing and Research Services, 2010) three-year *Bushfire: Prepare to Survive* awareness campaign, the Tasmanian Fire Service (TFS) introduced the Community Bushfire Preparedness Pilot (Pilot) and appointed a Community Development Officer in March 2009 to trial and evaluate this new evidence-based intervention program. The evaluation (conducted by two independent University of Tasmania researchers) employed an action research approach to enable the Community Development Officer to tailor and progressively develop the engagement process to accommodate the findings of the evaluation. This paper is a summary of that evaluation.

<sup>1</sup> 'Community Fireguard' is a community development program developed by Victoria's Country Fire Authority to assist community groups develop tailored bushfire survival strategies to help reduce loss of lives and homes in bushfires (CFA, 2011)

The Pilot sought to identify how to engage with communities to increase public acceptance of bushfire safety as a collective responsibility between the TFS and communities. Through consultation with TFS managers and District Officers appointed to those regions, four communities, considered to have comparable levels of bushfire risk, were chosen for the Pilot. To ensure that the sample was representative of Tasmanian communities, work was undertaken in one northern rural, one urban interface, two southern rural, and a community with a recent major bushfire experience (as well as various demographics and community characteristics). The four communities were Fern Tree, Binalong Bay, Huntingdon Tiers in Bagdad, and Snug Tiers. [see map]



### First Contact

The local volunteer fire brigades in each community were consulted to gain an insight into: existing levels of engagement with the community; their capacity for community liaison and education; awareness of their community's preparedness, capacity and vulnerability; local knowledge of key community leaders and groups; and, to gain their support for the project. All four brigades supported the project. Whilst some brigades (e.g., Fern Tree) indicated a strong, existing culture of engagement in their community and that promoting community preparedness was integral to their voluntary operations, other brigades indicated their community involvement was limited by lack of volunteer numbers or reflected an existing cultural attitude that their role as volunteers was 'to put the wet stuff on the hot stuff.'

Surveys collected from participating brigade members following these consultations indicated that 41 of 42 volunteers believed that encouraging two-way community-brigade engagement was beneficial to increasing bushfire preparedness and enhancing brigade ability to assist facilitating the preparedness

goals of communities. Importantly, the engagement process employed in the Pilot was perceived to increase people's understanding of the respective roles and responsibilities of volunteer fire brigades and community members, and the notion of 'help us to help them.' Thus, the community engagement approach provided a platform to help meet the Commission's (2010) objective of promoting bushfire risk management as a 'shared responsibility.' Volunteer fire brigades who were not actively engaged with their community suggested that this was due to a lack of resources and disinterest from the community; a finding that reinforces the value of promoting active community participation in social contexts prior to implementing the Pilot in each area (Paton & Wright, 2008). Consistent with previous work (McGee & Russell, 2003), the survey data highlighted the benefits of having a community liaison officer in a brigade. The general consensus of the brigade members was that this person should have fire-fighting experience, have a strong commitment to benefiting their community, and be someone who was familiar with the area and its community members.

### Level 1 Engagement

Through consultation with key representatives in each community (e.g., community leaders, volunteer fire brigade, local council etc) all four communities decided that an interactive information session (henceforth 'Forum') about bushfire preparation in their local community would be the most effective way to introduce the Pilot and provide bushfire preparedness advice to the communities' residents. Promotion of the Forums was largely organised by the Community Development Officer although, where possible, the local volunteer fire brigade and/or other community members assisted this process. The TFS District Officers agreed to provide the expert bushfire advice at each Forum.

*Binalong Bay Forum* (13th September, 2009): Binalong Bay Fire Station. As well as the District Officer and Binalong Bay volunteer fire brigade attending to provide advice and fire pump demonstrations, several St Helens volunteer fire brigade members also participated, as did representatives from the Tasmanian Parks and Wildlife Service, Forestry Tasmania, and local government. All presenters participated in the Question and Answer session at the end of the Forum. In total, 45 community members and approximately 20 volunteer fire brigade representatives attended the Forum.

*Snug Tiers Forum* (18th October, 2009): Snug Memorial Hall. The main presentation was given by the District Officer along with speeches given by Parks and Wildlife and a Community Fire Guard group leader from Kettering (a neighbouring township). A Question and Answer panel following the presentations also consisted of representatives from local government (a Councillor, Development Officer, Planning Officer, and Bushfire Care Officer). Seven members from the Snug and Margate volunteer fire brigades also attended and a display of fire fighting products from TasFire Equipment was provided. Approximately 45 people attended the Forum, of which 15 were representatives, presenters, or volunteer fire brigade members. The Forum was

concluded with a barbeque and opportunity for informal discussion with the various representatives.

*Fern Tree Forum* (1st November, 2009): Fern Tree Hall. The Fern Tree volunteer fire brigade is very active in the community and approximately 120 community members attended the Forum, with opportunity to ask questions of panel members, which included TFS representatives, local government representatives, and members of local Community Fire Guard groups. After the Question and Answer session, residents were given the opportunity to see fire pump demonstrations and engage in further discussion with TFS members and other representatives over a barbeque lunch.

*Huntingdon Tiers, Bagdad Forum* (15th November, 2009): Bagdad Community Club. The District Officer, General Manager of the Midlands Council, and a local police officer gave presentations, and members and young cadets of the local Bagdad volunteer fire brigade gave a demonstration of fire pumps. In total, 11 community members, 10 volunteer fire brigade members, and six other representatives attended the Forum. The Forum was concluded with a barbeque lunch prepared by the local volunteer fire brigade.

*Forum Feedback.* Post-forum feedback surveys were distributed to participants. Seventy seven people completed surveys (approximately 40% of those who attended Forums). The surveys assessed views on the format of the Forum itself, as well as perceptions of bushfire preparedness, benefits of attending Forums, and roles and responsibilities of residents and fire agencies. Overall, all participants agreed that the Forums were well organised, enjoyable, made them re-evaluate their own bushfire risk, and gave them a better understanding of appropriate sources of bushfire information.

When asked what they learnt from the Forum, five main themes emerged including: that bushfire management is a complex issue and that there is a lot of background work that goes on to manage it; the planning involved to prepare for bushfire; the various recommended preparedness measures; new information (e.g., Fire Danger Rating); and, actual fire behaviour. Residents indicated that they would have liked more specific information about home fire protection, information regarding the TFS (e.g., how to join), and whether there was an evacuation plan for their area or where to go if they had to leave their property. Of particular interest was the finding that 71 of 77 participating residents (92.21%) indicated that they intended to become more prepared for bushfire as a result of attending the Forum.

Furthermore, 42.86 percent of residents indicated that their perception of their own and their volunteer fire brigade's roles and responsibilities had changed and that they now had a better understanding of the limited resources of volunteer fire brigades and that home owners are responsible for their own preparation. For those whose perceptions of roles and responsibilities had not changed, many explained that this was because they were already aware of these roles and responsibilities. The most commonly listed benefits of attending included: acquiring more information about bushfires and how to prepare for them; understanding that community preparedness is a community responsibility; and the motivation to start preparing immediately (which was itself stimulated by discussing bushfire issues with others). Consistent with its theoretical foundations (McGee & Russell, 2003; Paton et al., 2008; Paton & Wright, 2008) forum attendance facilitated preparedness being seen as a collaborative activity, increased the likelihood of people continuing to discuss bushfire preparedness in everyday life, identified future needs, and arguably increased the likelihood of preparedness becoming a social norm. When asked how the Forum



Fern Tree Forum, November, 2009.

could be improved the most common answers were: better attendance from other community members; more specific information about how to prepare their properties; evacuation procedures in their community; and, longer question time. Telephone interviews conducted with residents from these target areas (data which is the foundation of a current PhD thesis), also suggests that these Forums were an effective means of raising bushfire awareness and promoting bushfire preparedness actions. Table 1 provides examples of such sentiment from the telephone interviews conducted.

The TFS Community Development Officer used the Forums to introduce the Community Development Pilot and invited residents to contact her to discuss further support opportunities. The outcome of these discussions provided the foundation for more proactive engagement between the Community Development Officer and those community members seeking to advance their bushfire knowledge and preparedness. This provided the foundation for Level 2 engagement.

**Table 1.** Extracts from Telephone Interviews with Residents of the Four Target Areas and their Remarks about the Forums.

Residents	Remarks
Ruby from Bagdad (12/1/10)	“...yes, we’ve probably done more of it [bushfire mitigation activities] this year than we have in the past...we’ve taken out a couple of trees that we’ve left in the past umm but like there’s a lovely big tree growing up against our um shed... we took that tree away, um and it’s been growing there for a long time, and it looks lovely, we were really sad when we took it down but err so we’ve made a few decisions this year, probably based on doing that Forum that we that we wouldn’t have otherwise...and there are others [trees] that we are contemplating taking out um because, that we wouldn’t have before (before the Forum?) yes...”
Tony from Binalong Bay (7/1/11)	Is there anything to gain from going to another [forum]? “Oh I think there is, yeah, yeah like I think it’s just a...good way, good reminder, but umm yeah like, it’s always in the back of your mind, especially this time of year, umm yeah but it’s always a good reminder...like we haven’t spoken for some time you know, as a family about yeah bushfire plans and you know, where the tennis balls and socks are for plugging the down pipes and all that sort of stuff but if you, you have a forum like that...it suddenly... back in the forefront of your mind and, yeah, it can probably get it, get some of those things, umm organised and discussed rather than just sort of waiting for it to happen so I think it’s a good idea, it’s like anything, you go and do training, you know, through work and yeah two years later you need to do a refresher like with First Aid or umm some other skill you’ve got yeah...”
Jackie from Snug (27/10/09)	“...and also thanks to the forum the other week, we’re working on getting everything organised, making sure we’ve got the, adequate clothing and umm, umm what do you call them, garden hoses and things readily available. So we’re conscious of all that and are working towards it.”
Merv from Snug (3/11/09)	So your little community there is quite close knit then? “Yeah, it’s it’s small, it’s not actually as close a knit, everyone’s friendly but we don’t spend a lot of time with each other, everyone knows each other so you’ll stop and have a chat on the road but we, there’s definitely potential I mean off the back of that forum the other day, there’s definitely potential for this this community to pull together and be a little bit more umm, probably planned and ready...until we went to that forum the other day, I didn’t realise or didn’t, you know, it hadn’t occurred to me that there’d been changes in their policy so yeah.”
Sandy and Gus from Fern Tree (17/11/09)	“...(Sandy) well I mean they’re all, I mean that Forum amazed me, I’d never seen those people before! (Gus:...that meeting there the other Sunday, Sandy and I looked at each other and thought, where do these people come from...I mean we’ve been up here 30 what? (Sandy) 36 years (Gus: 36 years, and we’ve never seen 90 % of those people)...”

**Level 2 Engagement**

*Binalong Bay.* Following the community Forum the Community Development Officer and District Officer met with community members (30th September, 2009) in a focus group format to discuss local and specific bushfire issues (e.g., highest risk areas, likely bushfire behaviour, specific mitigation needs). Focus group discussions were followed, at the request of residents, by three property inspections. Nine residents in total attended these property inspections and indicated their value in providing detailed, specific, and contextual information about how to prepare their homes that could not have been obtained from bushfire literature or other education formats such as the Forum. Inspections, particularly those conducted in response to community requests, are good predictors of the adoption of protective measures (Martin et al., 2007).

The District Officer endorsed the format explaining that, as well as being much more economical and less resource taxing, the community property assessments offered a larger number of residents greater access to specific and contextual information about how to prepare themselves and their homes for bushfire. The residents and the District Officer also commented on the benefit of the community members being able to discuss and share information about bushfire related matters with each other and the development of

community networks. As a result of this success, the Community Development Officer organised a larger community Field Day (18th January, 2010). A bus commuted participating local residents to five properties where the District Officer provided bushfire risk assessments and advice on how to better prepare properties. Eighteen local residents participated. Interviews with participating residents (n = 5) at the completion of the Field Day indicated that they found it to be a very informative and worthwhile event. For example see Table 2.

*Snug.* In response to residents’ earlier concerns, voiced at the Forum, about excess vegetation along the narrow road verges and the process for removal of vegetation on private property, the Community Development Officer organised for Council’s hazard reduction officer to attend a Field Day (13th March, 2010). Five property owners volunteered their properties for assessment by the TFS Field Officer and 17 people attended the Field Day. The presence of the local government officer was well-received as she was able to provide detailed explanations of the hazard reduction processes and how to comply with Council’s by-laws. One of the main benefits of the event was the networking between neighbours. This resulted in a follow-up request from seven property owners from one of the most at-risk roads to establish a bushfire ‘telephone tree’. Ten Field

**Table 2.** Participant Post-Field Day Survey Quotes Regarding their Opinion of the TFS Pilot Field Days.

Field Day	Example	Remarks
<b>Binalong Bay Field Day (18/01/10)</b>	Example 1	“[Overall impressions?] Very good, very informing. I’m a newcomer to Binalong Bay and I’m really impressed with how the firie [sic] taught us a lot of things that I knew nothing about yes. [Any improvements?] No, well I’ve got to learn all these things, but at least I’ve learned a lot more about what I’ve got to do with my property and I will join the fire brigade and err cause everyone should be helping each other...”
	Example 2	“[Overall impressions?] Very informative...I can see I’ve got work to do, and I appreciate that. I knew most of it anyway, but it just exacerbates...it’s causing me [sic] actions to be done quicker than they would normally have been done...”
<b>Snug Field Day (13/03/10)</b>	Example 1	“[Overall impressions?] Practical advice on fire preparation. Increased knowledge about the reality we might face. Made good connections/contact with local community. Excellent day.”
	Example 2	“[Overall impressions?] Very impressive, very good advice, facilitated community engagement and responsibility, should be continued and funded indefinitely.”
<b>Bagdad Field Day (30/10/10)</b>	Example 1	“[Overall impressions?] Extremely informative. I think it was valuable to be able to physically attend other properties to learn and observe what is available to fire prevent your property. It is also good to meet people in your area to maybe set up a safe area for the situations if need be.”
	Example 2	“[Improvements?] I don’t think it needs improving. If you can try and get more people and their properties on board then a larger percent of the community will learn about the danger to their houses and wether [sic] to stay and fight or evacuate.”

Day participants provided feedback. See Table 2 for example of participant comments.

*Fern Tree.* Following the Fern Tree community bushfire Forum the Community Development Officer met with leaders of five community Fire Guard groups in Ridgeway to discuss test templates for a bushfire survival plan (subsequently to be called Household Bushfire Survival Plan). A property assessment by the local volunteer fire brigade was also arranged for one of these properties as a result of this meeting. The Community Development Officer was also invited to attend a meeting of the Bracken Lane Fire Guard group on the 28th of November, 2010. The meeting provided an opportunity for the group to discover what the Community Development Pilot entailed and if it could provide them with further support. This meeting also provided the Community Development Officer valuable insights into the Fire Guard group operations and the support it afforded its members.

As the TFS aimed to use the Pilot to determine how to more effectively support the community through tailored engagement programs, the Community Development Officer was encouraged to adapt a new, more suitable program that would facilitate the formation of community groups with the aim of becoming more bushfire prepared. This process was facilitated by the appointment of a Community Engagement Officer within the Fern Tree volunteer fire brigade. The Community Development Officer and the new Fern Tree Community Engagement Officer developed a community group template named Bushfire

Ready Neighbourhood (to replace Community Fire Guard) and a complementing Household Bushfire Survival Plan to trial within the Fern Tree brigade's response area. This trial A5 booklet provides residents with a step-by-step guide to develop their own bushfire survival plan and is designed to be completed as a whole-household activity through the facilitation of a brigade Community Engagement Officer. The plan stresses the importance of property preparation and the need to make the choice between leaving early or staying and defending. The feedback received from residents who trialled this Plan, indicates that the Household Bushfire Survival Plan could potentially be an invaluable tool for Bushfire Ready Neighbourhood group members, and other members of the community, to more easily and in greater detail, prepare their own household survival plan.

