

# Australian Journal of EMERGENCY MANAGEMENT

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# Australian Journal of Emergency Management

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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 are 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. 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 Institute for Disaster Resilience 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 encourages empirical reports but may include specialised theoretical, methodological, case study and review papers and opinion pieces. The views in the Journal are not necessarily the views of the Australian Government, Australian Institute for Disaster Resilience or its partners.

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**Cover image:** Natural disasters present unique challenges and opportunities for the homeless and community service organisations.

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Contributions in the Research section of the *Australian Journal of Emergency Management* are peer reviewed to appropriate academic standards by independent, qualified reviewers.

# Foreword

Professor John W Zillman, Australian Academy of Science

The Australian Academy of Science recently held an important symposium on natural disasters as part of its annual Science at the Shine Dome in Canberra. The theme for the symposium varies each year, with much thought given to where next to shine the light on new and important scientific developments. This year, the Academy turned its attention to the multi-disciplinary science involved in understanding and coping with natural hazards.



The 2018 symposium titled, Predict, Respond, Recover: Science and Natural Disasters, provided compelling evidence that there is a lot of science involved in disaster mitigation. The 200 people at the Shine Dome heard four excellent keynote addresses and watched a video that provided the big picture on the role of science in natural disaster reduction. The keynote addresses were supported by six excellent specialist presentations that helped fill out some of the detail and update the Academy audience on the latest developments.

We also heard a little of the history and international context of the scientific research, operational infrastructure, services and policy issues in this area. In particular, four elements of that history and context deserve mention for having provided the foundation for much of our current knowledge of the science of natural hazards and natural disasters:

- The several previous ground-breaking scientific symposia organised by the Australian Academies on natural disasters including the Academy of Science's pioneering and comprehensive 1979 symposium, Natural Hazards in Australia, the 1996 joint Academies Gold Coast Conference on Natural Disaster Reduction and the important 2005 National Academies Forum initiative following the disastrous Boxing Day tsunami in the Indian Ocean to assemble advice to government, Harnessing Australian Expertise for Recovery.
- The international framework for disaster research provided by the International Council for Science ten-year program on Integrated Research on Disaster Risk.
- The Inter Academy Partnership for Science recent comprehensive four-pronged strategy for enhancing the role of science and technology in disaster risk reduction.

- The even larger international United Nations framework that began with the 1990-2000 International Decade for Natural Disaster Reduction that evolved into the ongoing international Strategy for Disaster Reduction, which has delivered the ambitious Hyogo (2005-15) and Sendai (2015-30) frameworks for disaster risk reduction.

I recall these specifically because one of the defining features of the role of science in disaster reduction has been the high level of collaboration and cooperation needed for success.

From earliest times, one of the most basic obligations accepted by communities has been that of working together to protect their members from danger including from the extremes of weather and climate. Indeed, it was the 17th Century Genevoise philosopher Jean-Jacques Rousseau who argued that Providence had created natural disasters to force people to cooperate.

One important aspect of that cooperation that came through clearly in the Shine Dome presentations was cooperation between the natural and social sciences. It is reassuring that, just as International Council for Science and the International Social Sciences Council are merging to bring the natural and social sciences closer together at the global level, this symposium has helped elaborate the increasingly important role of the social sciences in enabling future communities to cope with living in a warmer and more hazardous future climate.

Of course, in just one day, we could not go into detail on every aspect of Predict, Respond, Recover nor on all the natural hazards that can produce disasters in Australia. However, the Academy's keynote speakers provided excellent overviews of the systems underpinning Australia's meteorological, hydrological and oceanographic warning services, of the science and management of earthquakes and of the national



The symposium at the Shine Dome in Canberra considered the multi-disciplinary science involved in understanding and coping with natural hazards.

Image: Bushfire and Natural Hazards CRC

research questions that need to be, and are being, addressed. They also delivered a thought-provoking analysis of the role of science in policy development based on insight into the challenges of disaster management in Australia.

We heard important snippets about most of the hazards of meteorological and geological origin including severe weather, earthquake, heatwave and bushfire, plus the more specific challenges of thunderstorm asthma, marine heatwaves and the use of warnings. Time precluded our going into much detail on flash and riverine floods, hail storms, tornadoes, tsunamis and storm surges and we hardly touched on drought. There was also little on the science involved in assessing the economic costs of natural disasters in Australia. It would be good to further explore the scientific issues involved in designing effective disaster insurance as well as the medical, engineering, logistic, governance and political challenges of disaster relief and recovery.

There were, however, many powerful new insights from the presentations at the 2018 symposium that will add importantly to the general body of knowledge of disaster science from earlier national and international research and symposia. These will gradually find their way into the disaster mitigation policies and management systems and services at all levels of government in Australia. And we, the audience, were reminded (if reminder were needed so soon after news bulletins showed the destruction in Darwin from Cyclone Marcus and the horror of the Tathra bushfires) that Australia can often find itself with simultaneous and entirely different disasters in different parts of the country.

Science at the Shine Dome attracts a national and international audience and boundless networking opportunities with Australian Academy Fellows, Chief Scientists, Nobel Prize winners, early- and mid-career

researchers, government representatives, politicians, media, science-associated organisations and the science-interested public. Online, Science at the Shine Dome reaches audiences of more than 500,000 people via a range of social media that makes the event truly global. This year, the Bushfire and Natural Hazards CRC was the main supporter and assisted with the organisation and provision of speakers.

This edition of the *Australian Journal of Emergency Management* provides further important evidence of the science behind disaster mitigation and includes research reported at the AFAC18 conference in Perth last month.

In this edition, Brookfield examines how natural disasters can impact on the homeless and shows the limitations of state-funded agencies and the important role of non-government bodies in caring for communities. Berry and Kragt, in separate research articles, look at the roles and motivations of the volunteer forces that are so relied on during emergencies. Every examines the emerging field of psychological preparedness communication and its contribution before a disaster hits. McCarthy shows how both resilience and recovery can be improved with emergency plans that include pets and farm stock.

I am sure that those who heard the presentations at the Shine Dome and read the journal's pages will need little further reminder of the continuing scientific and other challenges of living in a land of 'droughts and flooding rains'.

**Professor John W Zillman AO FAA FTSE  
2018 Symposium Organising Committee  
Australian Academy of Science**

# Prepare for extended severe weather seasons

David Bruce, Bushfire and Natural Hazards CRC

Australia needs to prepare itself for the threat of year-round natural hazards that in the past were associated only with the summer months.

This is the view of the Bushfire and Natural Hazards CRC CEO Dr Richard Thornton when asked to comment to the media on bushfires on the east coast during August.

'Heat, drought, flood and fire are not new phenomena for Australia; we have seen these before and we will see them again. Although it is not common to have bushfires in northern New South Wales in August it's certainly not unprecedented. It was the severity of the August fires that was exceptional,' said Dr Thornton.

'What is different now is that there is an underlying 1 degree Celsius increase in average temperatures, which means that the variability of 'normal' events sits on top of that. We are seeing weather records routinely being broken across the continent and indeed the world, and all indications are that we are on a trajectory that will see temperatures continue to increase.

'What this means for extreme hazards, we cannot be sure. This is an area in critical need of further research into weather prediction, land planning, infrastructure development, population trends, and community awareness.

'Climate change is causing more severe weather, but demographic changes are having an equal impact and deserve just as much of our attention.

'Here in Australia, it has been unusually dry and warm over the last few months. When preceding conditions have been like this, and the bush and grass is so dry, it doesn't take much for a fire to get going once the wind is up, regardless of the season,' he said.

Dr Thornton said Australia was familiar with year-round bushfires that feature across the north of the continent in the middle of the year and move southwards at the end of the year and into the new year. However, these seasons are now getting longer. So too are the fire seasons in the northern hemisphere.

'With fire seasons lengthening and overlapping across the globe, we need to think of new ways of dealing with bushfires, floods, cyclones and heatwaves. The old ways of sharing resources around Australia and with the northern hemisphere may not always be possible

so we need to discover better ways to manage all our resources,' he said.

Dr Thornton said this was not only a matter of managing resources such as water-bombing aircraft and firefighting vehicles.

'Firefighting is still very much done by people, despite advances in technology, and a great many of these are volunteers from the community. Our research shows that those human resources are now being stretched with the bushfire seasons getting longer, while our emergency services still regularly deal with floods, cyclones and severe storms, plus other demands such as motor vehicle accidents and search and rescue,' he said.