Through the support of the Community Development Pilot and through the commitment of the Fern Tree volunteer fire brigade, and especially the newly appointed Community Engagement Officer, 15 new Bushfire Ready Neighbourhoods have been formed. Through ongoing support and facilitation by the Community Engagement Officer, these group members have established 'phone trees' as a communication and early warning device, know what resources other community members have access to, and are aware of what their group members' emergency plan is (i.e., who is staying to defend, and who is leaving early); invaluable information that will increase the



Bagdad Field day, October, 2010.

communities' resilience in the event of a bushfire in their area.

*Bagdad.* As a follow-up to the Forum, the Community Development Officer invited Forum attendees to have their properties assessed by the District Officer. A total of nine residents attended the assessment of four properties. Feedback from this initial Field Day included the benefit of confirmation from the District Officer that existing bushfire preparation and survival plans were adequate, and receiving tangible advice on how to better prepare. Again, residents highlighted the networking benefit the Field Day provided and the comfort in knowing that there are other people in the area that are also bushfire aware and prepared. Following the positive response from this earlier Field Day, the Community Development Officer organised another Field Day on the 30th October, 2010, and to encourage greater attendance, invited residents from the larger Bagdad area. A total of 28 residents participated in the Field Day assessment of four homes.

Field Day feedback surveys (n = 18) indicated that residents felt the activity was very informative, and that the format of the community assessments was valuable in that it provided specific and contextual advice on how to prepare for bushfire through various property examples (see also Table 2).

Suggested improvements for the day generally consisted of more hands-on fire training (e.g., how to use fire pump) or a specific fire training day at the local Fire Station. Others suggested that because of the benefits of the format, the Field Day should be an annual event and that more people should attend (Table 2).

## General Implications for bushfire risk management

Since March, 2009, over 300 community members have participated in at least one of the Pilot's various community bushfire preparedness activities (e.g., Forum, Field Day) and received more specific and contextual bushfire mitigation information than they would have otherwise received from traditional forms of TFS education material (e.g., pamphlets, TV ads). Importantly, the District Officers supported the Pilot and attested to its efficiency and cost-effectiveness.

An important finding of the Pilot is that engaging community members to become more bushfire prepared is not a 'one size fits all' model. While most communities have the potential to become 'bushfire prepared communities,' some may need to bring people together to foster awareness of the need for shared responsibility and community-wide preparedness. The Pilot also demonstrated the need to develop or identify local 'leaders' who possess invaluable information about their community. This facilitates the ability of engagement programs that build upon existing relationships and use these resources to ensure that

risk communication and education is more relevant and thus effective (Martin et al., 2007). Arguably, much of the success of the Pilot can be attributed to the Community Development Officer first engaging with leaders of the four target communities: a) to ensure acceptance, interest and commitment to the process, and b) to use their context-specific knowledge and resources to ensure that the activities that were organised were appropriate for the residents in each community. The Pilot also accommodated that, within a given community, people are at different stages of preparing (e.g., some not yet started, others at advanced levels) and helped people and groups to progressively identify individual resource and information needs and facilitate progressive preparedness.

Additionally, engaging with existing community groups provides an efficient and effective way for facilitators to obtain information about a community and their current level of bushfire risk awareness, preparedness, and motivation to mitigate negative hazard consequences (Martin et al., 2007). Increasing community involvement and the opportunity to engage in discussion of bushfire issues with other community members facilitate the kind of networking and resource sharing that is required to promote the development of sustained beliefs in the importance of preparing (Jakes et al., 2007; Paton, Johnston, Smith, & Millar, 2001; Paton & Wright, 2008). This ensures that the information provided is consistent with people's needs and thus increases the likelihood of the sustained adoption of preparedness behaviour (Paton, 2007). The use of community engagement principles also increases trust in and the maintenance of good community-agency relationships (e.g., Ferntree-TFS). The development of the Bushfire Ready Neighbourhoods, and the appointment of the Community Engagement Officer to facilitate and guide groups through the Household Bushfire Survival Plan, is an example of how this Pilot has used hazard research findings to ensure evidence-based practice.

In December, 2010, funding was received by the Tasmanian Fire Service from the Australian Government's Natural Disaster Resilience Program to extend the Pilot for an additional two years. The extension of the Pilot will enable consolidation of the community development work already undertaken and continue to trial a range of evidence and practice-based strategies that build community connectedness and resilience, including developing the capacity of volunteer brigades to engage in community consultation and development. The benefits accruing from the Pilot, which range from more cost-effective use of agency resources to increasing the likelihood of sustained bushfire preparedness, provide a cogent argument for continuing and expanding bushfire risk communication programs based on community engagement and empowerment principles.

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# Preparing for a 'Code Red' day

Ros Handley presents a case study describing Macedon Shire Council's preparations for a 'Code Red' day.

## ABSTRACT

**The introduction of Fire Danger Ratings in Australia following the devastating bushfires in Victoria on 7 February 2009 – known as Black Saturday, prompted Macedon Ranges Shire Council, in central Victoria, to consider the implications of a 'Code Red' day and prepare its community accordingly.**

Fire Danger Ratings were introduced for the 2009/10 summer, together with messages to accompany each level of fire danger. The highest level was Code Red and the corresponding message was that those living in a bushfire-prone area should leave the night before or early in the morning.

The declaration of a 'Code Red' day would particularly affect anyone living, working or travelling in the Macedon, Mt Macedon and Woodend areas - three of the 52 townships that had been identified by the Victorian government as representing the highest fire-risk areas in the state.

The three townships are heavily-treed, picturesque environments, surrounded by rural land and forests. They are located in the centre of the Macedon Ranges Shire, alongside the Calder Freeway and the rail line, which is the corridor for travel between Melbourne and Mildura.

If a Code Red day occurred on a weekend, it was expected that many more residents would be in the area than on a weekday when many commute to work outside of the shire. Being within an hours' drive of Melbourne and Bendigo, the area is also a popular spot for visitors and for those travelling to or from other parts of the state.

On a weekday, the situation was likely to be quite different, with many adult residents out of the area and others travelling to or through the area for work or school.

The Victorian government had declared that a significant number of schools and early childhood services in the Macedon Ranges would close on Code

Red days. This was such a new concept that it was hard to know how many local children and teenagers were likely to be at home on such a day – with or without an adult, how many would stay with friends or relatives for the day, and how many of those friends and relatives would be local or outside of the high risk areas. It highlighted the need for parents to have a plan for their family specifically for Code Red days.

## Council's approach to Code Red days

All too aware of the risk and potential impact of bushfires in this area, Macedon Ranges Shire Council made the decision in November 2009 that it would not operate any services or open any facilities in Macedon, Mt Macedon and Woodend from 12 midnight to 12 midnight (24 hours) on Code Red days.

This included services operated in council-owned buildings or facilities by the council, committees of management or other parties, e.g. the neighbourhood house, the library and community centre, as well as recreation reserves and sports facilities, including the Woodend swimming pool and Hanging Rock Reserve.

Other services that would not operate in the three towns included home care, maternal and child health, preschools, immunisation sessions, school crossing supervision, and the Woodend Visitor Information Centre.

Similarly, there would be no outdoor works conducted by council staff in and around those towns on Code Red days.

## Issues to consider

Such a move was unprecedented. The decision to close services and facilities on a Code Red day required the council to develop business continuity plans.

It had to consider how many staff – many of whom lived locally, were likely to implement their own household plan and therefore would be unavailable to work on a Code Red day. Some of these staff worked in the council's Kyneton or Gisborne offices, thus affecting the council's operations in locations outside of the three designated high-risk areas.

It required the council to consider how it would redeploy those who normally worked in Woodend, Macedon or Mt Macedon or usually travelled through these areas, and did intend to work on a Code Red day.

Importantly, it also required the council to consider how it would maintain its emergency response, recovery and other essential services.

As difficult as the anticipated logistics appeared, this decision demonstrated just how seriously the risk and potential consequences of bushfire were taken.

## Communicating the Code Red day arrangements

In tandem with the decision not to operate services or facilities in the three high-risk towns on Code Red days, was the development of a communication plan.

The aim of the communication plan was to create community awareness of the council's service arrangements on Code Red days, thereby encouraging those who lived, worked or conducted any form of activity in the area to also have a plan for these days.

Target audiences included:

- residents throughout the Macedon Ranges Shire, including those who utilised council services such as home care, maternal and child health services, preschools and immunisation, and facilities such as swimming pools, leisure centres and libraries;
- lessees and users of council facilities – including users of the Kyneton Saleyards and Kyneton Airfield;
- committees of management;
- businesses and contractors operating in the shire, particularly in the three townships designated high-risk;
- agencies, such as local community health centres and aged care providers;
- volunteers, such as those who deliver meals and assist in the operation of council's visitor information centres;
- relevant government departments, neighbouring municipalities and emergency services.

Communication methods included:

- letters to specific groups/service users;
- council's website;
- newspaper advertisements;
- fliers;
- signs/posters;
- media releases/briefings;
- email to ABC Radio (Bendigo and Melbourne);
- community-based newsletters;
- internal newsletters/email/intranet.

Council staff also met face-to-face with clients and other local service providers to encourage them to develop and implement their own fire plans.

These meetings were held with the following types of organisations:

- clients of the council's home care services, including meals-on-wheels clients;
- families with young children;
- schools;
- aged care providers;
- health and welfare agencies;
- tourism and business operators.

There were two stages identified for the council's communications:

- **Stage 1** (at the commencement of the fire season):  
*Key message:* These are the council's plans on a CODE RED day and this is how our services will be affected. Be sure to make your own plan.
- **Stage 2** (when a Code Red day is advised by Bureau of Meteorology) *Key message:* Reminder – These are our plans for (date), which is expected to be a CODE RED day. Do you have a plan?

## Conclusion

Representing just one component of the Macedon Ranges Shire Council's emergency planning, preparations for Code Red days and the development of related operational and communication plans, addressed an entirely new concept for the Council.

The three towns designated 'high-risk' following Black Saturday are not the only areas at risk of bushfire in the Macedon Ranges Shire. Communities to the north of the shire and neighbouring areas experienced bushfire on Black Saturday that burned close to 10,000 hectares and destroyed homes, property and livestock.

Bushfires also occurred in the 2008/09 summer without the conditions that would now be categorised as a Code Red day. Two bushfires had occurred in the west of the Macedon Ranges Shire and adjoining areas just two to three weeks before Black Saturday, highlighting the need for plans that enable an effective response to bushfire occurring in any location and in weather conditions that may not be considered Code Red.

## About the author

At the time of writing, **Ros Handley** was the Communications Officer for Macedon Ranges Shire Council, Victoria, and developed the council's Code Red day communication plan. For several years, she has worked with the council's Emergency Management Staff and representatives of CFA region 14 to communicate bushfire preparedness messages to local communities. Ros is now Project Coordinator – Fire and Emergency Management at the Municipal Association of Victoria (MAV) and can be contacted at rhandley@mav.asn.au.

# After the bushfires: Surviving and volunteering

Ruth Webber and Kate Jones analyse the affect of participation in Victorian bushfire recovery programs on volunteers.

## ABSTRACT

**This article analyses the negative and positive implications for bushfire survivors becoming involved in a range of voluntary activities in the bushfire recovery programs following the 2009 Victorian bushfires. It uses data acquired as part of a study of recovery programs being run by Catholic social welfare agencies in several regions of Victoria. Some volunteers were involved in activities organised by organisations, others volunteered on an informal and ad hoc basis. Volunteering, while having enormous benefits to the volunteer, the recipient and the community, also came at a cost. Many volunteers worked long hours and for many months with the result that there were many instances of burnout and emotional exhaustion. Sustained volunteering involving intensive commitments of time resulted in role conflict between the demands of their family and the demands of volunteering. Volunteers found it difficult to reduce the amount of time spent on their volunteer activity, especially those on recovery committees. They also had difficulty handing over leadership roles to others. As volunteers became exhausted, their ability to make clear judgments was impeded and conflicts sometimes arose.**

## Introduction

In January and February 2009 Victoria experienced the worst bushfires in its history, resulting in the deaths of 173 people, mostly as a result of the Kilmore East-Murrindindi fires in the semi-rural areas north of Melbourne. Most occurred on what came to be known as Black Saturday, 7 February 2009. There have been several studies of the emotional and psychological needs of survivors (Bateman, 2010; Giljohann et al 2010).

The Victorian Bushfire Royal Commission report stated that the fires 'resulted in one of the largest recovery efforts seen in Australia' (VBRC 2010, p. 322). Previous studies have shown that after a natural disaster, there is a need for ad hoc volunteers to work in voluntary activities in the aftermath (Villagran, et al. 2006). Volunteers usually come from outside the affected community, but some come from within. This article discusses the consequences for bushfire survivors who became involved in voluntary activities as part of the community recovery process.

Kenny, McNevin and Hogan (2008) have distinguished between voluntary activity and formal volunteering. They defined voluntary activity as '*an activity that: is of benefit to the community; is undertaken without coercion; and is without voluntary reward*' (p. 46). Formal volunteering was defined as one possible type of voluntary activity which shares all the characteristics of voluntary activity but is distinguished by an organised context and designated volunteer positions. Voluntary activity and formal volunteering are both undertaken in the aftermath of natural disasters.

A study on capacity building after the Canberra 2003 fires found that enabling the development of social networks fosters a sense of control over people's lives and helps to develop resilient communities (Winkworth et al., 2009). Bonding between volunteers resulting in long-term friendship has been found to occur after a natural disaster (Allen, 2007). However, volunteering can also have negative consequences. A great deal of attention has been directed to examining stress and burnout (physical, mental and emotional exhaustion) among volunteers after natural disasters (Campbell et al., 2009; Maslach & Leiter, 2006; Pooley, Cohen & O'Connor, 2010). Other researchers have also found less positive outcomes stating that being exposed to the suffering of trauma victims can induce a secondary traumatic stress response in helpers (Simons, Gaher, Jacobs, Meyer & Johnson-Jimenez, 2005). Volunteering involves an intensive commitment of time particularly after a natural disaster, which makes volunteers vulnerable to stress and burnout. Even in non-disaster situations volunteers have been found to experience burnout which consists of emotional exhaustion, depersonalization and reduced personal accomplishments (Byron, Curtis & Lockwood, 2001). It has been reported that volunteers with a high level of commitment to volunteer activities are likely to

experience role conflict between the demands of their family and the demands of volunteering which may add to the risk of burnout (Kulik, 2006).

## Method

The researchers were commissioned by Centacare Catholic Family Services Victoria to conduct research over a three-year period (2010-2012) on the Catholic Bushfire Community Recovery Response, an initiative funded by a bushfire appeal established by the Catholic Archdiocese of Melbourne. The aim was to a) document and analyse the effectiveness of the strategies used by organisations to respond to the bushfire crisis in the relevant bushfire affected communities, and to identify the gaps in those strategies, and b) develop principles and guidelines that will enable Catholic dioceses to prepare for future natural disasters. The services and programs that comprised the Catholic Bushfire Community Recovery Response were directed to communities affected by the Kilmore East and Murrindindi Fires which burnt through bushland and small towns north of Melbourne, the Delburn, Churchill and Bunyip Fires in Gippsland, the Long Gully Fire in suburban Bendigo and the Redesdale Fire, 35 kilometres south-east of Bendigo.