The Southern Australia Seasonal Bushfire Outlook - released by the Bushfire and Natural Hazards CRC and AFAC in September - is used by fire authorities to make strategic decisions on resource planning and prescribed fire management for the upcoming fire season. The map shows the bushfire outlook for southern Australia through to the end of 2018. This map has been combined with the outlook for the northern Australia bushfire season, which was released in July, to show the areas of fire potential for all of Australia.

## Antecedent conditions

Most of eastern and parts of south-west Australia have experienced a dry 2018 so far. The focus of the dry conditions has been New South Wales, where almost the entire state has experienced rainfall in the lowest decile (driest ten per cent of recordings), representing serious-to-severe rainfall deficiencies. Rainfall deficiencies also affect most of northern and eastern Victoria, parts of southern and central Queensland and eastern South Australia. Across southern Australia above average rainfall has been limited to the arid regions of western South Australia and adjacent parts of Western Australia, as well as western Tasmania (Figure 1). While August has seen some rainfall in drought-affected inland areas, this has fallen well short of that required to remove the longer-term deficiencies, which remain extensive.

# SOUTHERN AUSTRALIA SEASONAL BUSHFIRE OUTLOOK 2018

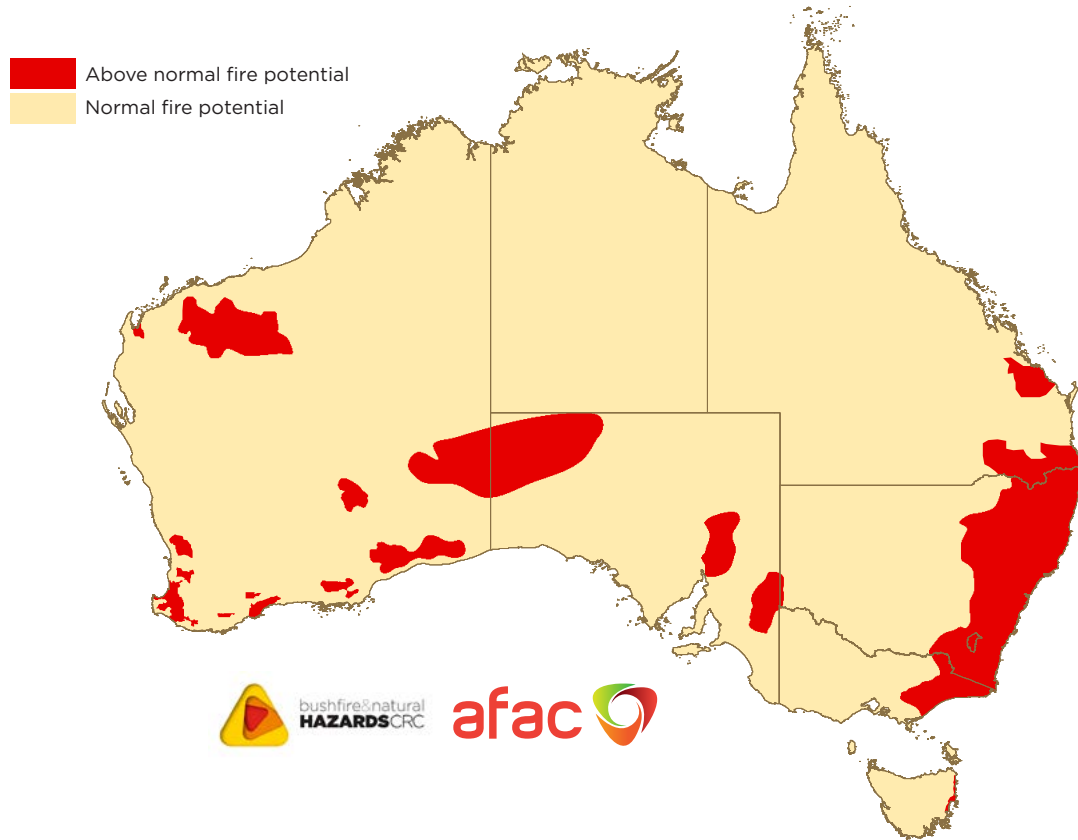


Figure 1: The above normal bushfire potential for much of Australia reflects the warm, dry lead-up to spring.

Image: Bushfire and Natural Hazards CRC

The combination of dry weather and the background warming trend has resulted in much warmer-than-average temperatures. Daytime maximum temperatures have been unusually warm in 2018, with a year-to-date maximum temperature anomaly of  $+1.36^{\circ}\text{C}$ , which is the warmest on record. High daytime temperatures and reduced rainfall, act to increase evaporation, further drying the landscape and vegetation.

Southern Australia has now experienced above average temperatures in 22 consecutive years, with the last below average season in 1995. Fire severity is now increasing across southern Australia as measured by the Forest Fire Danger Index.

maximum temperatures favours above average daytime temperatures for nearly all of Australia.

Taken as a whole, the current warmer and drier-than-average climate conditions and the outlooks suggest that the southern fire season is likely to commence earlier than usual and be more active than normal.

The Southern Australia Bushfire Seasonal Outlook was released at the AFAC18 annual conference in Perth in September.

More details on conditions on a state-by-state basis can be found at [www.bnhcrc.com.au](http://www.bnhcrc.com.au).

## Climate outlook

The climate outlook for spring is mainly influenced by the Pacific and Indian oceans, together with other factors including long-term trends. The Pacific and Indian oceans are neutral, though the development of an *El Niño* and positive Indian Ocean Dipole is possible.

The outlook for spring rainfall is for increased likelihood of below average rainfall in the south west, south east and much of Queensland. The outlook for spring

# Reflecting on Queensland's 2018 recovery

| Brendan Moon, Queensland Reconstruction Authority

In 2018, 48 of Queensland's 77 local government areas received natural disaster assistance following multiple flood events. The Queensland Reconstruction Authority, Australia's only permanent disaster recovery organisation, reflects on recovery successes and challenges from these events.

In early 2018, more than half of Queensland was hit by damaging storms as well as Tropical Cyclone Nora, causing multiple flooding events. The effects of these weather events were widespread and deeply felt. Geographically, these severe weather events stretched from Maranoa in Queensland's south-west to the Northern Territory border. Five separate rain events drenched communities across northern, central and western Queensland, causing widespread flooding. While these Queensland communities continue to recover and rebuild from these events, they are also preparing for the upcoming severe weather season.

The key to successful recovery relies on a community-led approach that is supported by local governments and state agencies that is focused on tailored local solutions. Local governments, through their disaster management groups and local recovery groups, are best placed to understand and identify recovery needs and lead local recovery activities.

Recovery plans have been developed by local recovery groups in the most severely affected local government areas to support recovery. The recovery plans for Hinchinbrook Shire Council and Cassowary Coast Regional Council are dynamic and were created to meet the emerging needs and priorities of these communities.

Local government areas throughout Queensland are continuing recovery efforts focused on reconstruction of essential public assets, with the Queensland Reconstruction Authority administering Natural Disaster Relief and Recovery Arrangements funding and acquittal processes.

## Recovery activities and reporting

We recognise that connected communities are resilient communities and those communities respond and recover well in good as well as difficult times.

At the state level, the progress of local recovery is supported by five functional recovery groups: human and social, economic, environment, building and roads and transport.

Following the severe weather events in 2018, we worked with the state-level functional recovery groups, the effected local governments as well as recovery partners to develop the Queensland 2018 Severe Storm, Cyclone and Flood Events Recovery Plan. This plan frames, defines and develops the understanding of recovery needs in disaster-impacted regions as determined by impact assessments.

The plan was distributed to all functional recovery groups, Queensland Fire and Emergency Services, Queensland Police Service, the Department of the Premier and Cabinet, the Local Government Association of Queensland as well as the mayors of Hinchinbrook Shire Council and Cassowary Regional Council for review. Feedback was incorporated accordingly.

The plan is a framework for the coordination of recovery efforts, including reconstruction and rebuilding of communities, economies and the environment so they are stronger and more resilient. It promotes resilience through recovery activities and encourages communities to learn from experiences and adapt to new circumstances.

## Complexity in recovery metrics and mapping

Immediately following the 2018 weather events, recovery assistance included collection and mapping of geocoded damage assessment data (see Figure 1). The data and associated understandings of the impacts on communities were shared with the relevant local governments and state-level agencies to inform coordinated recovery assistance and long-term planning. This data allowed us to quantify and report on the



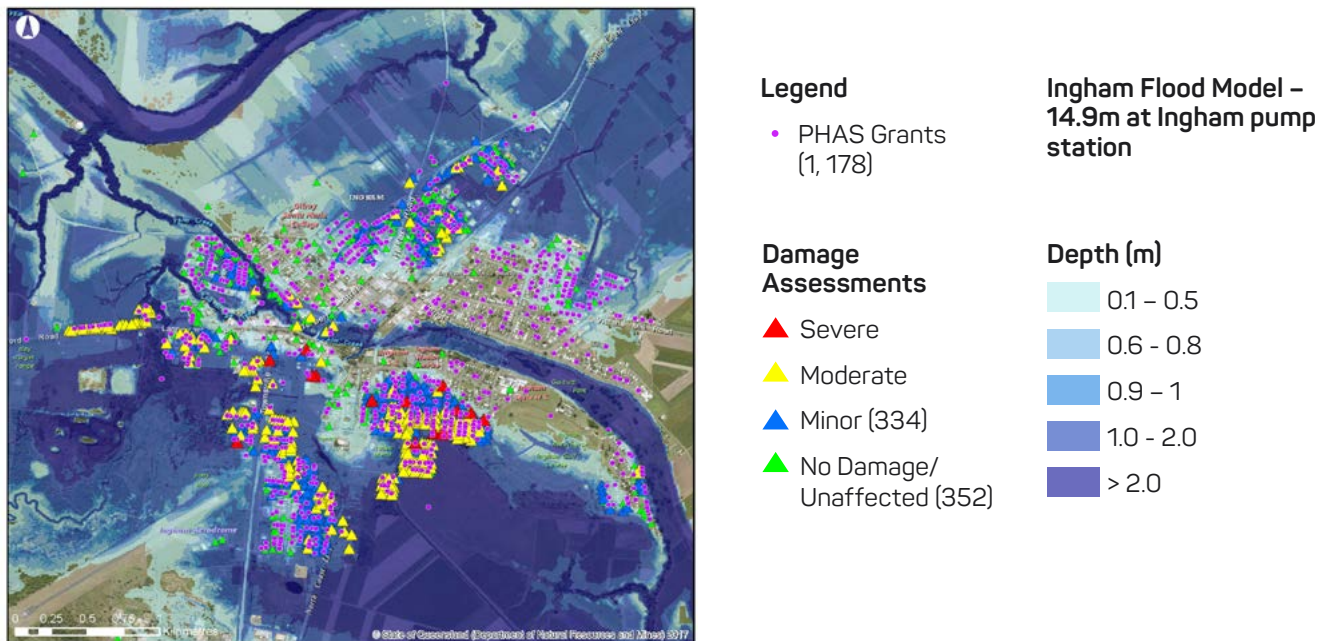


Figure 1: Layered GIS mapping information following the 2018 weather events show damage assessments, flood model and Personal Hardship Assistance Scheme grants at Ingham.

impacts and monitor recovery progress. Follow-up damage assessments are conducted three, six, nine and 12 months after the events as required.

An understanding of the pre-disaster state of affected communities is crucial to the effectiveness of recovery reporting. There are formal and informal approaches to post-event damage assessments, impact assessments and planning processes. During an event, this data collection is coordinated by the State Disaster Coordination Group.

Standardisation of government disaster recovery data presents some challenges and requires consideration of functional recovery reporting requirements, the National Impact Assessment Model and the Seven Global Targets from the *Sendai Framework for Disaster Risk Reduction 2015-2030*. Metrics must capture service delivery in the relief and recovery phases of an event and the outcomes of that delivery. Recovery metrics and outcomes are continually feeding into the development of community profiles and the 'new' status quo. These learnings make it logical to have a cyclical approach to disaster recovery reporting programs.

Queensland's recovery reporting is undertaken by the Queensland Reconstruction Authority in partnership with the state agencies responsible for functional recovery. This includes identifying an appropriate impact assessment model, clear metrics, outcomes-focused reporting and a suitable technical solution with GIS integration.

## Capability development

We have recently implemented a Recovery Capability Development Project to support localised recovery. The

aim is to increase confidence in community-led recovery processes, upskill disaster management teams to deliver recovery operations and plans, provide a coordinated structure for recovery and increase capabilities to develop and implement local recovery plans.

Community recovery from disasters can be a complex and lengthy process and different communities recover at different rates and in different ways. The Recovery Capability Development Project is helping improve how communities prepare for, respond to and recover from disasters. The Queensland Reconstruction Authority is delivering training and exercises focused on community participation in recovery for partners including Queensland Fire and Emergency Services, Queensland Police Service and the Department of Communities, Disability Services and Seniors. The project is being delivered in 21 Queensland local government areas as phase one of a state-wide rollout of recovery capability training.

*Resilient Queensland - Delivering the Queensland Strategy for Disaster Resilience 2018-21*, was launched in May 2018. The strategy was developed in consultation with state agencies, the private sector and local governments with a shared vision to make Queensland the most disaster resilient state in Australia. We will achieve this through realising the strategy's objectives and future actions, implementing a whole-of-government response to disaster resilience to increase the understanding of risk, continued investment in community resilience, improving how we respond and recover from disasters and ensuring resilience becomes business-as-usual for all parts of the community.

# Disaster resilience indicators: the connectedness of communities

Valerie Ingham, Rabiul Islam, John Hicks and Oliver Burmeister, Charles Sturt University

Can community organisational connectedness be a measure of community resilience? Our proposition is that the strength of a community's resilience is a function of the connectedness of local community organisations.

There is a strong government policy focus on building community resilience through an individual and organisational understanding of 'shared responsibility'.<sup>1</sup> In Australia, local community and emergency services organisations are directed to cooperate in building local disaster resilience.<sup>2</sup> How do we assess our success in meeting this directive?

The Disaster and Community Resilience Research Group within Charles Sturt University highlights issues concerning local disaster preparation and support for local leaders before, during and after disasters. The group works with community organisations to help them prepare people and communities for connected daily living; a strongly connected community is more resilient.<sup>3</sup> The unique contribution of community organisations to building resilience (building social connections) contrasts with the traditional emergency management approach (hazard reduction and information delivery). Our aim is to reconceptualise the notion of community in the disaster context to include social cohesion, community participation and integrated connections between all local community organisations.<sup>4</sup>

The simplest measure for community resilience involves an assessment of household preparedness. Our previous research was focused on the individual household as the unit of analysis (e.g. has a fire plan been devised and practiced?).<sup>5</sup> With some distance from the completion of a number of our research projects aligned with the 'individual' as a measure of resilience, we are reconceptualising this perspective. We now posit the strength of community organisational connectedness as an indicator of a community's resilience. Thus, rather than assessing a community's resilience on a household-by-household or postcode basis, we are investigating whether the strength of a community's resilience can be better determined by examining the strength of connectedness between local community organisations such as sporting clubs, neighbourhood centres and local emergency services. Exploring this perspective has important implications as funding changes for local community organisations, especially neighbourhood centres, have placed them in highly competitive funding environments. By demonstrating a nexus between

community organisational connectedness and building community resilience, we create a case for the continued and increased funding for local community and emergency services organisations.

In previous research, a community that had been disaster-affected was likely to have stronger and diverse community organisational networks and connections than prior to the event. This raised the possibility that a community that has not experienced a recent serious disruption may be less resilient. Therefore, we are exploring whether the strength of community organisational connectedness could be a function of experiencing a recent disaster and how to strengthen community organisational connections before disaster strikes.

We want to extend current resilience research to examine the role of local community organisations in facilitating general community resilience as a contributing factor to emergency preparedness. We also want to explore the role of organisational relationship strength as a possible antecedent to community resilience (in general, and in times of disaster) to understand how organisational relationships might be strengthened without waiting for emergencies to occur. We are triangulating our findings with other disaster experiences in various Australian communities as reported through inquiries, research articles and lessons-learned documentation.

- 1 Lukaszewicz A, Dovers S & Eburn M 2017, *Shared responsibility: the who, what and how*, *Environmental Hazard*. doi:10.1080/17477891.2017.1298510.
- 2 COAG 2011, *National Strategy for Disaster Resilience: Building our nation's resilience to disasters*. At: [www.coag.gov.au/sites/default/files/national\\_strategy\\_disaster\\_resilience.pdf](http://www.coag.gov.au/sites/default/files/national_strategy_disaster_resilience.pdf).
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- 4 Redshaw S, Ingham V, McCutcheon M, Hicks J & Burmeister OK 2018, *Assessing the impact of vulnerability on perceptions of social cohesion in the context of community resilience to disaster in the Blue Mountains*, *Australian Journal of Rural Health*, vol. 26, no. 1, pp. 14-19.
- 5 Redshaw S, Ingham V, Harrison K & Quigley T 2016, *BSAFE. Blue Mountains Sustainable Approaches to Fire and Emergencies: A Community Action Model to build resilience, improve preparedness and enhance self-responsibility*, Charles Sturt University.