## Participants

Purposive criterion and snowball sampling was used to obtain participants for this study. This enabled the researchers to maximise discovery of heterogeneous patterns that occurred and to identify common themes. The criterion was that participants would work for agencies or government organisations that were involved in the recovery or planning for recovery after the Victoria bushfires. It was intended that various levels of workers would be included i.e. policy advisors, senior managers, middle managers and workers on the ground. The selection process was also opportunistic in that the researchers made use of new leads to obtain new interviewees in organisations which were involved in community recovery.

It was intended that each participant would be interviewed up to 3 times over a three-year period. To-date the researchers have interviewed 35 people (15 males and 20 females), and conducted 31 interviews in the first round and 17 in the second round. The participants were selected from a range of sectors, including Catholic welfare agencies (19), local and state government (8), international recovery agencies (2), and others, i.e.; parish, school, clergy, church, medical (6). Some of the earliest interviewees raised the issue of survivors as volunteers. As a result this issue was pursued in subsequent interviews. In some instances the people interviewed about their role in community recovery were also volunteers in their own community. Although they were not targeted because they were volunteers, they provided additional insights.

In addition the research team attended meetings of the project steering committee and met with key people in

the organisations for consultation, feedback and advice about the direction of the research. Interviews were progressively transcribed and analysed by the research team.

## Data collection and analysis

Data were collected by the interdisciplinary research team through face-to-face and telephone interviews and analysed. In keeping with the theory-generating approach, early interviews were open and exploratory, evolving over time to facilitate axial and selective coding. For example, initial interviews with staff were replete with references to volunteers and the issues of effective utilisation of volunteers as well as volunteer burnout. Moving from open coding to axial coding, interview questions were adapted to explore staff perceptions of specific volunteer experiences. Responses to these interview questions led to descriptions of types of volunteers, issues of conflicting obligations and difficulties of withdrawing from volunteering. Selective coding led to identification of issues associated with burnout and the value to the volunteer and the community of survivors as volunteers.

The large number of people who volunteered after the fires included both external and internal volunteers. Internal volunteers were local people who lived in fire affected areas. External volunteers were people from all walks of life, but not directly affected by the bushfires. This paper reports only on the experiences of internal volunteers. The type of volunteer activity in which bushfire survivors were engaged covered a wide range of activities, from unstructured and spontaneous offerings of help to neighbours, to participation in the community recovery committees established by local government. Volunteers later became involved in other types of community recovery efforts such as planting gardens, chopping wood and making jam.

## Results

### Informal volunteering

Immediately after the fires, many people from the local community were involved in the recovery process. Often the help provided was informal and there was no formal organisation overseeing these activities. In different communities locals gathered together for support and provided such things as food, drinking water, animal feed, emotional support as well as talking together about their experience. They were also involved in tasks such as shooting injured stock, clearing fallen trees, connecting generators and building fences.

*It was the local ones, ones that were locally based, that the staff and volunteers ... it was communities that were hit so communities were trying to look after each other, grieve together, celebrate together, go through an amazing time, life and death, everything happened in a couple of days. (#1)*

Some activities that were somewhat ad hoc in the early days after the fires, were formalised over time. An example of how a volunteering exercise could move from the informal to the formal among residents is 'Blaze Aid', an initiative to build fences for farmers who had lost them (Wilson, 2009).

### Formal volunteering

Three types of formal volunteering can be identified. The first type of formal volunteering involved locals working for an existing organisation that provided welfare and material aid. For some volunteers working for these organisations, it was a continuation of volunteer work for which they had been engaged prior to the fires. For example, in several fire affected areas the St Vincent de Paul Society supplied material aid to those who had lost property. In other situations existing organisations extended their roles and added new ones as occurred with Centacare Catholic Family Services. Churches already had strong links into the community including visiting and welfare programs, so they extended and adapted them as described by a local government participant: *'I mean, the churches have come on board more since, and have been around, and I know in some of our communities there's people around visiting' (#3)*. Members of these groups focussed their attention on individuals and families in need, often on a one-to-one practical level.

A second type of formal volunteering involved community committees that were for the most part in existence prior to the fires but whose role focussed more on community and social activities – social and sporting events, theatre, the arts. While these community organisations and committees were in existence prior to fires, they often grew in numbers and started to provide a greater range of social events for the community after the fires.

*There was little groups of people before from what I gather, ... they were running meals on a Friday night down at the cricket club and at first they limited it to 60 and there'd be so many coming and someone marked it as a hundred there and every Friday night it is booked out, you've got to put your name down weeks ahead if you want to come. (#9)*

A third type of formal volunteering was as part of committees and groups that were formed after the bushfires and were focussed on communicating and documenting the recovery process and developing strategies to prepare for the future. One of the responsibilities of local government is to establish community recovery committees (Office of the Emergency Services Commissioner, 2001). The make-up of the membership of committees varies both between and within different municipalities but should include the Municipal Recovery Manager, community development workers, councillors, community groups, affected persons, government agencies and non-government agencies as well as volunteers. Local government members played an active role in involving

local people to join these committees or finding ways to assist in developing community emergency plans.

*They are looking at developing their own community emergency plans which is good because we want to leave them feeling a little safe and secure and more confident about the future so that is part of the deal. Also we want them to think about how they could help others and how their experience can be utilized in a positive way. (#10)*

In each region there were other formal structures that coordinated welfare and relief efforts after the fires. For example, the Country Fire Authority; the State Emergency Service and the RSPCA<sup>1</sup> had volunteers from the local community doing a variety of tasks in addition to those normally associated with these organisations (VBRC, 2010).

### Positive outcomes of volunteering

There were many positive outcomes that emerged from both formal and informal volunteering. Volunteers, recipients of the volunteer efforts and the local community all benefitted. For many volunteers there were therapeutic outcomes accompanied by an increased capacity to cope and move forward with a degree of optimism. As one local government worker said in respect to community volunteers: *'It's been a lot of fun, we've had some fun things happen and some laughs. ... There have been just some amazing efforts from people'. (#3)*

Volunteers came together with others in solidarity, to bond with them and to reflect on their bushfire experiences. So while individuals benefited from the work done, the whole community also benefited. The committees and organisations played a significant role in assisting people to strengthen their networks and to talk among themselves.

*That's been great for the community because they've met one another and talked about what they've done and how they feel and particularly for the men cause they'll stand and have a beer and talk about it. (#9)*

A further advantage to the community was that new leaders emerged with new ideas and renewed vigour for new community development projects.

*So some community leaders, some existing and some new leaders emerged, they put up their hand, they made, they rang and starting getting referrals and resources and getting donations and taking donations and more and more whether it was needed or not, and there's all those sorts of issues too, where they became a place for the gifting, the focus, sometimes for themselves and others for the community. (#3)*

There were many comments made about how volunteers were developing leadership qualities which would be useful in the community for years to come. A local government official told us about a member of the

<sup>1</sup> Royal Society for the Prevention of Cruelty to Animals

community recovery committee who had developed new skills and confidence as a result of volunteering.

*I was just talking to a fellow about they've identified that they want to have a water storage tank in a certain area, how to get it done, ... I suppose as a result he is leading up a project to install these tanks and he's looked into all the bits and pieces and got quotes and is enjoying himself. He's a busy person, young bloke and I can see he is going to be such a great local community leader into the future and one day hopefully he will run for council and be a councillor because his levels of civic participation have gone up so much and he's a credible, decent young fellow and it is great to be involved in that personal development side of things. (#10)*

The analysis revealed that volunteer efforts by community members had the effect of linking them back into the community and establishing closer links with their neighbours or those who live in their community. Participants noted that this was beneficial to three groups; the community, the volunteers and those receiving assistance.

*I think that has a dual response and a lot of people, their notion of gift and gifting has changed, has come to the fore a bit. So I feel if they provide an opportunity for other community members to become reconnected or connected for the first time with some of those organisations, that might then develop a longer term relationship from that experience because it becomes an important part of their life at that time; that relationship might link in, and might provide a response to a need then or some time in the future. So I would see that as something that might expand. I think the*

*communities have changed, I think there is still a much stronger sense of community and valuing of neighbours and the importance of life and what is important even though people are trying to establish their new normal and getting on with things, there's a lot more tolerance and understanding from the way people talk. (#3)*

### Negative consequences

While the positives outcomes of volunteering were extensive there were also some negative consequences of local people becoming involved in volunteering. Volunteering, while having enormous benefits to the community came at cost. Some formal volunteer experiences resulted in heightened conflict and tension between those involved. This seemed to occur more frequently in recovery committees and in local recreational and community organisations rather than welfare agencies. Most community organisations appeared to work well with members cooperating. 'We tend to make collective decisions at public meetings. We're not very factionalised here so I guess we've avoided some of the things that we've heard have been going on in other areas' (#10). However, there were a number of instances where considerable friction between members of committees emerged: 'There's a lot of conflict going on in the three committees' (#2).

The source of the conflict was multifaceted and in some instances was already present prior to the fires; in others it was created by competing needs or by leadership tensions. In some cases a pre-existing voluntary community organisation was quite small and had members who had been actively involved for some time. After the fires local people became more active in



Emergency response volunteers.

the community and joined these organisations, sometimes taking on roles previously held by long-standing members as well as suggesting significant changes to the way the organisation was structured. This created tension between the old members and new members. Some interviewees also reported on cleavages and disagreements amongst community members about how the recovery process should take place and what the community needed. *'In some recovery community meetings you have people yelling at each other, people crying, tension' (#8)*. Factions formed and caused unpleasantness between community members who previous had been amicable.

*No one deals with the conflicts within the group that need to be dealt with in terms of different points of view, and they are at loggerheads with one another. Some community recovery committees are imploding because they wanted to kill each other, almost fisticuffs in one meeting. (#9)*

To put this in perspective, one participant observed that all communities have their tensions and that emergency situations do not cause them but they may escalate as a result of the trauma: *'Look I think there was tension in the town before the bushfire, I think it is one of those towns. Lots of towns, communities are like that, no community is perfectly, finely balanced.'* (#6)

Over commitment impacted on the volunteers' health and put strain on the family. Many volunteers put large amounts of physical and emotional energy into these volunteer activities at a time when there were numerous other demands on their physical and emotional resources. This resulted in them being worn out and in some cases doubly traumatised as they listened to others' stories of loss and grief. This was variously described by the workers as 'burnout', 'vicarious trauma' and 'exhaustion'.

*I think the volunteers that were doing it day in and day out, definitely in my viewpoint have got vicarious trauma so you have to think about that as well. (#8)*

*The ones who have given a lot to recovery are exhausted and the ones who have given a lot to the community and they are needing now to give it to themselves (#2)*

Another negative outcome of volunteers working long hours in their community was that the time they spend on these activities took them from their own farms, properties, jobs, businesses and families, all of which had also been affected by the fires.

*There's people out there working 80 hours a week on volunteer services for the bushfire for their community and are still trying to run their B&B or have their business to run and have to put food on the table so you are seeing that switch now between "I've given my heart and soul to this recovery process for 14 to 15 months now, yet I come back to my block and look out the back and my property is a mess" and*

*"my relationships are a mess" so I think in terms of resilience it depends on who you talk to. (#2)*

Some volunteers recognised the personal cost it was having and reduced the time they were putting into these activities; others found it harder to withdraw or to pull back.

*Since then I think a lot of people, in terms of the people involved in the community recovery committees or relief centres or things like that, you can sense a lot of burn out and a lot of people are starting to shift away from spending so much time in the groups. (#2)*

Some volunteers who were still involved 12-18 months after the fires appeared to be burnt-out and over-committed, and to lose some of their edge and the ability to make sound decisions. It was noted that people who had been working as volunteers in various capacities over a long period of time sometimes did not make the best decisions, and this had a flow-on effect on the recovery programs that had been put in place.

*One of the things we've noticed now is that the people who have sat on these committees and been very hard workers in these groups, they have become tired, it also affects their decision making process so sometimes the common sense doesn't prevail due to their tiredness and I suppose it is no different to a footballer when they are towards the end of the game and their skill level tends to drop, likewise it happens with individuals where, as strong and healthy as they can be, it does take its toll on the individuals and common sense doesn't always prevail. (#7)*

### Handing over - withdrawing

There did not seem to be any easy way for people who had been spending large amounts of time and effort on volunteering to ease back or to hand over to new comers. Further, it was claimed by several participants that people's health or wellbeing was being affected by the demands upon them. Often volunteers did not recognise the toll it was taking on their own wellbeing, and one worker claimed that they did not take kindly to suggestions that they should pull back on their volunteer efforts. One manager noted that the only solution was to wait until they came to their own realisation and then help them to find ways to withdraw that maintain the service but do not detract from their achievement.

*They want to contribute, want to help, got things they can give but then they go into this adrenalin driven position where everyone around them is concerned that they are working so hard and about to fall over and the reality is that you can't stop someone in their tracks and take away the power you've given them, no one is going to give it up until they fall over and the best you can do is sit on the side and go: "We'll wait till you fall, pick you up along the way and fluff you up" and hopefully they'll be able to be restored. (#5)*

## Discussion

Having processes for handing over or taking turns in leadership roles seemed to be a critical factor in minimizing conflict and avoiding burnout. The researchers asked the participants who raised the issue of burnout and over-commitment if they saw a solution to these problems. One participant suggested that in future natural disasters, those involved in setting recovery and community committees might have in their guidelines a rotating membership and responsibilities and to avoid having the same people on several committees. However, it was noted that getting people to recognise their own limitations would not be easy.

*I don't think there is a real solution but there are things you can do along the way that will benefit people and one of those things is suggesting that you have an interchange bench on the committee, where you have a person who steps out and someone who hasn't been on the committee that they step in and have their fresh minds and thoughts. They can do that, give the people time off who are in the committee or group and try not to get them to double up so they are not acting in committees that have got similar roles because it just wears them out and becomes a mundane operation for them where they've already presented their case to one meeting, then they go to the next and present the same case again and they become oblivious to the importance of that so not to spread themselves too wide or thin and to try and target more individuals to be active in those groups. (#7)*

The internal volunteers, people who had experienced the bushfires themselves and then went on to become involved in the recovery as volunteers as well as participants and clients, share some of the qualities and experiences of all volunteers. However they are also in a special category because they of their dual role as both helpers and helped. This is an area which would repay further research.

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# A walk along the boulevard of expression

A reflection of a Social Worker working with bushfire affected families.

## ABSTRACT

**There are many stories from the 2009 Victorian bushfires. There are stories of heroes and survival, and stories of devastation and indescribable horror. And there are stories from the people who came in after the fires had passed: the emergency workers, the relief and recovery workers, the counsellors and the case managers. This reflective paper is one story from a social worker working with a family affected by the bushfire, illustrating the nature of bushfire case management, the relationships that develop and the impact that it can have on both the client and the worker.**

February 7, 2009 was a hot, windy day. The newspaper headlines warned that it would be a nasty day and as a Social Worker, I was hoping that they had got it wrong. The forecasters predicted extreme fire behaviour and unstoppable fires and as the day quickly heated up and the menacing wind gathered momentum, there was an unsettling, ominous feeling in the air. By mid-afternoon, fire-fighters were stretched across Victoria and our sense of safety on a hot summer's day changed forever.