# Project Firestorm: a student, teacher and NSW RFS collaboration

Tony Jarrett, NSW Rural Fire Service

St Ives North Public School, Sydney, developed Project Firestorm with quality educational challenges and in collaboration with the local Rural Fire Brigade to increase resilience.

The NSW Geography Syllabus requires Year 5 and Year 6 students to explore the impact of a bushfire on people, places and the environment. St Ives North Public School created Project Firestorm to address the educational goals of the Geography Syllabus while incorporating the STEM subjects of Science, Technology, Engineering and Mathematics.

Project Firestorm ran for 12 weeks, involving 200 students across eight classrooms who created 65 group projects. The school designed a unit of study that encouraged scientific and mathematical thinking alongside critical and creative thinking.

Students focused on a real-life and authentic local problem, with the 'driving question' being: How can the community of St Ives North Public School prepare for, survive and recover from a catastrophic bushfire?

The inquiry learning approach applied at the school highlighted the capacity and capability for young people to rigorously investigate the effects of bushfires on people and places, identify problems and issues as well as propose solutions.

Students learnt about the physical and emotional effects of bushfires using research, listening to podcasts and personal stories as well as experiences shared by the NSW Rural Fire Service (NSW RFS) staff and volunteers. The students transferred this empathetic knowledge into the design of solutions for their community.

The students took the project to heights and extents that we could not have foreseen. Teachers 'let go of the curriculum' and allowed the students to lead the learning. Students reviewed their own practice, set their own milestones and applied critical and creative thinking. Classroom interactions were focused and engagement was very high.

Real and authentic links have been created with the NSW RFS, especially with volunteers from the local Ku-Ring-Gai Brigade. The NSW RFS became learning partners with the students and, importantly, they provided a critical and supportive audience where students felt their ideas were valued and their solutions were viable. The

NSW RFS staff and volunteers shared their expertise in bushfire management, their stories about what it was like to be in a bushfire and shared current and accurate data about the impact on communities of bushfires.

Project Firestorm was conducted in classrooms, led by teachers. The project was supported by NSW RFS at four points:

- A discussion with teachers to finalise the key inquiry questions and to how NSW RFS experts could support the project.
- A single one-hour bushfire overview session for the student cohort (eight classes) as a lead-in to the unit of work.
- About five weeks in to the project, a NSW RFS expert visited each of the eight classes to hear from students on the progress of their group work.
- An end-of-Unit showcase where students presented and described their work to the whole school, parents and community members, as well as to the NSW RFS.

This collaboration addressed two key enablers of scaled implementation of effective disaster resilience education in the classroom: increasing teacher understanding and knowledge of emergencies and disasters; and having a close relationship with emergency services organisations.

Evidence-based practice in disaster resilience education highlights that the best role for emergency services staff when working with students is to support teachers. Project Firestorm allowed the NSW RFS to better understand the value of inquiry learning and the strong connection that can be made to support teacher-led education about bush fires.

NSW RFS staff and volunteers are subject matter experts and can guide students to examine problems as well as reflect on and refine solutions. The participation of the NSW RFS certainly enhanced the educational outcomes for students.

# Learning to love where we live again: Strathewen-Arthurs Creek Bushfire Education Partnership

Jane Hayward AM, Strathewen Primary School

The Strathewen-Arthurs Creek Bushfire Education Partnership came to life following devastating bushfires in February 2009.

The community of Strathewen in Victoria was devastated by bushfire in February 2009. Many homes were gone, properties were damaged, the local school and hall were destroyed and many family members, friends and neighbours were lost.

After 20 months of operating from a site 20 km away, the local school reopened in October 2010. In the years following the Black Saturday bushfires, the students of Strathewen Primary School, their families and many members of the local community experienced heightened anxiety and distress as the fire season approached each summer.

Given the incredible impact of the firestorm, householders dealt with the effects of trauma, grief and loss and students presented us with many challenges. Our little school had a major role to play in community recovery. There was a great deal of distress and fear in our young people and we worked hard to make sure that school was a safe and calm place.

As a small staff team, we explored and implemented a range of wellbeing projects and each year we carefully addressed the issue of bushfire preparedness and response at school and home, but there was a need to do more. The difficulty we faced was in identifying a program that would meet our specific needs. We wanted to focus on the future; building resilience in our young people and equipping them with essential skills, and the knowledge, to manage life in a high-fire-risk area.

The Strathewen-Arthurs Creek Bushfire Education Partnership started to come to life when local Country Fire Authority (CFA) volunteer, Lisal O'Brien and Anglesea's Jamie McKenzie (the driving force behind the CFA Survive and Thrive Pilot Program) began discussions with me, as Strathewen's teaching principal. The pilot program had been successfully implemented at Anglesea Primary School by Jamie and the CFA's Emma Taunt and it seemed like the perfect fit for Strathewen.



Community Helpers Day involves students, members of the community, CFA volunteers, local police and others to work on projects.

Image: Jane Hayward

External funding was successfully sought through Foundation for Rural and Regional Renewal and the local Strathewen Bushfire Relief Trust. In late 2015, the planning began in earnest. With the support of Survive and Thrive, a program was created to specifically meet our needs. The main focus was community recovery, reducing distress, building resilience within our student group and empowering our young people with knowledge. Our aim from the outset was to support our children as they learnt to love where they lived once again.

The Strathewen-Arthurs Creek Bushfire Education Partnership commenced in 2016. We are now into the third year of program implementation, which sees the grade 5 and 6 cohort each year involved in a wide range of fire-education sessions on Tuesday mornings during terms 2 and 3. Students become junior members of the local CFA and proudly wear their special uniform to school for all sessions. They work with an incredible host



Children from Years 5 and 6 benefit from fire-education activities every week at the school.

Image: Jane Hayward

of experts, both local and from further afield, and are immersed in rich learning experiences.

Investigating fire behaviour, students look closely at where they live and the subsequent bushfire risk. In weekly sessions they learn about the bush, in very hands-on sessions. They study map reading, topography and learn to measure fuel loading. They work on understanding the Fire Danger Rating system and learn to use tools to determine how the rating is calculated. They explore the responsibility of local bushfire preparedness and planning.

We now have 11 and 12 year olds confidently understanding and using complex scientific equipment and keenly stepping up to instruct adults as they share their knowledge. Student engagement in the program has been amazing. We have witnessed growing family and community interest and participation in all that we do. The wider community and emergency services are involved, participating in 'community helper' days, working with students on a range of projects, sharing knowledge and attending presentation events. The communities of Strathewen and Arthurs Creek have formed strong, new connections as a direct result of the program.

During the past three years, students have worked alongside and formed relationships with CFA volunteers and staff and a host of experts in the emergency management field. They proudly and confidently share their projects and information at every opportunity, delivering presentations to other schools and audiences near and far. They're passionate about sharing what they know.

Our students have created a claymation movie and a picture story book to share information on bushfire



The hands-on sessions help students understand fuel loading and fire danger rating.

Image: Jane Hayward

preparedness and understanding the Fire Danger Rating system in Victoria. These resources are now being used in many school settings as teaching tools. The direction the project takes each year is largely driven by the students, providing them with a real voice and a true sense of ownership.

The outcomes of the program to date have far exceeded expectations. In addition to the strength of the learning outcomes, which relate directly to curriculum, the effects of the Partnership Project have been incredibly positive. Parents and teachers have clearly noted a reduction in stress and anxiety related behaviours and a new sense of confidence and calm in our young people as the fire season approaches. There is a shared understanding within the school community of our responsibility in living where we do.

At a school level, we have moved forward. Not so long ago, all bushfire-related discussion was approached cautiously due to student and community sensitivity. Today we have information on bushfire preparedness addressed regularly in school newsletters. Almost weekly, we're publishing updates and articles written by students to communicate their learning. Empowering our students with knowledge has built confidence and resilience across the senior student cohort and this is filtering down to younger students who take great interest in what is going on.

We're all very proud of what is being achieved in our little school. The Arthurs Creek-Strathewen Bushfire Education Partnership is an outstanding program model and an example of a community working together to support resilience education.

# Strengthening resilience of primary producers and farming communities

Justine Drew, Mary-Anne Young and Merri Tohill, Primary Industries and Regions South Australia

A community's capacity to lead its recovery depends on its collective resilience. How governments provide the right kind of support to primary producers to build that resilience is being assessed in South Australia.