In the aftermath there were stories of heroes and survival, and stories of devastation and indescribable horror. For the first time in this capacity local, state and Commonwealth governments worked together to set up a co-ordinated response for people who were affected by the bushfires. There are many stories – some are sad, some are inspiring, and in this paper, I would like to share one story with the readers of the Australian Journal of Emergency Management.

This is my story of my work with Linda (not her real name). I met Linda at the Whittlesea Recovery Centre on February 14, Valentine's Day. Linda, in her 50s, had her teenage autistic son living with her. They lived in Kinglake and left home early in the day, before the fires came. Linda was staying with her brother at his house in a nearby suburb and for the past week, she didn't know if her Kinglake home had been affected by the fires, or not. I couldn't imagine what this must be like

for her – not knowing if her house, pets and all of her treasured possessions were still there.

I was Linda's Victorian Bushfire Case Manager. Linda told me how she didn't like Social Workers and she wasn't sure if she was going to like me. She based this on social workers that she had met in the past. I wondered how to approach Linda and how to build her confidence. I wanted to make sure I didn't become another faceless Social Worker that let her down, but how could I be sure that she didn't get let down by the confusion that was around us?

My first visit to Kinglake was a poignant time for me. I had to sign in to go through the road block and I felt like an intruder – what right did I have to be here? I was stunned by the blackness and the obvious devastation – the miles and miles of burnt trees, the burnt cars abandoned on the side of the road, and the charred remains of homes. I was amazed by the silence – there were no sounds of birds, rustling leaves or anything. The quiet was disconcerting and uncomfortable. I felt like an outsider, a stranger who had entered a different world, where people were exposed and vulnerable, and feelings of sadness and anguish permeated the air.

It was two weeks before Linda could go home. She had heard from a neighbour that her house was still there, but there was some damage. Linda moved home as soon as the road block was opened and she was determined to live in her home, amidst the blackness and the destruction. She was worried about looters, and she wanted her son to be in a familiar environment. But there was nothing familiar about their Kinglake home. The house had received minor damage, the sheds were gone and there was a huge burnt tree that had fallen along the driveway. The power was on, but she didn't have any water as her rainwater tank had cracked in the fire and all the water had leaked away.

Linda drove into the township of Kinglake every day and filled up orange juice bottles with water that she and her son used to flush the toilet, to bathe and for drinking and she did this for six weeks. The repair of the concrete rainwater tank was a challenge as there weren't any concrete tank repairers in the area and we started telephoning people from adjacent areas. I recall one conversation with a concrete installer from interstate, who said that he could come and repair the tank, but he couldn't find any accommodation and so he

was sleeping in his truck. Linda offered to accommodate him at her house, which I was concerned about, and I made arrangements to find him a bed in a nearby motel. I think this was my anxiety about wanting to ensure that Linda was safe and not exploited, rather than Linda being concerned. I wondered if this was the right way to handle myself in this situation – should my decisions be based on my concerns and anxieties, or should they be informed by what my client wanted and needed?

There were eight people that died in Linda's street. For weeks, she had police and the army come to the door and ask if they could search through the rubble in her backyard and see if there was anyone dead there - it seemed a neighbour was missing. I was there one day when the forensic police turned up and we sat together at her table, quietly drinking tea. We watched them through the window as they lifted sheets of iron and took away unknown objects in brown paper bags. I wondered what Linda was thinking and feeling. What were they looking for and what would they find? Was there anything personal or private hidden amongst the rubble that Linda didn't want to be discovered? What exactly were they taking away anyway? And if it was Linda's would she ever get it back? Should I do more to protect Linda and myself – should we not watch this? I wondered how I would feel if this was my kitchen, my window and my backyard. How would I feel watching strangers comb through my personal belongings and inspect or take away bits and pieces? What if they find something awful – would I be able to live here any more? Thankfully, it turned out that the missing neighbour was found safe and well, but that experience has vividly stayed with me.

The insurance company was quick to assist and an assessor had been to Linda's house before she was allowed through the roadblock. They were keen to settle Linda's claim and I was there one day when they telephoned and offered her a lump sum payment of over \$50,000. The insurance adviser explained that this was the best offer that she was going to get and allowed only fifteen minutes to decide whether to accept it, or it would be withdrawn. I advocated on Linda's behalf and we negotiated some extra time by requesting the offer in writing and Linda was able to have some time to think about it and consider her options. Money was tight, and Linda normally lived week to week, so this was a lot of money in anyone's language. I was worried about how Linda would spend the money – would she make sure that she replaced the sheds and fixed the rainwater tank first? No-one has ever given me that much money before and I wondered how I would feel in this situation. How do you know if it is the right decision? Accepting the insurance money also meant the end of a chapter and the start of something new – the money would provide the financial means to start the cleanup and rebuilding of her home.

I visited Linda at home most weeks for six months and we developed a strong connection. There were funerals - lots of funerals. In one week, Linda went to three funerals. Linda talked about feelings of sadness and guilt. She was sad that her small, rural community would never be the same and she worried that she will not feel safe in the summer again. She felt guilty that she still

had so much – that somehow her house had survived, and people who stayed to fight had lost their home, their loved ones and sometimes their life.

Over this time I spent with Linda I noticed many changes. The countryside changed as the charred remains of buildings were removed and the burnt out cars disappeared. The road was repaired, new white lines were painted and shiny new road signs appeared. Much sooner than I expected, nature started to show signs of regeneration - the ferns unfurled dazzling green fronds and the blackness of the trees was covered up by brilliant red and green shoots. The birds returned and I felt buoyant to hear the chirps and chortles in the wind. As the weather cooled, the smell of wood smoke from combustion heaters permeated the air and many hearts, including mine, beat a little faster when we first noticed the acrid, burning scent in the wind.

Time passed quickly and soon it was time for me to say goodbye to Linda. We had been talking about this for several weeks and Linda was confident that she would be fine by herself. I wondered how I would be. Linda told me that she felt like she was back in control of her life, and she was going to finish her studies at TAFE because she wanted to give something back to her community. On my last visit she baked biscuits and she gave me a beautiful card to thank me for sharing this time with her. There were lots of tears at this last visit, and many of them were mine.

Now, more than two years have passed since those devastating fires, and many more things have changed. We have made it through the Australian summer without a repeat of those horrific fires, and we have faced new challenges with flooding affecting large parts of the country. For the bushfire affected families, many have moved into their new homes, and some have moved to start afresh somewhere new. Many are still not sure what to do next. For me, I've reflected on this experience and I appreciate how much of a privilege it was to walk along with these people, through a part of this devastating time in their life. It was a rewarding and inspiring experience that has changed me in ways that I am only beginning to understand. As I continue my research into the experiences of social workers working with bushfire affected families, I recognise the value of reflecting on these experiences as a boulevard for expression and I am committed to making sure that there are more stories told.

### About the author

**Helen Hickson** is a Social Worker and Lecturer at La Trobe University and she worked for seven months as a Bushfire Case Manager, supporting bushfire affected families in Kinglake, Flowerdale, Redesdale and Bendigo. Helen was awarded a research grant by the Australian Association of Social Workers (AASW) to explore social workers' experiences of working with bushfire affected families. This is a reflection of Helen's experience working as a Bushfire Case Manager.

# “Deep Survival”: Experiences of some who lived when they might have died in the 7 February 2009 bushfires.

Jim McLennan, Mary Omodei, Glenn Elliott, & Alina Holgate examine how and why some people survived extreme conditions during the Black Saturday Victorian bushfires.

## ABSTRACT

As a result of the 7 February 2009 ('Black Saturday') bushfires, 173 Victorians perished in Australia's worst bushfire disaster to date. In the aftermath, attention has been focused largely on these fatalities. We argue that important lessons can also be learned from the experiences of those who did not perish, but lived despite being on the margin of survivability during the extreme conditions. Transcripts of 301 interviews with survivors, conducted by members of the Bushfire CRC Taskforce for the 2009 Victorian Bushfires Royal Commission, were re-examined. It was judged that 33 of those interviewed survived conditions so adverse that they might well have died. It was concluded, tentatively, that the major contributor to "deep survival" by the majority of these interviewees was that they were able to maintain their mental focus on acting in such a way as to maximize their chances of surviving the extreme environment. Analysis of the interview transcripts suggests that in spite of physical distress and the pressing danger of their situation, they: (a) retained control over fear; and (b) maintained their attentional focus on the major threats to life and the implications of these threats for actions.

## Introduction

Historically, Australian communities have proved vulnerable to four kinds of natural disasters: tropical cyclones, severe storms, floods, and bushfires. Of these, bushfires have accounted for the most fatalities (Ellis, Kanowski, & Whelan, 2004). From 1900 to 2008, bushfires caused 552 recorded civilian deaths (Haynes, Tibbits, Coates, Ganewatta, Handmer, & McAneney, 2008).

On 7 February 2009, 'Black Saturday', several large fires broke out across Victoria. Weather conditions on

the day were extreme, with temperatures above 45 degrees Celsius, very low relative humidities (<10%), and very strong winds (>100 kph in many locations). These conditions followed an extended period of high temperatures, and a decade of drought.

A total of 173 people died as a result of the fires, and more than 2,000 homes were destroyed. Three fires were especially destructive (2009 Victorian Bushfires Royal Commission, 2009): the Kilmore East Fire (119 fatalities), the Murrindindi Fire (40 fatalities), and the Churchill Fire (11 fatalities). In their review of fatalities from the February 7 2009 bushfires for the Victorian Bushfires Royal Commission, Handmer, O'Neil, and Killalea (2010) concluded that:

*...30% of fatalities showed some evidence of fire fighting defence in the lead up to their deaths (5% active defence, 25% some or questionable defence)... There is also evidence...that many of the fatalities were 'waiting and seeing' before deciding what to do. From the evidence, it appears that at least 26% of fatalities fall into this category, waiting for a trigger – although it is rarely clear what this trigger might be – before making a decision and taking action. This delay meant that their options became very limited....A majority of fatalities were sheltering and not undertaking defensive action at the time of, and possibly in the lead up to, their deaths. There is evidence that 69% of fatalities were sheltering. Shelter was sought in a variety of locations.*

*... There was considerable evidence of sheltering in bathrooms as that was the location of 27% of fatalities...In some cases, this was a last minute decision as the fire encroached, but in others it appeared to form part of their intentions and in a few cases, of a fire plan. (pp. 23, 25)*

The analysis reported by Handmer et al. (2010) sheds light on the circumstances of fatalities. However, we propose that in order to form a comprehensive understanding of bushfire survival-related decision making and actions (including those of the aforementioned fatalities), it is also necessary to examine the circumstances in which many people survived despite exposure to potentially lethal environments.

There is rich anecdotal material on surviving disasters—both natural and man-made—including a popular 2006 BBC Discovery Channel TV series, *Surviving Disaster*, which featured interviews with survivors of several late-20th century disasters. However, there is little by way of systematic investigation, with the exception of Leach's (1994) *Survival Psychology*. Gonzales' (2004) book *Deep survival: Who lives, who dies, and why* presents numerous accounts of survival, and endeavours to link the lessons from these with emerging knowledge about brain functioning, thinking and feeling. While he offers several lessons and principles for avoiding trouble in the first place (pp. 263-269), and surviving it when it comes (pp. 270-274), he gives central place to the role—both positive and negative—of **fear**, and its **control**. Similar themes are discussed in two other recent popular books about surviving extreme hazards: by Ripley (2008) and Wise (2009). Following the 'Black Saturday' fires, initial media reports of survivors' experiences resembled in many ways the accounts of survival described by Gonzales, Ripley, and Wise.

We decided to investigate systematically the reported experiences of a group of survivors of the 'Black Saturday' fires to see if we could identify specific aspects of their psychological processes and actions which contributed to surviving the potentially lethal environments generated by that extreme bushfire event. We were guided in our investigation by previous findings reported in the extensive stress and human performance research literature, including reviews by Kavanagh (2005), Leach (2004), and Staal (2004).

Immediately following 7 February 2009, the Bushfire Cooperative Research Centre commissioned a Task Force to investigate the fires. An important aspect of this was interviewing a cross-section of survivors. Overall, more than 600 interviews were conducted. Because of the damage to infrastructure and the large number of people who were displaced it was not possible to construct a random sample of residents to interview. Interviews were conducted at properties where people were present on those days in which Task Force teams were in the area. However, the total interview sample covered a range of locations, communities, property types, household compositions, fire intensities, and outcomes. The interviews were recorded digitally, and subsequently transcribed. A detailed description of procedures is in Whittaker, McLennan, Elliott, Gilbert, Handmer, Haynes and Cowlshaw (2009). A sample of 301 transcripts was selected by a Task Force analysis group, covering all the major fires on Black Saturday. These were analysed using the NVivo8 text analysis software program to investigate survivors' bushfire planning, preparation, intentions, warnings received, and actions, as a basis for a report to the Victorian Bushfires Royal Commission (Whittaker et al., 2009).

For the present study, the transcripts were re-examined, and a subset of 33 identified in which the interviewees had survived a potentially fatal situation. These transcripts were then re-analysed to investigate

interviewees' survival-related experiences, judgements, decisions, and actions. In the remainder of the paper, we summarise the analysis procedures, describe the findings, and discuss implications.

## Method

### Participants

Those whose transcripts were selected for re-analysis were 29 men (88%) and 4 women (12%). Their mean age was 46 years, and ages ranged from 34 to 68 years. Twenty three survived the Kilmore East Fire, six survived the Murrindindi Fire, and four survived the Churchill Fire. The participants included more men in comparison with the larger sample of 301 survivors (men, 67%; women 33%). This is probably because women were more likely to have left safely (often with children) before impact of the fire, while men were more likely to choose to stay and defend their property (see McLennan & Elliott, 2010). The average age of participants was considerably less than that of the larger sample of survivors (61 years) from which they selected.

### Materials and procedure

A Bushfire Threat Rating Scale was developed to assess the level of danger experienced by interviewees. The scale has eight levels: none (0); minimal (1); low (2); moderate (3); significant (4); serious (5); severe (6); extreme (7). Each level has a behavioural description: for example, severe = 'Interviewee (and companions) were not injured (or only minor) but: the house they were defending was damaged or destroyed and they had to shelter at some stage; or the vehicle in which they were escaping/sheltering sustained fire related damage or other impact damage'; extreme = 'Interviewee injured or otherwise seriously affected physically; or companion(s) in the incident perished or were injured or were otherwise seriously affected physically'. The scale has been found to generate reliable threat ratings, with an inter-rater reliability of  $r = .89$  (McLennan & Elliott, 2010).

The 301 transcripts used in the original analysis described in the Introduction were assessed using the Bushfire Threat Rating Scale and 33 were identified by two independent raters as involving either extreme, or severe threat. These transcripts were then re-analysed using the NVivo8 text management software to examine interviewees' survival-related experiences, with particular attention given to how interviewees managed their feelings as they responded to the unfolding threats.

A preliminary analysis of six randomly selected transcripts suggested that seven aspects of the interviewees' experiences were associated with their survival in a potentially lethal bushfire environment. These experience categories are described in Table 1. A coding guide was constructed, and all 33 transcripts were then assessed by two independent coders.

A coding system developed by McLennan and Elliott (2010) and used in their analysis of the impact of the Murrindindi Fire on residents of Marysville, Narbethong, Buxton, and environs was used by the coders to also assess interviewees' levels of preparation and alertness on the day. In the original interviews, survivors were asked to describe the nature of their preparation for either property defence or for safe early evacuation, and to describe the steps they took on the day to monitor possible threat from a bushfire. The coders used behavioural criteria to assign a rating (0-5) for level of preparation and for level of alertness. For example, preparation Level 4 = 'at least four substantial preparation actions, which must include both a power source and a water supply independent of mains'; alertness Level 4 = 'frequent regular monitoring and checking of at least two official information sources, and for visual signs of fire, plus active searching for current information such as use of the telephone or the internet'. The decision-wise agreement rate for all the nine coding categories across the 33 transcripts was high:  $286/297 = 96\%$ . Disagreements were resolved by joint re-examination of the transcripts in question, and discussion to reach agreement.

## Results and discussion

Nine (27%) of the interviewees survived extreme threats; the remaining 24 (73%) survived severe threats. Most (29, 88%) planned to defend their home, though the apparent strength of commitment to such a plan varied, with some (4, 12%) intending to 'wait and see' before committing definitely. Three (9%) planned to leave if threatened, but the speed of advance of the fire, coupled with the absence of warnings, meant that they found themselves unable to leave safely and were forced to defend their house as a means of protecting their lives. All but one interviewee said that the speed of advance of the fire, coupled with the absence of warnings, compromised last minute preparations to defend, or to leave. Thirty two (97%) made at least an initial attempt to defend their property: 22 (67%) were successful, 10 (30%) were unsuccessful and had to seek last resort shelter either on the site or elsewhere. Table 1 summarises interviewees' survival-related experiences.

The majority of the interviewees (22, 67%) were well prepared (Level 4); 5 (15%) were moderately well prepared (Level 3); and 6 (18%) had undertaken little or no preparation. Most (25, 76%) were very alert (Level 4) for danger on the day; 5 (15%) were reasonably alert (Level 3); and 3 (9%) evidenced a low level of alertness.

Table 1. Survival-related Experiences of the 33 Survivors.

Experience Category	Number & % reporting	Examples
Expectations negated	33; 100%	"A wall of darkness and hot embers at a thousand mile an hour came rushing at us"
Focus on personal survival	29; 88%	"I just put my head down and my arse up and started filling buckets"
Awareness of threat plus fear regulation	31; 94%	"I just felt that the situation I was in I had a good chance; even if I didn't save the place, that I'd still survive the fire"
Controlled attentional focus	31; 94%	"I had about 30 small fires happening and they were all happening at the same time, so I was sort of working-out which ones were the most important to put out, prioritise which fire was more important because they were getting bigger, getting harder to put out"
Actions knowledge-driven	30; 91%	"And I know what it takes, you have got to be very level-headed and you have got to be very conservative in your energy. You just keep going, don't run, don't do anything silly"
Actions systematic	27; 82%	"By this stage we've abandoned the kitchen, we're retreating to these two bedrooms. We had no idea what was (happening) in that room over there, and that door (there) we knew was our last escape, right."
Adapted actions to changed situation	31; 94%	"B_____ was sort of collapsed on the couch and saying 'I can't do anything'. And I said 'Yes you can, just stay here and tell me if you see or hear a window break or if you see smoke (coming) under a door. Just tell me and we'll deal with it'".

Overall, the levels of preparation and alertness by these survivors appeared to be higher than the levels evidenced by the majority of those whose transcripts were analysed by Whittaker et al. (2009), when interview transcripts were selected randomly regardless of threat level: Whittaker et al. describe a very wide spread of preparation actions and checking on bushfire threat. This supports a conclusion (albeit tentative) that should the current sample not have engaged in such greater preparation and alertness some may have succumbed to the threats.

All described an experience of having their expectations dramatically negated: for 21 (64%) it was the intensity and speed of the fire's impact; for 10 (30%) it was the sudden failure of vital firefighting equipment (e.g., a petrol-driven pump stopping) or a failure of an aspect of the house construction (e.g., a portion of the roof being blown off by the wind); one person's escape route was blocked by a fallen tree; another was devastated when his companion collapsed—he thought she was about to die. For most, the experience resembled the 'collapse of sensemaking' described by Weick (1993, p. 637): "... the process of a cosmology episode, an interlude in which the orderliness of the universe is called into question because both understanding and procedures for sensemaking collapse altogether". Four interviewees gave no indication that they focussed rationally on personal survival: two simply fled in vehicles when their homes were dramatically engulfed in flames; one left his home precipitately just after the fire struck, drove around aimlessly in hazardous conditions, and returned to successfully defend his

house; another focussed so intensely on saving his house that he had to be dissuaded by others from continuing to put his life in jeopardy.

For most of these interviewees, down-regulating fear and controlling attentional focus so that their actions were linked closely to surviving in a potentially lethal environment were associated with their survival. In practice, this meant that they behaved so as to minimize their exposure to radiant heat and embers, and they did not remain in smoke-logged buildings to perish because of toxic gases (such as carbon monoxide), in spite of the evident danger and physical discomfort or psychological distress. Almost all (31, 94%) reported having to change their intended actions in response to a dramatic deterioration in their circumstances (equipment failure; failure of an aspect of house construction; injury or incapacitation of a member of the household). About one third (12, 36%) described a link between fear regulation and attentional control: "We just got stuck into what we had to do. So when I opened the door I thought 'This is probably dangerous, because there is only one (other) door further around to get out again', but it had to be done". This resembles Koole's (2009) proposed goal-oriented effortful distraction emotion-regulation strategy. The mental mechanisms through which inadequately regulated fear degrades survival-related judgements are not well understood, although the stress and human performance literature suggests that under conditions of very high stress: (a) individuals may narrow their field of attention so that important environmental cues are not noticed (Staal, 2004); (b) working memory capacity can be reduced and retrieval of rule-based



Two of the four interviewees simply fled when their homes were engulfed in flames saying they did not focus rationally on personal survival.

survival enhancing knowledge can be impaired (Leach & Ansell, 2008; Leach & Griffith, 2008); (c) physical tasks may take longer to complete and mistakes may become more likely (Idzikowski & Baddeley, 1983); and (d) judgement and decision making may become rigid and narrow, resulting in failure to adapt to changing circumstances (Keinan, 1987).

## Concluding discussion

Before discussing possible implications, limitations of the study need to be acknowledged. The findings should be regarded as suggestive, because the study was largely descriptive: there was insufficient information available at the time of writing to enable meaningful comparative analyses to be undertaken. It should also be remembered that peoples' perceptions and recollections were the source of the data.

Bushfire threat and survival depend on many factors, including fire intensity, wind direction and strength, fuel load, vegetation, slope, and building construction characteristics. These were taken into account only indirectly through participants' reports. Undoubtedly, chance and luck also play a role.

When read in conjunction with Handmer et al.'s (2010) report about fatalities resulting from the 7 February 2009 fires, four tentative conclusions about bushfire survival can be drawn from the above findings. The first is that more attention needs to be given to developing effective approaches to psychological preparation, alongside physical preparation of properties, to assist those who choose to prepare and defend their home against bushfire attack. In this regard, the Australian Psychological Society's Disasters resource kit provides useful information (APS, 2010). Second, households who may, for whatever reason, end-up having to defend their home against a bushfire, whether as planned or not, need more effective instruction about vulnerabilities: how firefighting equipment can fail; how building structures can fail; and how human effort can fail—because of panic, distraction, fatigue, injury or incapacitation. Third, there is probably value in more effectively educating members of at-risk communities, as well as the public at large, about the specifics of the hazardous nature of bushfires—especially the reason most individuals actually die as a consequence of a bushfire: namely, through rapid rise in core body temperature (hyperthermia) as a result of the impact of radiant heat on the body; or poisoning by toxic gases in rooms and other confined spaces. Finally, more effective community education about general preparation of a property for bushfires may have secondary benefits, namely sensitizing households in at-risk communities to important issues involved in surviving the impact of a bushfire, should they have to do so.

The final report of the Bushfires Royal Commission (2009 Victorian Bushfires Royal Commission, 2010) has stimulated much discussion among members of the fire and emergency services sector about possible

policy changes in relation to community bushfire safety: namely, introducing some version of targeted community warning and evacuation procedures so that the primary strategy for community protection becomes one of removing people from threatened locations. Any such blanket approach may have unintended negative consequences. Notably, reducing the overall level of community knowledge and understanding about how to survive bushfires if entrapped, as a consequence of a possible over-emphasis on simply being somewhere else when a bushfire occurs—there seems an uncomfortable similarity to a 'just say no' approach to sex education! Fire and emergency services agencies may be at-risk of promising, inadvertently, more safety than they can deliver: it is unlikely that any warning or evacuation system will work perfectly during every future extreme bushfire under conditions similar to those of 7 February 2009.

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# A conceptual framework for assessing the risk posed by extreme bushfires

Rick McRae and Jason Sharples propose a conceptual framework to assist in assessing bushfire risk.

## ABSTRACT

Bushfires are serious environmental problems that consistently result in loss of life and property, and further impact the cultural, economic, social and political stability of the community. Consequently, much effort has been directed at devising tools to assist in assessing the level of bushfire risk. Further effort has been directed at implementing policy and planning devices that mitigate the risks posed by bushfire, and that best communicate to the public the level of bushfire risk, and the measures they should take to optimise their chances of survival in a certain bushfire situation. However, traditional methods have been found to perform poorly when used to assess the risk posed by the most extreme fires. To better elucidate the bushfire risk problem and to understand where improvements might be made to risk management practices, we propose and discuss a conceptual framework for assessing bushfire risk. The framework formally recognises that bushfire risk evolves in a manner that is dependent on the size of the fire and the processes to which it is susceptible. As such, the paper is designed to stimulate discussion amongst researchers and practitioners that deal with bushfire. The framework is based upon transitions between five fire size or severity classes. In this respect the framework directly addresses one of the issues raised by the Royal Commission into the 2009 Victorian bushfires.

## Introduction

The growing incidence of large wildfires over the last decade has revealed the need for more appropriate and effective measures for assessing bushfire risk. For example, during the 2007 and 2009 fire seasons in Greece and California a series of wildfires burned thousands of square kilometres of land causing extensive damage. Thousands of houses were destroyed, critical infrastructure such as major roads and transmission lines were lost, many people were injured or killed and approximately one million people were displaced, with the overall cost of the fires amounting to billions of dollars. The mix of extended drought periods and the increasing number of homes built in canyons and on slopes surrounded by forest and shrubland has only exacerbated the already difficult problem of managing wildfire risk in these areas. Similarly in Australia, vast tracts of land were consumed in extreme bushfires during the 2002/03 and 2006/07 fire seasons, resulting in multiple fatalities and the loss of numerous dwellings and important infrastructure. The fires also devastated ecological, cultural and hydrological assets, with ongoing consequences. The 'Black Saturday' fires in Victoria during February 2009 resulted in the destruction of a number of townships and unprecedented loss of life. At the time of writing they stand as the worst natural disaster in Australia's history.

It is necessary to clarify the term 'extreme' used here. Historically in Australia 'extreme' has been used for a fire danger rating, corresponding to a fire danger index over 50 until 2009, and redefined after Black Saturday as being between 75 and 100. There is no correlation between extreme fire danger rating and an extreme fire as used in this paper, where the term refers to the fire's dynamics. An additional point to note, which will be explained below, is that the behaviour of an extreme fire is poorly related to fire danger index.

In the aftermath of these extreme fires there have been a number of inquiries aimed at investigating the potential shortcomings of operational and strategic methodologies surrounding the management of bushfire risk, and devising ways of overcoming them. The Royal Commission into the 2009 Victorian bushfires is one such example. The Royal Commission Interim

Report (Teague *et al.*, 2009) covers a wide range of issues arising from the disaster including the causes of the fires, their impact on infrastructure, community awareness and understanding of established bushfire risk management tools and preparation and response measures that follow from them. In examining these issues the Royal Commission produced a list of recommendations aimed at decreasing the susceptibility and improving the resilience of the community to such extreme bushfire events. One group of recommendations concerned the provision of timely and accurate warnings. In particular, Recommendation 4.3 (p144, Teague *et al.*, 2009) calls on the State (of Victoria) to commission research into the development of a new fire severity scale that denotes the risk posed by dangerous and extremely dangerous bushfires. In fact the recommendation alludes to the development of a scale analogous to that defined by the cyclone categories 1 to 5 used in Australia.

There are of course a number of fundamental problems with drawing such an analogy. In the case of cyclones, the categories are determined by well-defined and directly measurable quantities such as average wind speed, maximum wind gust or the central atmospheric pressure. However, in the case of bushfires there does not appear to be any direct analogue of these quantities. The area burned by a fire or its convective power may be suitable measures but neither of these can be measured directly or with the same degree of certainty that the quantities relating to cyclones can. Similarly, while land use patterns can affect the damage a cyclone causes, they cannot affect the likelihood of cyclone occurrence (at least in the short term). This is not the case with bushfires as land use can affect the likelihood of damaging bushfires occurring (e.g. through fuel reduction or lack thereof) as well as the damage they cause to assets (e.g. by extending the rural-urban interface). Moreover, bushfires can be actively suppressed, which is not something that is possible in the case of a cyclone. Thus while a severity scale along the lines of that defined by the cyclone categories may be plausible there are a number of important and unique characteristics of the bushfire risk management problem that must be taken into account. Despite this, the success of the cyclone category system in informing community preparation and response would suggest that developing something similar for bushfires is a worthwhile endeavour.

In this paper we offer some propositions that directly address Recommendation 4.3 and the development of a more appropriate fire severity scale. In particular we introduce and discuss a conceptual framework that considers the evolution of a dangerous or extremely dangerous bushfire as a series of transitions through a number of fire severity categories. Moreover, we discuss a number of factors that could potentially affect the probability of a fire transitioning from one severity category to another and use the framework as a basis to discuss some aspects of risk arising in dangerous bushfire situations.

### A conceptual framework for bushfire risk management

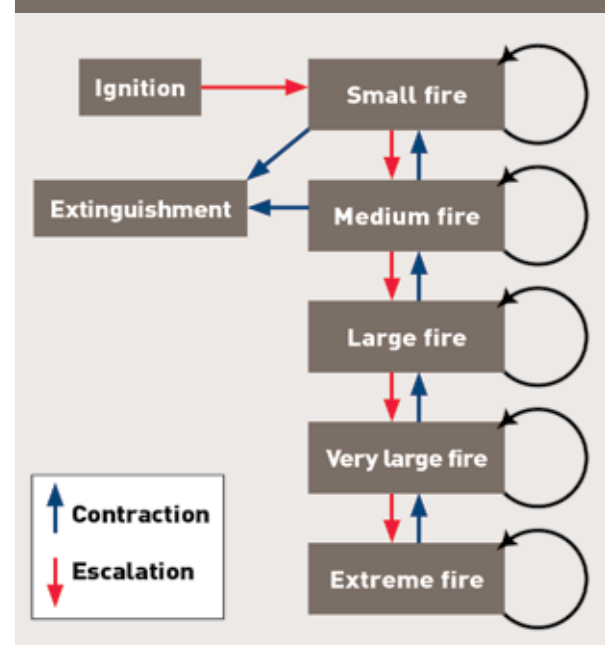
Traditional methods of assessing the level of bushfire risk in southeastern Australia derive from the McArthur fire

danger rating systems, which are essentially a weather-based product. Forecast surface weather conditions are used to produce a single index for each main fuel type that relates to the ease of a fire starting, the speed at which it can be expected to spread, and the difficulty of suppression.