Primary Industries and Regions South Australia (PIRSA) is a state government economic development agency that provides response, relief and recovery support to primary producers and industries in collaboration with other government agencies and non-government organisations. In events that significantly affect regional economies and wellbeing, PIRSA works with affected communities and industries to develop community-led recovery programs and support regional development opportunities.

PIRSA is flexible in its approach. Experience shows that working at various levels (individual, group, regional and industry) as part of a community-led approach is successful in achieving economic recovery. A community's capacity to lead its recovery depends on its collective resilience; the ability of individuals, communities and industries to absorb, respond to and recover from adversity and adapt to changed circumstances.<sup>1</sup>

We provide four case studies where the type and level of recovery assistance varied according to the needs of those affected. Community resilience is considered in terms of the human, social, financial, and political capital as outlined in the Australian Disaster Resilience Community Recovery Handbook.

## Pinery fire, November 2015

The Pinery fire burnt 85,000 hectares of agricultural land and destroyed 139 homes. Two people died and 31 were injured. Approximately 150 grain and livestock farmers were affected and a significant area of land was exposed to soil erosion. The Insurance Council of Australia declared the event as catastrophic with insurance claims of over \$172 million.

Most producers had some insurance. Donations of fodder were provided from farmers state-wide and many volunteers helped clean up debris and reinstate fences. Farmers collaborated to deal with soil erosion. PIRSA provided technical advice on soil erosion, assisted in coordinating fodder donations and distribution, administered National Disaster Assistance Scheme Recovery grants, facilitated connections between support agencies and organisations and primary

producers and participated in the local recovery committee.

The level of support required from PIRSA was considered moderate as most primary producers used their own social, physical and financial resources. The community was well-prepared for such an event and was well-connected through numerous networks.

## Gawler River flood, September 2016

In spring 2016, 5860 hectares of land in the Gawler River catchment flooded following a severe storm. Approximately 300 primary producers were affected. Extensive damage occurred to land, infrastructure and high-value horticultural crops at point of harvest, causing immediate financial hardship for many growers. The value of crops lost was estimated at \$51 million.

Most producers were unable to insure against such losses and they lacked financial resources to repair damage and replant. The event did not attract volunteers from outside the region, however, family members assisted with clean-up and restoration efforts on some properties. PIRSA support included flood water removal, coordinating a waste-removal program, providing technical advice on soil management, administering National Disaster Assistance Scheme Recovery grants and participating on the local recovery committee.

The level of support required from PIRSA in this case was very high due to the need for a recovery centre to provide face-to-face support and interpreter services to manage cultural, business and language needs. The flood water removal and waste removal were essential services that required intensive effort to support the recovery.

<sup>1</sup> Australian Institute of Disaster Resilience 2018, *Australian Disaster Resilience Community Recovery Handbook*, Australian Government Department of Home Affairs.

## Riverland hail storm, November 2016

Hail and extreme winds moved through the Riverland region of South Australia, severely damaging or destroying grape, citrus and stone fruit crops as well as irrigation infrastructure. The total damage was estimated to be \$74 million.

Some producers had insurance or other risk management safeguards. The event did not attract volunteers from outside the region to assist with clean-up. Growers within commodity groups collaborated to manage damaged fruit for biosecurity purposes and alternate markets. PIRSA's support included administering National Disaster Assistance Scheme Recovery grants, coordinating clean-up of fallen fruit using labour from a local training centre, collaborating with industry groups to fund and coordinate mental health and financial counselling support workers and participating in the local recovery committee.

The level of support required from PIRSA was considered high due to the administration of grants and oversight of the clean-up and financial counselling services. This community has successfully withstood a number of adverse events in recent times and is well-connected through numerous networks.

## Sherwood fire, January 2018

A fire in the Sherwood district burnt 12,000 hectares of agricultural land on 19 properties, destroying two homes. Losses included 3000 animals, houses, sheds, machinery and fencing and land was exposed to soil erosion. The total estimated damage was \$7.1 million.

The local community provided support for immediate needs such as livestock welfare and locally donated fodder. Volunteers helped clean up debris and reinstate fences. Farmers collaborated to deal with soil erosion. PIRSA provided technical advice on soil and land management issues, participated in the local recovery committee and supported landholder liaison.

The level of support required from PIRSA was very low due to the preparedness and self-reliance of the community. This community has successfully withstood a number of adverse events in recent times and are well-connected through strong local networks.

## Building resilience

Previous approaches in South Australia have concentrated on developing the technical and business skills of farmers. These aspects remain a priority, however, key to building business and community resilience is developing the resilience of individuals.

Resilient individuals generally have characteristics of:

- caring and supportive relationships within and outside of family

- a capacity to make realistic plans and take steps to carry them out
- a positive view of themselves and confidence in their strengths and abilities
- skills in communication and problem-solving, and capacity to manage strong feelings and impulses.<sup>2</sup>

Including individual resilience development in a farm business program improves a producer's ability to implement plans. Developing the self-reliance of primary producers as well as independence and personal accountability increases their confidence in making sound decisions for their business, with less expectation on government and non-government organisations to 'fix' problems, provide financial assistance or provide compensation for hardship or inconvenience.

Caldwell and Boyd (2009)<sup>3</sup> looked at coping and resilience in farming families affected by drought and noted that: 'Providing financial assistance to support current community initiatives and collective coping strategies may prove more beneficial to farmers than allocating inadequate amounts of funding to individual farming families'.

Opportunities for PIRSA to build the resilience of primary producers, industries and communities include:

- increasing the viability and sustainability of primary production businesses by improving producers' skills and knowledge in managing and operating their businesses
- strengthening community and industry networks and leadership through involvement in planning, development and delivery of learning and development activities
- undertaking primary industry sector resilience profiling for better collective understanding of potential hazards, impacts and recovery needs
- promoting and including a personal resilience component in farm business skills development
- exploring the lessons from past recovery efforts to inform resilience-building programs.

The needs of primary producers and primary industries recovering from the four case study emergency events varied considerably and required different levels and types of support. A review of resilience characteristics of affected communities suggests that people in the more resilient communities were more strongly interconnected, more financially secure and more knowledgeable, skilled and experienced in managing their primary production businesses. As a result, PIRSA is considering how it can strengthen the resilience of primary producers and primary industries to maintain economic growth.

2 American Psychological Association 2018, *The Road to Resilience*. At: [www.apa.org/helpcenter/rpad-resilience.aspx](http://www.apa.org/helpcenter/rpad-resilience.aspx).

3 Caldwell K & Boyd CP 2009, *Coping and resilience in farming families affected by drought*, *Rural and Remote Health* vol. 9, p. 1088.

# Program evaluation, preparedness and resilience: Western Australia examples

Dr Rachel Armstrong, Western Australia Department of Fire and Emergency Services

Community preparedness programs make an important contribution to disaster resilience, but their outcomes can be difficult to measure. Improved preparedness requires behaviour change, which can take a long time and multiple interventions.

Individuals and communities have different needs and levels of readiness to engage in preparedness. Therefore a one-size-fits-all approach does not work. Challenges such as timeframes for change, local differences and lack of data make it difficult to evaluate the achievements of community programs. However, overcoming these challenges is essential to demonstrate results and to build knowledge of how best to design and implement programs that make a difference into the future. This is an overview of how the Department of Fire and Emergency Services (DFES) is responding to this challenge, drawing on examples from our Bushfire Ready program.

## Evaluating preparedness programs

The DFES preparedness programs aim to improve disaster resilience in Western Australia in line with the strategic vision of: 'Resilient Western Australian communities that work together to build capability and capacity to prevent, prepare for, respond to and recover from disasters'<sup>1</sup> and *the National Strategy for Disaster Resilience*.<sup>2</sup>

DFES has developed a monitoring and evaluation framework to support evaluation of its community preparedness programs. The framework is aligned to monitoring and evaluation practice and program theory.<sup>3</sup> It provides a structure for evaluating preparedness programs against the following objectives:

1. individuals and householders have an increased understanding of risk and undertake effective actions to prevent, prepare for, respond to and recover from disaster
2. community leaders, networks and organisations have an increased understanding of risk, increased capacity to work with their communities towards disaster resilience and improved self-reliance
3. organisations involved in emergency management show increased collaboration and coordination in enhancing community preparedness and disaster resilience.

## Contribution of preparedness programs to disaster resilience

Disaster resilience is a broad concept with multiple influences. Parsons and colleagues (2016)<sup>4</sup> identify two resilience capacities and eight resilience themes as a framework for the Australian National Disaster Resilience Index:

- Coping Capacity: social capital, economic capital, planning and the built environment, emergency services, community capital, information access.
- Adaptive Capacity: governance and leadership, social and community engagement.