It is important to note that the McArthur fire danger rating systems are based largely on observations of relatively small and low-intensity experimental fires (Cruz and Gould, 2009). So while these traditional approaches have enjoyed considerable success in assessing the degree of risk posed by bushfires there are some notable exceptions. For example, the 1995 Berringa fire exhibited rates of spread that were around 2-3 times more than that predicted by the McArthur forest fire danger rating system (Tolhurst and Chatto, 1999). Research conducted by the Bushfire Cooperative Research Centre in the aftermath of the Black Saturday fires also indicates that current fire behaviour models can under-predict forward rate of spread by a factor of 1.5 to 3 (Bushfire CRC, 2009). Such findings indicate a need for better understanding of very large fires and more appropriate and accurate methods for predicting their growth and assessing their associated risk.

The key component of the proposed framework is a transition model, which can be seen in Figure 1. To reach its most catastrophic state a fire must escalate through a series of different severity classes, via a series of potentially different processes. The conceptual framework is designed to preserve the success of the traditional models, when they apply, and to also accommodate new approaches to understanding very large fires. In effect, the flowchart in Figure 1 is a state diagram for a Markovian process model (Parzen, 1999), with states given by the different fire size or severity classes.

Figure 1. Schematic illustration of the fire size-class transition model.



**Figure 2.** Aerial views of intense pyro-convective events. (a) View of intense pyro-convection, British Columbia 2001 (Photo: Noriyuki Todo, Japan Airlines). (b) Generally equivalent view, but from a lower flight height, over intense pyro-convection, Canberra Fire, 2003 (Photo: Air Target Services Pty Ltd.).



The proposed framework reflects the fact that all fires start small. It also reflects the fact that a fire will escalate or decay in size with a probability depending on the setting of the fire and the likelihood of occurrence of certain processes or events that can affect the development of a fire. For example, events such as wind changes or the incidence of extreme fire weather can cause a fire to escalate, while events such as suppression, or night time weather or rain can cause a fire to decay. The framework formally recognizes the fact that different driving factors will apply to different scales of fire. Recognising these differences in a formal way is especially important in rugged or high-country landscapes, which experience conditions that can be inherently different to less rugged or low-land sites (Sharples, 2009).

It is important to note that the transition model in Figure 1 can be viewed as an extension of the stochastic model considered by Preisler *et al.* (2004). Of fundamental importance to the utility of the framework is the manner in which we assign membership to the different fire severity classes.

### Definition of the severity categories

Preisler *et al.* (2004) define a 'small fire' as one that had burnt an area of between 0.04ha and 40.5 ha, and a 'large fire' as one that had burnt more than 40.5 ha. However, in Preisler *et al.* (2004) the focus was on modelling wildfire risk based on historical fire data and so area burnt was a natural choice for the defining

variable. Using the proposed framework to assess the risk posed by an evolving fire in the landscape, however, it may be more appropriate to define the size classes in terms of the average burning rate, the total intensity, or convective power of the fire, or perhaps the number of landform elements (e.g. slopes, ridge-tops, etc.) involved at a particular time. Of particular importance in these respects is the behaviour of the convective plume.

The behaviour of the convective plume that forms above a bushfire is driven by the interaction of the heat and moisture released by the fire and the characteristics of the surrounding atmosphere. Typically there is a correlation between the rate of spread or intensity of a fire and the vertical motion of the air in the buoyant, convective plume; the faster a fire spreads, consumes fuel and generates heat, the faster and higher the plume will rise (assuming that atmospheric stability is unchanging). The interaction of the convective plume with the atmosphere thus offers a plausible way of conceptualising fire severity. Indeed, Potter (2002) considers a three-stage model (surface, mixed and penetration stages) for fire development based on the extent to which the fire couples with the atmosphere above it.

The 'small' and 'medium' fire size classes of the transition model are identified with fires burning on up to a few landform elements. Such fires are driven by interactions between fuels and meteorological conditions near the terrain surface.

In essence they are surface phenomena that involve negligible interaction with upper levels of the atmosphere (cf. the surface stage fires of Potter, 2002). The evolution of these fires should be well described by traditional approaches to modelling fire behaviour and spread. We distinguish the 'small' and 'medium' size classes to account for the way different size fires might be affected by changes in surface conditions. For example, a 'small' fire might respond uniformly to microclimatic conditions on a knoll, while different parts of a 'medium' fire might be affected in different ways by topographically-induced variations in fuel moisture and wind patterns (Sharples, 2009).

The 'large' fire size class involves fires burning on multiple landform elements or fires that generate enough convective power to couple with the mixed layer (the part of the atmosphere above the surface layer). Conceptually these fires are able to interact with this higher level of the atmosphere through enhanced convective mixing (cf. the mixed stage fires of Potter, 2002). Consequently these larger fires have the potential to be affected by meteorological extremes that fires in the 'small' and 'medium' size classes would not be susceptible to. Similarly the enhanced interaction of 'large' fires with the mixed layer permits certain processes, such as long distance spotting, which can lead to accelerated fire growth. Furthermore, owing to their spatial extent, fires in the 'large' size class will be subject to more variable conditions (e.g. driven by terrain-atmosphere interactions) thereby making accurate prediction of their growth more problematic.

Fires in the 'very large' fire size class involve numerous landform elements and consumption of large volumes of biomass. These fires generate enough heat for the convective plume to reach the top of the mixed layer and to interact with the free atmosphere above it (cf. the penetration stage fires of Potter, 2002). As such these fires have the potential to access stronger winds and very dry air, which if returned to the surface can lead to extreme levels of fire behaviour and rates of spread (Potter *et al.*, 2007; Mills, 2005; 2008a; 2008b). Fires in this severity category would also be extremely difficult to suppress and would be very likely to do extensive damage to any assets they impacted.

If the amount of energy emitted by the fire is sufficient and the atmospheric conditions are conducive the convective plume can undergo a phase change and develop into a pyro-cumulonimbus (McRae, 2004; Fromm *et al.*, 2004; Damoah *et al.*, 2006; Fromm *et al.*, 2006; Trentmann *et al.*, 2006; McRae *et al.*, 2007). Photographs of violent pyro-convective events can be seen in Figure 2. A number of case studies (Tolhurst and Chatto, 1999; McRae, 2004; Fromm *et al.*, 2006) have indicated that once the plume develops to such a level, factors such as surface meteorology, fuel characteristics and terrain become much less influential in determining fire spread. Instead fire spread is dominated by processes occurring within the plume, such as ember transport, alteration of wind flow (including downbursts) and heat transfer (Chatto and Tolhurst, 1999; Bushfire CRC, 2009). These case studies have also shown that traditional methods of fire behaviour and spread

prediction perform poorly (e.g. under-predict by a factor of around 2-3) when applied to these types of fires.

In these cases the fire and the atmosphere above it have essentially become a convective storm cell. Hence this stage of fire development could properly be termed a 'firestorm' or, as commonly referred to in the literature, a 'plume-driven' fire. While fires of this type are rare they pose the most serious risk to assets; they are almost certain to cause widespread damage, burning with high intensity and are only likely to decay after encountering an extended region of reduced fuel load or a significant change in atmospheric conditions. Williams (2007) refers to these types of fires as 'mega-fires' and notes that in the U.S. they account for 85% of suppression costs while only totalling less than 1% of all wildfires. In terms of the transition model such fires occupy the most severe 'extreme' category. Consequently, knowledge of the processes that trigger violent pyro-convection will be particularly important for evaluating the likelihood of a fire escalating from the 'very large' to the 'extreme' fire size class.

### Transitions between the severity categories

Under the general assumption that larger fires cause more damage, the severity category or size class to which a particular fire belongs provides emergency managers with a measure of the potential consequences of the fire. Gill and Moore (1998) point out that this assumption is not always strictly valid, particularly in the context of damage to houses, due to the nature of the rural- or wildland-urban interface. However, if impacts on ecology, hydrology, cultural values and remote infrastructure such as substations and power lines are also considered it will mostly be the case that the greatest socioeconomic losses result from larger fires. Indeed it is highly unlikely that a small or medium fire would cause the destruction of an entire township. The fact that bushfires have only recently become of interest to insurance companies, in the wake of the recent spate of extreme events, lends further weight to this claim.

While the fire severity categories themselves are useful for conceptualising risk, the transitions between them also carry information that is fundamentally important to a complete understanding of bushfire risk. Moreover, it is this aspect of bushfire risk that is often overlooked in frameworks based on fire danger rating, which assume a fire severity continuum. For example, traditional approaches to modelling fire spread in undulating terrain often assume that since upslope acceleration will be balanced by downslope deceleration the overall result will be similar to what would be expected on relatively flat terrain (Cheney, 1968). Under this assumption rapid transition from one size class to the next would not be expected. However, Sharples *et al.* (2011) indicate that if the undulation in the topography exceeds some threshold then processes can occur that may cause a fire to rapidly escalate, resulting in a transition that may even skip intermediate size classes. The rapid development of the Bendora and McIntyre's Hut fires to the west of Canberra on 18 January 2003 provides an example of this possibility (see Figure 3).

The implications of such a transition for bushfire risk management are obvious.

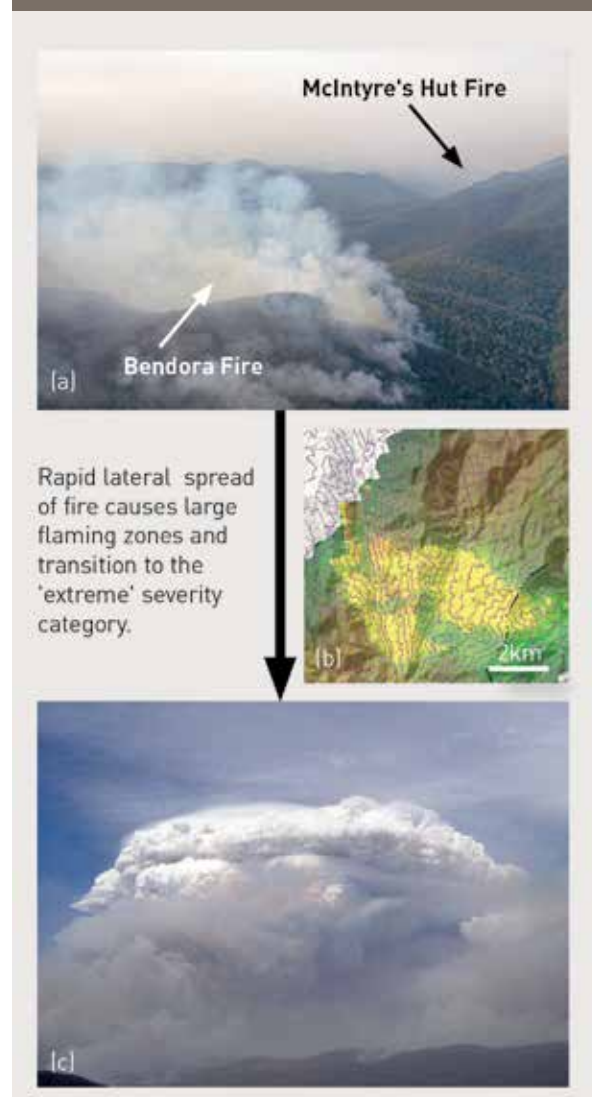
Hence, from the point of view of risk management it is important to understand processes that can affect transition probabilities, as knowledge of them can assist in assessing the likelihood of transition to the most catastrophic class and can also provide knowledge of how to implement prescribed burning and other management strategies so as to reduce the probability of transition to the larger size classes or even to increase the chances of contraction to smaller size classes. Enhanced observation of extreme bushfires in recent years has provided researchers with the means to conduct detailed analysis of processes that can increase the probability of fire escalation (Dold *et al.*, 2005; Finkle *et al.*, 2006; Mills, 2008a; 2008b; Sharples *et al.* 2010; Sharples *et al.*, 2011). These driving processes can greatly increase the chance of a fire transitioning to the 'extreme' size class. Processes that have been identified as being important include wind changes or convergences; the passage of regions of very dry upper air over active fires; wind-terrain interactions; extremely high rates of spread that may result from a combination of extreme weather, high fuel loads and steep or confined topography; enhanced spot fire development; and atmospheric instability. Fig. 3 illustrates how lateral fire spread associated with topographically forced winds can result in such a transition to the 'extreme' severity category.

## Discussion and conclusions

We have presented and discussed a conceptual framework designed to provide a more formal basis to bushfire risk management, and to better reflect current research into interactions between large fires and the upper atmosphere. The framework is based upon transitions between fire severity classes similar to the cyclone severity classes used in Australia. In this respect the proposed framework directly addresses Recommendation 4.3 of the Victorian Bushfires Royal Commission. The proposed framework differs from traditional methods in that it formally recognises that different size fires will be susceptible to different processes. While more research needs to be conducted to be able to formally apply the model in an operational setting, using the model as a conceptual tool can be of benefit. Figure 4 illustrates a hypothetical scenario and how the model can be used to assess the evolving risk. Viewing fires as belonging to a series of different size classes also obviates the fact that methods based on surface observations will become less valid as the fire progresses to the more severe categories.

The framework also highlights the need for more targeted research on the processes that can trigger escalation of fires to their most damaging extremes. Understanding how to mitigate and respond to the occurrence of such processes will require research that combines mathematical modelling, fire behaviour science, (severe storm) meteorology and emergency management. The framework also suggests that the community might benefit from more detailed education

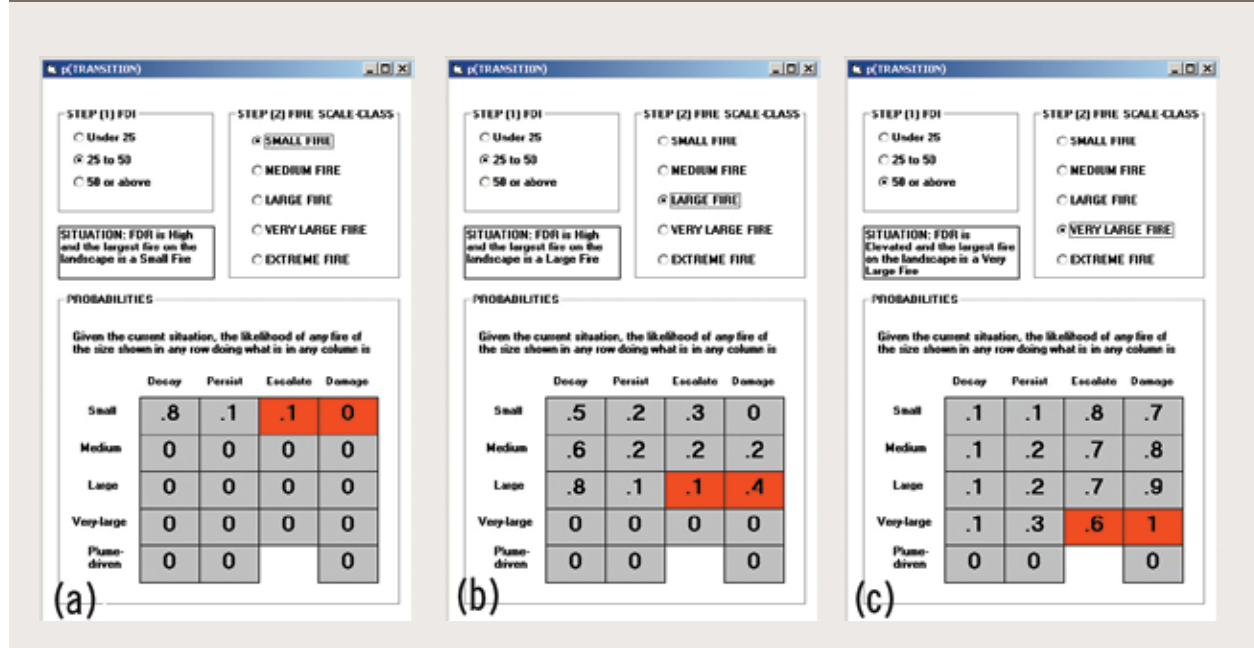
**FIGURE 3.** Transition from a 'medium' to an 'extreme' fire driven by a fire channelling event. (a) The 'large' Bendora and McIntyre's Hut fires burning to the west of Canberra on 13 January 2003 (Photo: Geoff Cutting), (b) Multispectral linescan image showing lateral development of the McIntyre's Hut fire 15:13, 18 January 2003. The lateral development is driven by terrain-modified wind flow. (c) Pyro-cumulonimbus development over the McIntyre's Hut fire about 30 minutes after the image in panel (b) was captured (Photo: Stephen Wilkes, NSW Rural Fire Service Air Observer).



about the various stages of fire development. Promoting public knowledge of the severity classes and how they relate to other information such as fire danger rating forecasts would engender a more complete appreciation of the inherent risk posed by a particular bushfire.

The separation of fire severity classes emphasises the fact that certain key phenomena in the "life cycle"

**FIGURE 4.** An example of how the framework can be utilised. A small fire is burning in rugged terrain with high fire danger rating. In panel (a) there is an 80% chance of the fire decaying (going out) and 10% chances of persistence or escalation. There is a low likelihood of damage. In panel (b) the fire has escalated to the 'large' fire size class and high fire danger levels have been forecast. The chances of decay or escalation have not changed. The chance of damage has gone up, as might be expected for a larger fire. In panel (c) the fire has again escalated to a 'very large' fire and fire danger rating has been forecast at extreme. There is now a 10% chance of decay, a 30% chance of persistence and a 60% chance of escalation to the 'extreme' fire size class. Damage is essentially guaranteed.



of catastrophic fires are confined to certain classes. Through appropriate training we can greatly improve field observations and reporting of these phenomena, and the reaction to those reports within Incident Management Teams. Supporting material is currently under development. Timely and appropriate adjustment of incident objectives and warnings to the public are an essential part of reducing the potential consequences to fire crews and the community arising from extreme bushfire events.

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# Post Black Saturday: Development of a bushfire safety system

Lisa Sturzenegger and Terry Hayes examine Country Fire Authority's post-Black Saturday bushfires Bushfire Safety System.

## ABSTRACT

Following the devastating effects of Black Saturday, Country Fire Authority (CFA) in Victoria developed the concept of a 'Bushfire Safety System' to address issues within its community preparedness programs. The Bushfire Safety System demonstrates that there is no single solution to creating safer communities and that there is a strong relationship between the role of government, community and individuals to build a safer environment. This approach to community preparedness will strengthen the resilience of our communities and reduce bushfire risk.

- Community warnings and community information (when and how warnings are received),
- Vegetation management (creating and maintaining a defensible space around homes)
- Building codes (constructing buildings to withstand the passage of fire and severe ember attack), and;
- Planning laws (where people are allowed to build), refuges and evacuation (Teague, McLeod, Pascoe 2010).

CFA recognised that an improved approach was required to address these issues, and in the months following Black Saturday developed the concept of a 'Bushfire Safety System' based on systems theory (Robbins, Barnwell 2002). It was designed to combat the impacts of bushfire in Victoria and acknowledge that there is no 'silver bullet' or single risk reduction measure that could be effective in isolation.

## Introduction

CFA is responsible for the delivery of fire prevention and suppression services to over 3,000,000 residents in Victoria. Many of these services are now in the urban/rural interface where some 484,000 people reside, with approximately 250,000 people living in the 52 towns identified as being at high-risk from bushfire.

The 2009 bushfires brought unprecedented destruction and loss of life to Victorian communities, many of which were unprepared. Community preparedness was severely compromised by more than a decade of drought and a record breaking heatwave in late January, which coincided with the highest temperatures ever recorded across much of Victoria (Tolhurst, 2009). Combined with strong, dry, hot winds and uncharacteristically unstable atmospheric conditions, the result was a number of catastrophic fire events (Bushfire CRC, 2009). The devastating fires compromised every line of defence and affected approximately 430,000 hectares of public and private land, claimed 173 lives and destroyed over 2,000 homes and 61 commercial premises (VBRC, 2009).

Key issues that emerged from the 2009 Victorian Bushfires Royal Commission (VBRC) included:

## What does a bushfire safety system look like?

In designing the Bushfire Safety System, the first consideration was to look at the risk reduction measures (also known as treatments) that were available to be implemented ahead of the forthcoming fire season that would address the issues emanating from the 2009 Victorian Bushfires Royal Commission Interim Report (VBRC, 2009).

The issues that emerged from the VBRC could be described as complex or 'wicked' (Australian Public Service, 2007). A 'wicked' problem is often described as being beyond the capacity of any one organisation to understand and respond, and there is often disagreement about the causes of the problems and the best way to tackle them.

Using a systems approach to 'wicked' problems is not new in its application – a system is quite simply a recognition that there is a set of interrelated and interdependent parts. The unique characteristics of the systems viewpoint is the inter-relationship of parts within the system. Every system has diverse forces: differentiation and integration (Robbins et al, 2002).



Figure 1 (below) illustrates an overview of a Bushfire Safety System (BSS). The model operates as a matrix of interdependent and interactive risk reduction measures that take into account the roles, capacities and responsibilities of government, communities and individuals. The weighting and scale of responsibility in each quadrant are not equal and highly dependent on the level of investment placed into a risk reduction measure. Acute focus is often placed on the individual/household

The BSS recognises that both active and passive measures are important to our bushfire safety outcomes. An active measure is one seen as an individual having to make an active decision or action; whereas a passive measure is one that generally occurs without notice to an individual (for example a airbag).

There are four quadrants shown in the BSS with examples of risk reduction measures:

- **Enforcement/Economics** (incentives or disincentives to do or not do something)
- **Education/Empowerment** (educating and empowering people with the responsibility to act)
- **Engineering** (using design/technology to solve a problem)
- **Environmental Modification** (modifying the environment to reduce the risk)

Each element of the system contributes to a risk reduction measure. When delivered together these elements aim to reduce the number of holes that are described as the 'Swiss Cheese Theory' (Reason, 2000) and thus improve the overall safety.

(Brunner, 2009) describes the "Swiss Cheese Model" and how each layer of cheese represents a barrier that will prevent an unacceptable event from occurring, however each barrier has holes in it. When all the holes

in the barriers line up then an unacceptable event may occur.

### Risk reduction measures (treatments)

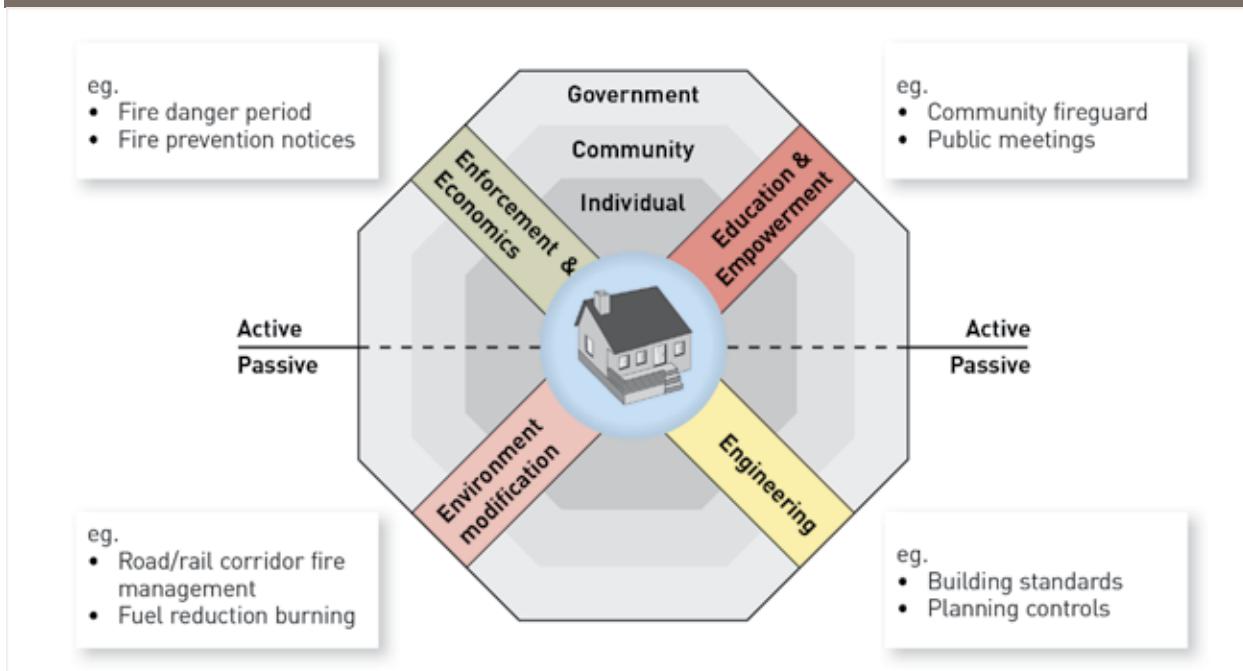
No single measure provides an absolute solution to reduce the risks from bushfire. Bushfire agencies within Australia have stated publicly over the years that they do not have the resources to defend every property that may be in danger when a major bushfire occurs.

In the past decade or so there has been a clear movement within fire agencies and emergency management organisations more generally to acknowledge that by increasing knowledge and understanding about bushfire it is possible to reduce bushfire risk (Elsworth et al, 2009).

Most emergency management agencies in Australia have adopted a risk management approach using the AS 4360 or ISO 31000 risk management standards with a clear focus on prevention, mitigation and community preparedness (Smith, Nicholson & Collett, 1996).

This transformation in thinking from the traditional bushfire response to preparedness of communities in Australia has international parallels in the fields of emergency management, crime prevention and public health and is broadly described as the 'community safety approach' (Elsworth et al, 2009). These community safety approaches cut across each other and are often underpinned by differing paradigms including the medical, health education, public health and system engineering paradigms (Hanson, Vardon & Lloyd 2007).

FIGURE 1. Bushfire Safety System Sturzenegger et al 2010.



## Applying a systems paradigm to bushfire

Within the aviation industry these paradigms are referred to as a concept known as the 'Swiss Cheese Theory' (Reason, 2000), which is based on the idea that it is extremely difficult, if not impossible, to get a single risk reduction measure absolutely perfect and therefore reliably mitigate risk on its own. This is why robust safety management systems are constructed of multiple overlapping, even redundant controls.

A risk reduction measure here can be thought of as a slice of Swiss Cheese with a number of random holes, each representing a weakness or service delivery gap. The worse the design and implementation of a measure the more holes it has. The fewer measures (or slices of cheese) there are in place, the more likely it is for the holes to line up and mitigation strategies to be unsuccessful. When layers of Swiss Cheese - or rather multiple measures are combined even imperfect controls are remarkably effective.

The experience of the February 2009 fires in Victoria showed that some of the risk reduction measures adopted by CFA were not aligned and there were some weaknesses in their application. Even with many layers (defined here as the broader emergency services, including the government, communities and individuals themselves) to the State's risk reduction strategies, catastrophe can still occur. This then drives the need to implement many layers of risk mitigation, considering how each risk reduction measure as an isolated and imperfect control can fail without understanding its relationship to another risk reduction measure. This forces us to consider each measure in terms of 'systems thinking'.

Understanding how each measure interacts with the other will allow for strategies aimed at preventing the Swiss Cheese holes from aligning. It demonstrates the need to look at how individuals, communities and governments risk reduction can work together to create an effective Bushfire Safety System.

Social systems that involve people are acknowledged to involve a number of complex subsystems. *Figure 1* endeavours to demonstrate how individual systems, community and government subsystems interact with a range of other subsystems (that may be outside of their control). Within each quadrant there is a system within itself that provides a risk reduction measure, and this can occur at the individual, community or government level. For example in the education quadrant, the individual will be educated by their own experiences, beliefs and attitudes, along with the experiences of their community, and then a program delivered by CFA. Education therefore comes from multiple sources all looking to produce a safety outcome at each layer of the hierarchy (McNamara, 2006). It also comes through many programs that reflect differences in individual and community needs, priorities and capacities as well as the diverse range of issues being addressed through a range of 'safety issues' e.g. road safety (Gilbert, 2007).

CFA used this thinking in its design of the Bushfire Preparedness Program (BFPP). The BFPP was developed to have risk reduction measures sitting within each quadrant of the Bushfire Safety System and subsystem at an individual, community and government level. The ideal model ensures that all levels are well resourced and complementary to each other, which then allows for elements of failure in an individual's risk reduction, compensated by the government or vice versa, the objective being to have redundancy and increase 'fail safe' measures.

## Beginning the journey – putting theory into practice – developing the Bushfire Preparedness Program using Systems Thinking

The BFPP was instigated in mid 2009 to immediately address some of the inherent weaknesses within community preparedness programs that were apparent on Black Saturday, as well as in response to the Victorian Bushfires Royal Commission Interim Report.

It was also critical to prepare the state of Victoria for the coming fire season. The program comprised 42 projects allocated across six emergency services agencies and government departments, and CFA was responsible for the delivery of 32 of the 42 projects. They aligned to four themes: community education and engagement; warnings to the community; land and vegetation management; and bushfire operations (Table 1).

## BFPP and the bushfire safety system

Within the BFPP the community education projects efficiently align with the Education and Empowerment quadrant of the Bushfire Safety System, whilst the land and vegetation management projects are parallel to the Environment Modification quadrant. Some aspects of the warnings to community projects aligned with the Engineering quadrant and there were no projects that specifically addressed the Enforcement and Economics quadrant - as enforcement activities take many resources and require robust policing systems this quadrant was left to be addressed in later evidence in the VBRC in 2010.

Whilst on the surface it may seem uncomplicated to make linkages between the projects within the Bushfire Preparedness Program and the Bushfire Safety System, there is a complex set of interdependencies and interrelationships between each of the projects, with a number of the projects playing an enabling role to one another.

Within the community education and engagement theme there were 21 projects ranging from the development of the Household Bushfire Self-Assessment Tool through to the development of children's bushfire education resources. Land and vegetation management encompassed two significant projects around environmental compliance and quality assurance systems. The warnings to communities extended across

Table 1. Bushfire Preparedness Program Projects.