The index describes disaster resilience from a top-down perspective using national data sets. These capacities and themes also provide a useful conceptual framework to clarify how programs contribute to disaster resilience from the bottom up. DFES community preparedness programs contribute improvements in the areas of social capital, information access and social and community engagement. However, there are multiple other influences on these areas. Other resilience themes, such as economic capital, are unlikely to be affected by preparedness programs but could affect a community's capacity to prepare.

1 DFES 2016, *Department of Fire and Emergency Services 2016-2028 Strategic Plan*, Department of Fire and Emergency Services, Perth.

2 Council of Australian Governments 2011, *National Strategy for Disaster Resilience*, Commonwealth of Australia, Canberra.

3 Markiewicz A & Patrick I 2016, *Developing Monitoring and Evaluation Frameworks*, Sage, Thousand Oaks.

4 Parsons M et al. 2016, *The Australian National Disaster Resilience Index Conceptual Framework and Indicator Approach*, East Melbourne, Bushfire and Natural Hazards Cooperative Research Centre. At: [www.bnhrcc.com.au/research/hazard-resilience/251](http://www.bnhrcc.com.au/research/hazard-resilience/251).





DFES provides preparedness information to residents as part of the Bushfire Ready program.

Image: Department of Fire and Emergency Services

## Bushfire Ready program and disaster resilience

Bushfire Ready is a local community action program supported by emergency services volunteers that encourages residents to work together to prepare for bushfire. Local networks that can support the community in the response and recovery phases of an incident are also developed. The program contributes to the coping capacity of the community by increasing the availability of localised bushfire prevention and preparedness information and by encouraging householders to take preparedness actions that reduce the risk posed to property by bushfire. Social and community capital are built through activities that bring the community together around bushfire prevention and preparedness. Adaptive capacity is improved by increasing the level of social and community engagement. In this way, the program improves community resilience to natural disasters.

## Bushfire Ready program results

Research undertaken in May 2017, following a 'near miss' bushfire in Argyle-Irishtown in the Lower southwest region of Western Australia, demonstrates positive program results. The Bushfire Ready program was introduced to the area two years prior to this incident, and grew rapidly. The post-incident survey showed a high level of engagement with Bushfire Ready (66 per cent of respondents) and that most who had participated in Bushfire Ready activities (79 per cent) had undertaken actions to plan or prepare for bushfire. Those who had participated in Bushfire Ready were more likely to have a bushfire plan. On the day of the incident, they were more likely to have communicated with others in the area about the fire.<sup>5</sup>



The Bushfire Ready program includes practical activities householders can do to safeguard their property from fire.

Image: Department of Fire and Emergency Services

## Challenges to measuring program outcomes

The DFES approach to engagement is partnership-based, building on existing local strengths, skills and networks.<sup>6</sup> Program implementation is flexible and localised and a significant amount of the program implementation work is undertaken by volunteers or other partners. This approach is well grounded in community development practice but also creates challenges for evaluation. Flexible implementation means that gathering consistent data is difficult. In addition, there are multiple factors that affect a community's resilience and level of engagement with preparedness activities. Evaluation results will always be affected by context and only partially be attributable to the program itself. Unqualified quantitative results or comparisons between areas are not possible.

## Where to next

Being specific about the mechanism by which a program affects disaster resilience is an essential basis for evaluating the contribution of preparedness programs to disaster resilience. The themes developed for the Australian National Disaster Resilience Index provide a useful framework for conceptualising how preparedness programs contribute to disaster resilience. DFES is now clarifying how each of its programs supports specific outcomes related to disaster resilience. DFES is also trialling a database for recording and managing stakeholder information. The database contains information about program activities that can be used to monitor and evaluate programs. DFES has also developed a longitudinal survey to assess the contribution of community engagement in targeted high-risk communities to increased disaster resilience.

<sup>5</sup> DFES 2017, *Argyle-Irishtown Community Bushfire Survey - Report on Results*.

<sup>6</sup> DFES 2018, *Community Engagement Framework, Department of Fire and Emergency Services, Perth*.

# Mental health interventions to build resilience

Linda Black, Joseph van Agteren, Matthew Iasiello and Marissa Carey, South Australia Health and Medical Research Institute, and Ronnie Faggotter, South Australian Department for Communities and Social Inclusion

Natural disasters have severe and often traumatic implications for affected individuals and their communities. Evidence suggests that preventative mental health interventions, primarily designed to improve resilience and wellbeing, can provide individuals and communities with resources to 'bounce back' from adversity and decrease the risk of future psychological distress or mental illness.

Experience of disasters can lead to a higher risk of developing mental illness such as depression, and more immediately, decreased levels of wellbeing and flourishing.<sup>1</sup> These two constructs, mental illness and wellbeing, are often thought of as polar opposites. However, they are related but separate constructs, with both playing an important and dynamic role in the mental health of individuals.<sup>2</sup> This distinction is an important one, as both wellbeing and mental illness should be considered separate targets for intervention prior to, or following a disaster situation.

Although a period of gradual recovery from mental illness symptoms is witnessed for a large proportion of people affected by natural disasters, many suffer throughout the process.<sup>3</sup> After a disaster, mental health service providers may have greater difficulty engaging with people because they may not display clinical mental illness symptoms or do not wish to talk with a counsellor or psychologist, or they live in regional or rural communities with problematic access and attitudes to mental health services.<sup>4</sup>

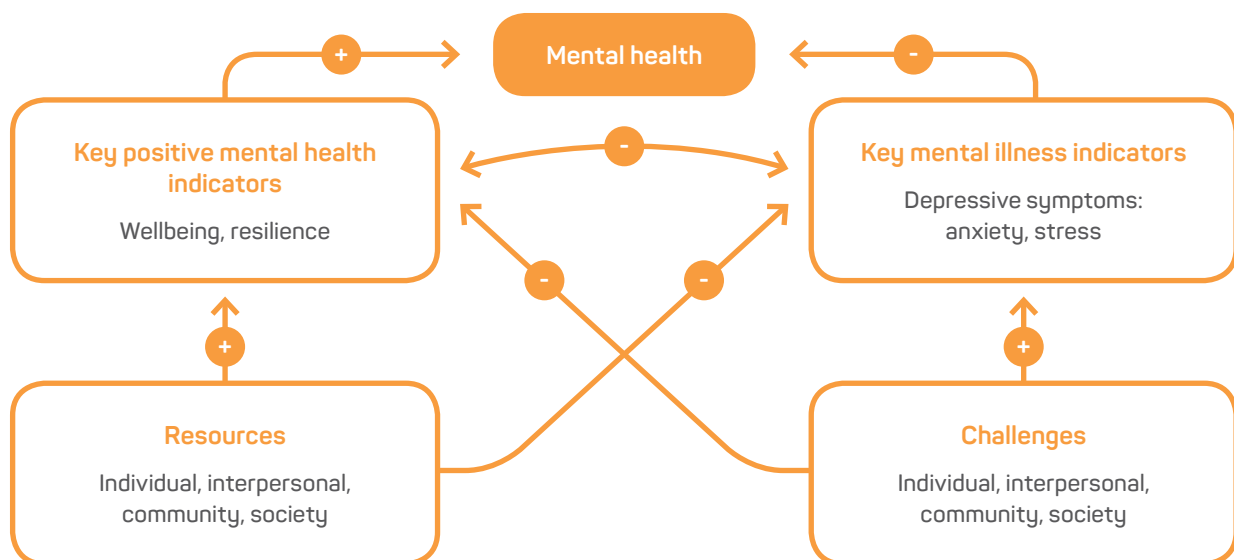
Teaching basic psychological skills to improve positive mental health outcomes, such as wellbeing and resilience, can mitigate the immediate effects of the disaster on the individual. It can improve and maintain positive mental health outcomes that help individuals to 'bounce back' quicker and decreases the risk of developing psychological distress down the track.<sup>5</sup> Similarly, using positive mental health interventions to upskill people and communities before the disaster actually occurs (i.e. using a primary prevention strategy), may play an important and protective role in the mental health of individuals regardless of whether disaster strikes or not.<sup>6</sup> Interventions targeting individual community members may be a cost and time effective solution that can be offered in conjunction with other services. An example would be interventions delivered at the interpersonal, community or societal level<sup>7</sup> aimed at

restoring the communities after a disaster (see Figure 1 for an explanatory model).

## Wellbeing training

A pilot project to deliver a resilience training program to a rural community affected by a significant bushfire was conducted by the South Australia Health and Medical Research Institute Wellbeing and Resilience Centre and the South Australia Department of Human Services. The training was offered in the rural community affected by the Pinery fire that caused catastrophic losses in several communities in South Australia's lower mid-north in 2015. The bushfire burnt 86,000 hectares of land, destroyed 97 homes, caused extensive damage to property and losses of livestock and crops with an estimated \$88 million in insured losses. Tragically, two people died in the fires.

- 1 Fergusson DM, Horwood LJ, Boden JM & Mulder RT 2014, *Impact of a major disaster on the mental health of a well-studied cohort*. *JAMA psychiatry*, vol. 71, pp. 1025-1031.
- 2 Keyes CLM 2005, *Mental illness and/or mental health? Investigating axioms of the complete state model of health*. *Journal of consulting and clinical psychology*, vol. 73, p. 539.
- 3 Norris FH, Friedman MJ, Watson PJ, Byrne CM, Diaz E & Kaniasty K 2002, *60,000 disaster victims speak: Part I. An empirical review of the empirical literature, 1981-2001*. *Psychiatry: Interpersonal and biological processes*, vol. 65, pp. 207-239.
- 4 North CS & Pfefferbaum B 2013, *Mental health response to community disasters: a systematic review*. *JAMA*, 310, pp. 507-518.
- 5 Bolier L, Haverman M, Westerhof GJ, Riper H, Smit F & Bohlmeijer E 2013, *Positive psychology interventions: a meta-analysis of randomized controlled studies*. *BMC Public Health*, vol. 13, p. 119.
- 6 Howlett JR & Stein MB 2016, *Prevention of trauma and stressor-related disorders: a review*. *Neuropsychopharmacology*, vol. 41, p. 357.
- 7 Norris FH, Friedman MJ & Watson PJ 2002, *60,000 disaster victims speak: Part II. Summary and implications of the disaster mental health research*. *Psychiatry: Interpersonal and biological processes*, vol. 65, pp. 240-260.



Plus signs represent a positive effect and minus signs indicate a negative effect.

Figure 1: A conceptual model of the interplay between positive mental health outcomes and outcomes associated with mental illness.

The pilot program offered members of the community a suite of practical skills to build their personal resilience that would be useful. The training included ten 'resilience skills'. These originated from best-practice positive psychology interventions such as mindfulness, as well as techniques stemming from well-accepted psychological therapies such as Cognitive Behavioural Therapy.<sup>8</sup> The skills included adaptability, positive coping, self-regulation and social support to improve wellbeing and resilience. In particular, the training focused on knowledge creation, skills building and improvement of behavioural capacity.

The training was delivered using a train-the-trainer model where the trainers teach a selected group of community members to deliver the skills training to residents living in the fire-affected communities. The goal is to embed aspects of wellbeing and resilience into community ethos.

To evaluate the pilot program, consenting participants provided data used to measure their wellbeing, resilience and psychological distress before and after the training, as well as training satisfaction questions. Encouraging results were achieved despite the small sample size ( $n=28$  at time 1,  $n=13$  at time 2). Participants who completed both surveys indicated significantly higher levels of resilience ( $p=.03$ , Cohen's  $d=0.2$ ). Additionally, non-significant increases were found for wellbeing and psychological distress when comparing before and after scores (Cohen's  $d$ s of 0.31 and 0.56, respectively).

Qualitative feedback on the training was also positive. Participants reported a high degree of confidence in the quality of the trained community trainers and reported that the content was understandable, useful and engaging. All participants either strongly agreed or agreed that people would benefit from the resilience skills and equally felt that the training prepared them to use the skills learnt. There was a strong sentiment that

the skills would be useful across the entire community and participants indicated they would be very likely to recommend the training to others. This feedback was represented by a quote from one participating community member:

*I have begun to use skills and will continue to have a more effective life for myself and those around me. Thanks to all of you for supporting our community following the fires.*

These results should be interpreted with caution due to limitations of study design, the small sample size and challenges associated with a real-world implementation of a program (e.g. attrition during intervention) in a disaster-affected community. However, its positive reception and indications of positive effects on relevant mental health outcomes provide an encouraging basis for future exploratory work.

Future work should focus on 'future proofing' communities that are prone to natural disasters by upskilling local trainers and involving communities and local partner organisations to consider the wellbeing and resilience of individuals and communities before critical events occur. Importantly, training should be offered in conjunction with established mental health services (we do not recommend this training is a replacement for clinical intervention). The goal is to build psychological health at the individual and community level. Improving the resilience of individuals contributes positively to community social capital that, in turn, builds community resilience.

8 Leppin AL, Bora PR, Tilburt JC, Gionfriddo MR, Zeballos-Palacios C, Duloher MM, Sood A, Erwin PJ, Brito JP & Boehmer KR 2014, *The efficacy of resiliency training programs: a systematic review and meta-analysis of randomized trials*. *PLoS one*, October 2014. doi.org/10.1371/journal.pone.0111420.

# Co-designing a disaster resilience strategy for South Australia

Miriam Lumb, South Australia Fire and Emergency Services Commission and Monica Ritz  
Department of the Premier and Cabinet

In September 2016, a supercell thunderstorm and seven tornadoes with wind gusts of 260 km an hour destroyed major transmission lines across South Australia, triggering a state-wide blackout. Many households and businesses were unprepared for the loss of power, communications, fuel and food supplies.

A review of the incident made a number of recommendations including the need for South Australia to have a common understanding of disaster resilience and an agreed policy for building resilience. To address this, the South Australia Fire and Emergency Services Commission (SAFECOM) developed a Disaster Resilience Strategy for South Australia.

Improving resilience involves working across systems and organisations including the emergency services, government and non-government agencies, business and communities. To design a strategy in this complex environment SAFECOM partnered with the Department of the Premier and Cabinet to apply a user-centred design process. The user-centred design approach challenged existing work practices as traditional projects are generally solution-focused and have little flexibility to change or incorporate input or feedback. Alternatively, user-centred design places the needs, wants and limitations of the end users at the centre of the process.

'Mobilisation' is the first of the user-centred design phases and is about establishing the team, developing a user research plan and sharing the problem statement to eliminate any preconceived solutions. In this case the problem statement was:

*If a community is not resilient it is at greater risk during an event and its recovery delayed.*

The 'discovery' phase is about gaining a deep understanding of the problem. Through this process, over 500 participants contributed from across the state through one-to-one interviews, workshops and meetings. Contributors were asked what disaster resilience meant to them, what could make South Australia more resilient (programs, services, legislation, etc.) as well as their thoughts on barriers to resilience and roles and responsibilities.

Resulting data were analysed for pain points, needs and opportunities and grouped into themes. This mapping

exercise identified 47 ideas and opportunities ranging from an information sheet on the Emergency Services Levy to a long-term behaviour-change campaign. The next phase was to test and refine the opportunities. This was achieved by over 100 further consultations. The team invited stakeholders to vote for their favourites, performed cost-benefit analysis and looked at the viability of each opportunity. This process resulted in the list of 47 opportunities shrinking to 15 as some were merged, dropped or deferred.

Stakeholder engagement has already resulted in benefits to the sector. There is increased awareness of disparate resilience-building activities, creating opportunities for collaboration and shared learning in the future. Throughout the project the team received feedback that the process motivated participants to think about what actions they could take and what influence they could have in their home, work or community to strengthen resilience.

The strategy will reflect the findings from the discovery phase. It will document and define what disaster resilience looks like and will focus short- and long-term goals. Everyone has a role to play. The challenge is to create the right environment for communities, including businesses, to adopt significant roles in leading and building resilience.

For sustainable behavioural and cultural change to be achieved, a long-term, bi-partisan commitment of resources and support is required. A challenge will be to facilitate collaboration and joined-up approaches across government and external to government and to involve communities in the development of solutions.

For information about this project, contact [Miriam.Lumb@sa.gov.au](mailto:Miriam.Lumb@sa.gov.au).

# Integrating animal welfare into emergency management

Amanda Nardi-Wallace, Department of Primary Industries and Regional Development, Western Australia

Events requiring an emergency response such as fires, floods, cyclones and earthquakes have the potential to affect animals. Previous incidents have identified that a lack of adequate planning for animals and their welfare in emergencies can result in poor last-minute decisions and have resulted in dangerous and fatal consequences for both animals and their carers. In Western Australia (WA), fatalities occurred in the 2015 fires in Esperance while carers were attempting to move a horse. Post-incident reviews of this event and others<sup>1</sup> identified a need to improve the management of animals and their welfare during emergency events.