Theme	Quadrant in the Bushfire Safety System	Projects
<b>Community education and engagement</b>	Education and Empowerment	<ul style="list-style-type: none"> <li>• Victorian Fire Risk Register</li> <li>• Neighbourhood Safer Places – Places of Last Resort</li> <li>• Township Protection Plans</li> </ul>
	Education and Empowerment	<ul style="list-style-type: none"> <li>• Fire Ready Victoria Community Meetings</li> <li>• Review and improvements to the Community Fireguard Program</li> <li>• Household Bushfire Self-Assessment Tool resource</li> <li>• Advice to property owners</li> <li>• Localised place-based campaigns</li> <li>• Children's bushfire education</li> <li>• Tourism initiatives</li> <li>• Diverse populations programs</li> <li>• Development/review of publications</li> <li>• Brigade community safety support</li> <li>• Bushfire related research</li> </ul>
<b>Warnings to the community</b>	Education and Empowerment	<ul style="list-style-type: none"> <li>• Development of standards and delivery of training</li> <li>• Kits for information gathering and analysis</li> <li>• Community information warnings</li> </ul>
	Engineering	<ul style="list-style-type: none"> <li>• One Source One Message (OSOM)</li> <li>• Establishment of online registration and booking system</li> <li>• Household Bushfire Self-Assessment Tool (software)</li> </ul>
<b>Land and vegetation management</b>	Environmental Modification	<ul style="list-style-type: none"> <li>• Vegetation Management on Roadsides</li> <li>• Ecological management and environmental management of roadside burning</li> </ul>
<b>Bushfire operations</b>	Engineering	<ul style="list-style-type: none"> <li>• Existing building upgrades and modifications to existing buildings</li> <li>• Upgrading of IT infrastructure</li> <li>• FireNet connectivity updates</li> </ul>

the information flow spectrum from field intelligence gathering and analysis to the issuance of warnings to the community via the One Source One Message system (designed to deliver warning messages via short message service, radio or via the internet).

## Discussion

Before Black Saturday CFA delivered some of the most comprehensive programs that developed community preparedness for bushfire. These programs were not delivered through a comprehensive systems approach but were targeted in an ad-hoc way to communities perceived as at risk. Its flagship programs such as Community Fireguard and Fire Ready Victoria programs were often adopted by other fire agencies and were well acknowledged in the VBRC final report (Teague, McLeod, Pascoe 2010 Final Report, Vol II, pt 1, p 23), but their application was seen as limited in reach and homogenous across diverse communities. It was decided that programs needed to be complemented with other risk reduction measures for those members of the community that did not attend these programs. A need to make use of both active and passive parts of a

system needed further development so the benefits of using a systems approach to underpin the development of the BFPP could be fully realised.

## Benefits of using the bushfire safety system

Using a systems approach to the development of the BFPP created the opportunity for a strategic conversation around the outcomes that needed to be provided by government agencies. This approach made it possible to conduct a gap analysis of the elements that had little or no activity or investment at an individual, community or government level, ensuring a more targeted approach to program delivery.

CFA, with the Department of Sustainability and Environment (DSE), integrated a number of data layers to support local decisions makers to identify 52 high risk towns across the State. This project provided a critical focus to inform where and what risk reduction measures should occur. This galvanised the intention to target activities to those at 'most risk'. Through using a 'systems approach' it brings many agencies'

key strengths into play and the relationships across government agencies have strengthened as a result.

The identification of communities at risk from bushfire has now been formalised through the Victorian Fire Risk Register.

## Limitations of the Bushfire Safety System

There are many influences that can affect the desired performance of elements of the Bushfire Safety System. Currently there are no economic measures and limited enforcement measures in place. Appetite for incentives and disincentives of bushfire safety outcomes can be influenced by tolerance and political climates.

We can note that the amount of fire prevention burning can be influenced by delivery capacity (in the Environmental Modification quadrant), timing and weather.

While informational/educational/engagement/empowerment activities can influence issues such as immediacy, accessibility and priority – planning and design elements within the engineering paradigm are often future focussed and generally subject to the outcomes of cost-benefit equations which vary with the status of economic, personal and community attitudes.

The Bushfire Preparedness Program sees significant investment into the Education and Empowerment Quadrant which is often seen as the least effective 'risk reduction' control hierarchy (UNSW, 2007), whereas major investments in long term engineering solutions such as community refuges are yet to be realised in their value.

## Conclusion

The Bushfire Safety System is the first documented approach in Australia to describe bushfire mitigation in a "systems thinking" context to reduce bushfire risk. In its development and design, the BFPP acknowledges that a BFPP using a systems approach is a significant first step on a journey that may take many years.

It is apparent from a closer examination of, and lessons learned during, the BFPP delivery in 2009/2010 and a refinement and understanding of the 'systems approach' that there is an imbalance in risk reduction measures. It is now evident that there is an over-reliance on *community education and empowerment* risk reduction measures within the emergency management system. This dependence leads to an overemphasis on the need to change behaviours and provides a tremendous challenge.

What is required in the future is more emphasis on engineering and environment modification wherein the solution to improved safety lies further up the hierarchy of control. Behaviour modification can then be driven

non-coercively and information and incentives can be enhanced to better influence within a narrower context.

It is recognised that a number of the current initiatives described in BFPP have not reached the limits of their cost-effective potential for all groups within communities and locations throughout Victoria. The next delivery of BFPP during the 2010/2011 fire season will focus on continuing effective risk reduction measures, enhancing these measures to help them reach their full potential and introducing new risk reduction measures – focussing more heavily on the Enforcement/Economics quadrant.

The concept of a Bushfire Safety System is in its early stage of thinking. It demonstrates that there is no single solution to designing out the bushfire risk and creating safer communities. It shows that there is a strong relationship between the role of government, communities and individuals that collectively contribute to an improved system of bushfire safety. This will contribute to strengthening our communities' resilience, decreasing the risk of bushfire and create safer communities.

We all have a role in the Bushfire Safety System.

## Acknowledgements

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National Emergency Management

# VOLUNTEERS SUMMIT 30-31 MAY

The future is in our hands  
Partnerships • Experiences • Solutions

# 2011

The Australian Attorney-General's Department, in partnership with the Australian Emergency Management Volunteer Forum, and with the support of the Australian Taxation Office, is holding the third National Emergency Management Volunteers Summit from 30-31 May 2011.

Up to 450 emergency management volunteers from across Australia will attend the Summit, to be held at the Rydges Lakeside Hotel in Canberra. This event will coincide with the United Nations' International Year of Volunteers Plus 10, and the theme is 'The future is in our hands – Partnership • Experiences • Solutions'.

This year, there will be a emphasis on the younger generation, and social networking tools will be used during the Summit to encourage participation by those who are unable to attend.

### The objectives of the Summit are to:

- identify and discuss contemporary issues within the emergency management volunteer sector
- showcase and discuss best practice in the emergency management volunteer sector
- develop recommendations of significance to the emergency management volunteer sector
- commit to working together to progress recommendations to further enhance emergency management capability and community resilience in Australia
- connect government at all levels, non-government organisations and emergency management volunteers from across Australia

### The Summit will focus on:

- **Partnerships** – providing networking opportunities for emergency management volunteers, and those working with volunteers from across Australia. The Summit will also focus on developing and strengthening relationships across all levels of government and with Non-Government Organisations to attract, support and retain emergency management volunteers.
- **Experiences** – providing an opportunity for the Australian Emergency Management Volunteer Forum to report on its activities and achievements for the emergency management volunteer sector since the 2005 Summit.
- **Solutions** – providing recommendations based on issues identified at the Summit for use by agencies and organisations that engage emergency management volunteers.

### The program includes:

- Welcome to Country Ceremony by Mrs Agnes Shea, Ngunnawal Elder
- Two days of thought provoking presentations
- Interactive breakout discussions
- Plenary sessions with key note speakers
- Official Summit Dinner

### Hear presentations from:

- Government
- A Leading International Expert on Volunteering
- The Australian Emergency Management Volunteer Forum
- Australian Red Cross
- Fire and Rescue NSW
- St John Ambulance Australia
- Surf Life Saving Australia

### Confirmed speakers:

- Mr Andrew Coghlan, National Manager – Emergency Services, Australian Red Cross, AEMVF Chair
- Mr Adam Dent, Emergency Services State Manager Victoria, Australian Red Cross
- Mr Kym Duggan, First Assistant Secretary, National Security Capability Development Division, Attorney-General's Department
- Dr Judy Esmond DipWelPsych (TES), BSW, MSW (Curtin), PhD (WAuth), Director Morevolunteers
- MAJGEN BW (Hori) Howard AO MC ESM (Rtd), AEMVF Deputy Chair
- Mr Paul Ronalds, First Assistant Secretary, Department of the Prime Minister and Cabinet; formerly of World Vision Australia (2004-2010)
- Mr David Weir, Community Safety Advisor, Fire and Rescue NSW
- Mr Brett Williamson OAM, Chief Executive Officer, Surf Life Saving Australia
- Mr Stuart Diver – sole survivor of the 1997 Thredbo landslide

Follow this program on  and 

### REGISTRATIONS FOR THE SUMMIT CLOSED ON 1 APRIL 2011

Delegates were nominated by parent emergency management volunteer agencies and organisations to ensure the best possible cross-section of participation. Dedicated pages on social networking sites, **Facebook** and **Twitter** have been created to encourage electronic participation by those unable to attend the Summit.

Further information is available via the **Volunteers Summit page of the Emergency Management Australia website**, <<http://www.ema.gov.au/volunteers>>.

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# Australian Emergency Management Institute

**A centre of excellence - building resilience through education, collaboration and innovation**

- Providing nationally accredited education and training
- Providing professional development
- Undertaking applied research
- Conducting strategic activities
- Promoting community awareness and resilience

## **News from AEMI:**

### **Connect! workshop on Social Media**

On the 14 and 15 April AEMI conducted the Connect! workshop that explored current and future use of social media in the Emergency Management sector. There were fabulous examples of social media, including the Queensland Police use of Facebook and Twitter during the recent floods. Also showcased was the St John's Ambulance phone app, recent winner of the National Safer Community Award.

### **Wildfire arson investigation management course**

In April AEMI hosted a wildfire arson investigation management course that was attended by people from USA, New Zealand and Australia. This was a pilot program, please see the article on page 11 of this journal for more information.

### **Engaged and resilient communities workshop**

**17-19 May 2011**

AEMI's Engaged and Resilient Communities Workshop will bring the emergency management sector and community engagement experts together to explore the big questions about community engagement; the challenges and the implications for disaster resilience.

### **Facilitating community-led recovery workshop**

**20 May 2011**

Another upcoming event is the workshop on community-led recovery. This event will explore issues including that community members are the first responders during an emergency taking action to save and protect themselves, their families and their communities. In responding, disaster affected communities spontaneously begin their own recovery process. Empowering communities to create their own solutions can improve overall social cohesion.

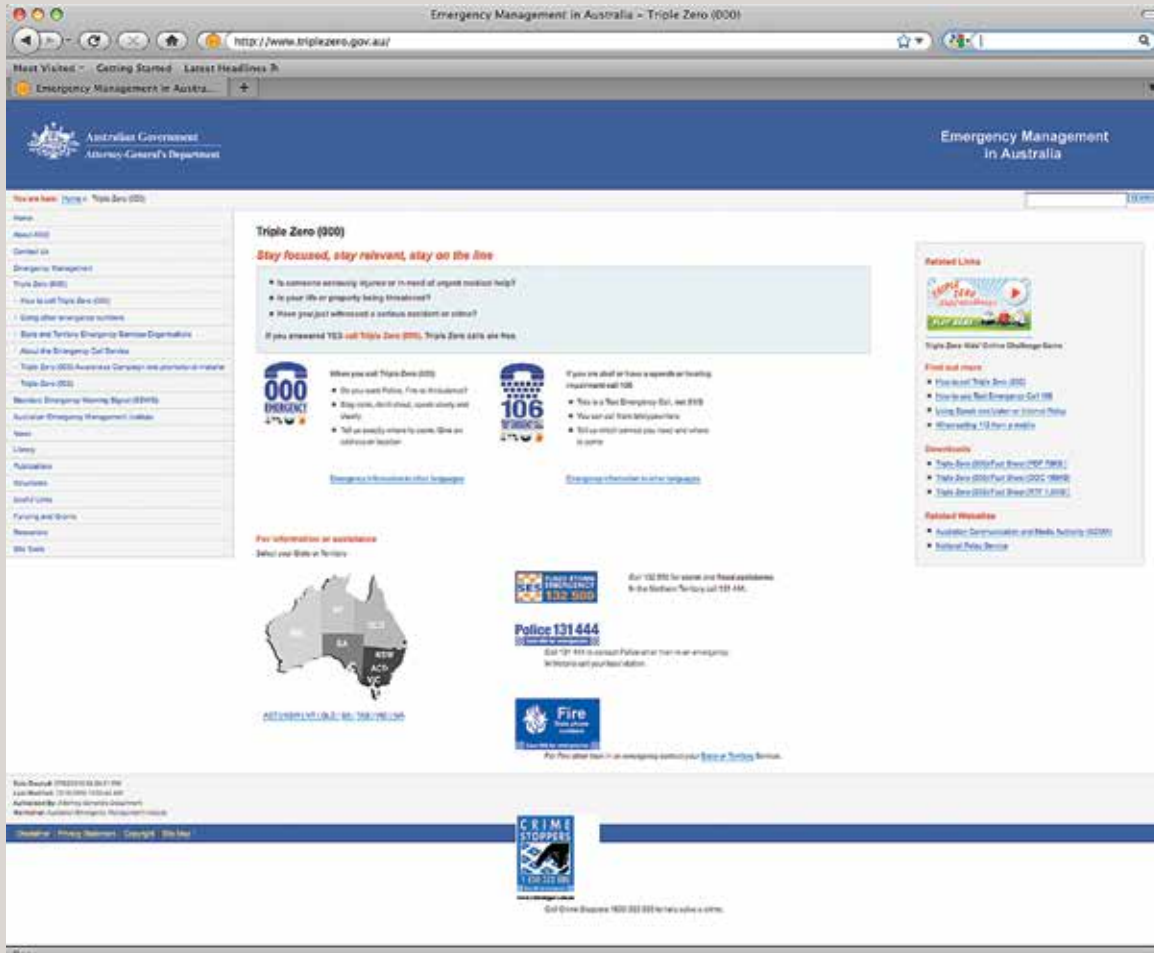
### **AEMI Curriculum review**

Having recently completed a widely consulted Training Needs analysis for the emergency management sector AEMI will launch our new suite of products in August 2011. Please watch this space!

## **Courses at AEMI: May – July 2011**

- Exercise management
- Coordinate resources within a multi-agency emergency response
- Facilitate emergency risk management
- Liaise with organisations and Promote the organisation's missions & services
- Business continuity management
- Manage projects
- Manage recovery functions and services

# Interesting Websites: Emergency Management in Australia



## Triple Zero (000) Website

[www.triplezero.gov.au](http://www.triplezero.gov.au)

The Emergency Management in Australia website is part of the national Triple Zero (000) campaign that aims to build awareness of the Triple Zero (000) number and educate the community about when to use the number.

The campaign serves to reinforce to members of the public their responsibilities when calling the Triple Zero (000) emergency number both in nominating the required emergency service and identifying the location they are calling from.

The campaign uses the Internet, newspapers, radio and television to promote messages of Triple Zero (000). In addition, elements of the campaign have been translated to reach culturally and linguistically diverse communities throughout Australia.

There is also a 'Triple Zero Kids' challenge online safety game that raises awareness of what to do in a crisis amongst children in schools.

Did you know that there is now also a 106 Text Emergency Call service? This service is not SMS but an emergency call service for the speech and hearing impaired?

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# You could be a 2011 Australian Safer Communities Award winner

To find out more, visit [www.ema.gov.au](http://www.ema.gov.au)  
Entries close 1 July 2011



*Photo: Volunteers help to clean up Gray Road in West End, Brisbane, which was severely damaged by the 2011 Queensland floods. Photographer: Andy Zaleki*

# I love a sunburnt country

Her beauty and her terror –  
The wide brown land for me!

Core of my heart, my country!  
Land of the Rainbow Gold,  
For flood and fire and famine,  
She pays us back threefold

Though earth holds many  
splendours,  
Wherever I may die,  
I know to what brown country  
My homing thoughts will fly.