Under the direction of the State Emergency Management Committee (SEMC), WA adopts the 'all-hazards, all-agencies' approach and, in accordance with the *National Planning Principles for Animals in Disasters*, the SEMC has committed to integrating the welfare of animals into emergency management. While the responsibility for an animal's welfare remains with the person in charge of the animal, better planning and coordination can contribute to better outcomes for animals, communities and the livestock industry. In March 2018, the SEMC assigned the role and responsibility for the coordination of animal welfare in emergencies to the Department of Primary Industries and Regional Development (DPIRD). DPIRD has appointed a State Animal Welfare Emergency Coordinator and has drafted the State Emergency Animal Welfare Plan (SEAWP), which is due for endorsement in December 2018.

WA accounts for approximately one-third of Australia's land area, yet only an estimated 10 per cent of Australia's population.<sup>2</sup> The natural hazards identified for emergency management in WA include fires, floods, earthquakes, cyclones, storms and tsunamis. WA spans diverse climatic zones and the consequences of a given hazard can vary greatly depending on where in the state it occurs. This presents challenges to effective emergency management; approaches successful in other Australian locations may not be transferable. Coordination, collaboration and cooperation play a significant role in WA's emergency management framework, which uses a three tiered structure and aligns to the shared responsibility concept.<sup>3</sup>

Applicable to all managed hazards in WA, the aim of the SEAWP is to identify the state-level arrangements that provide for a coordinated approach to supporting animal welfare in emergencies. The SEAWP follows the concept of shared responsibility. It acknowledges the role of the person in charge of an animal and identifies this person's

responsibilities in the preparation and response phases of emergencies. The next level of responsibility is with the community and local government. Local Emergency Management Arrangements (LEMAs) that identify animal welfare considerations and ways to support people with animals are the first steps in providing a coordinated response.

The SEAWP identifies six categories of animal and assigns an Emergency Resource Support Organisation (ERSO) for each category. It is the role of the ERSO to provide support when the capability and capacity of the person in charge of an animal, and any LEMAs, are no longer sufficient or effective. DPIRD maintains overall responsibility for the coordination of animal welfare in emergencies and provides support to the ERSO as required.

Coordination, collaboration and cooperation are vital. The size and diversity of WA means that some areas are better resourced to support local arrangements, while others need more and earlier assistance from the ERSO and DPIRD. A lack of understanding of the role and concerns about taking responsibility and resource implications can be barriers in achieving collaboration and cooperation. DPIRD is establishing a Committee for Animal Welfare in Emergencies with membership including the ERSOs, as well as representatives from local governments and animal welfare service providers. The committee will provide a forum to progress the integration of animal welfare in emergency management, identify issues and promote collaboration.

Our understanding of animal welfare needs in emergencies and our responsibilities for them are increasing. While DPIRD has been assigned a coordination role at the state level, only through shared responsibility, collaboration and cooperation can we expect to protect animal welfare in emergencies and, in turn, improve the wellbeing and livelihoods of those responsible for animals. WA faces challenges along the way but the benefits to animals and communities will make it worthwhile.

1 Parkerville-Stoneville-Mt Helena bushfires in 2014 and the Waroona fires in 2016.

2 Australian Bureau of Statistics. At: <http://stat.abs.gov.au/itt/r.jsp?databyregion>.

3 National Strategy for Disaster Resilience. At: [www.homeaffairs.gov.au/emergencymanagement/Documents/national-strategy-disaster-resilience.pdf](http://www.homeaffairs.gov.au/emergencymanagement/Documents/national-strategy-disaster-resilience.pdf).

4 Title to be approved by the SEMC.

# Managing disaster risk to enhance preparedness

Jillian Edwards and Monica Osuchowski, Australian Government Department of Home Affairs

Growing concern about the effects of a variable and rapidly changing climate combined with increasing potential for loss and harm are forcing us to question what can be done differently - before disaster strikes - so Australians can successfully live with intensifying natural hazards.

Over the coming decades and with a population expected to double by 2050, more people, assets and infrastructure than ever will be exposed to the impacts of extreme climate and weather events and we will be challenged in ways we have not experienced before. We need to rethink our approach to disaster risk and better understand the implications of our decisions on future vulnerability and resilience.

Australia's increasing exposure and the desire to sustain a prosperous nation requires us to adapt to complex and changing circumstances and become more effective in talking about and managing disaster risk; scaling our efforts to bring maximum benefit.

Building on the excellent work underway across the country, we can do more to connect and coordinate this effort - sharing our successes and understanding of the likely future - what it means for decisions we make about where and how Australians live, the infrastructure and services we rely on and our collective ability to prepare and respond.

Importantly, we must create an environment to talk about the ways in which we (as individuals and as a nation) are vulnerable so that resilience can be fostered. Building resilience requires an understanding of what is valued and what we stand to lose. With that knowledge, we can learn where vulnerabilities lie and how social and economic systems contribute to disaster risk, preparedness and resilience.

## Responsibility cannot be equally shared

Responsibility for preparedness and resilience cannot be equally shared. Risk transference and individual and collective capacity to cope and be resilient has its limits. Knowing where vulnerabilities are in our social and economic systems can help inform and prioritise efforts to minimise, mitigate or avoid future risk.

The task of preventing natural hazards developing into disasters is complex. People from all sectors must get better and be more transparent about high-stakes decisions; continually adapting and taking new knowledge into account.

## Many disasters are not 'natural'

Weather and climate don't cause disasters—vulnerability does. Australia has a variable and changing climate and a growing population. Natural hazard events have always been a factor in the Australian way of life and social and economic costs escalate when events happen concurrently and with greater regularity. These events are expected to get worse and the potential for loss and harm is increasing day by day.

The decisions we make—where we live and how we manage our lives, settlements, infrastructure, assets and services - has shaped and continues to shape our strength, prosperity and ability to successfully live with natural hazards. The level of loss and disruption that we tolerate and how we function as a society depends on the extent to which disaster risk is understood and who has or is making the decisions and for whom.

There is risk in every decision made. How well we manage the trade-offs contributes to whether or not disasters occur and how bad the effects are. What we value and tend to assume will always be there, such as viable economies, strong cohesive communities, reliable and accessible services, affordability of insurance and a healthy environment, are linked to what we value and therefore prioritise. Decisions are ultimately informed by what is assessed as valuable and at-risk against what we are willing to trade-off.

The way decisions are made and the rules governing them have evolved over time and during periods of relative stability. They have been effective in creating a vibrant nation and a valuable network of highly



Natural hazards like storm surges and coastal erosion have been a factor in the lives of people since European settlement.

Image: Bushfire and Natural Hazards CRC

interconnected, specialised and efficient systems that we depend on. When livelihoods are disrupted by catastrophic events and values shift, latent vulnerability in our systems is exposed and new ones not prominent in everyday life rapidly appear. As such, the limits of resilience will become evident. Disruption to the systems we rely on will be a shock and could have disastrous consequences depending on our level of preparedness.

All Australian governments and sectors of society recognise there is a need for change. As a result, there is a great deal of investment and effort already under way to adapt to complex and rapidly changing circumstances. There is a significant opportunity for greater cooperation and unified effort to do more than change at the margins.

## The Australian Vulnerability Profile project

The Australian Vulnerability Profile project intentionally looked at the ways and means the highly dynamic systems that support Australian society are vulnerable when disasters happen. The project sought an answer to the question *“what makes Australia vulnerable to disaster when severe to catastrophic events impact what people and society value.”*

Our social, economic and environmental systems are connected across local, regional, national and global scales and are structured and designed to work together as a whole. We need to pay more attention to the intersection and interdependencies across these systems as many elements are not currently configured or calibrated to deal with the nature and scale of a rapidly changing climate and extreme events.

There is limited knowledge or understanding, not only among decision-makers but also the public, of how these complex and highly dynamic systems interact and the cascading impacts when one or other part of the system fails or is disrupted. There is also little knowledge about

the patterns within them that can build resilience and reduce vulnerability, including the common practices for risk transfer used by institutions and carried across generations.

The Department of Home Affairs, National Resilience Taskforce partnered with CSIRO to ground the project in social science methods and create a solid evidence base to inform key findings. Working with a multi-sector project team and advised by a panel of academic scholars a series of Deconstructing Disaster workshops were co-hosted by Home Affairs and South Australia, Queensland, Western Australia and the Northern Territory. The CSIRO team created and facilitated a bespoke workshop approach to gathering and curating the data.

Deconstructing disaster events and mapping cause-and-effect flows were used to provide a way to diagnose the root causes of vulnerability, consider the different values that are prioritised or traded off and identify points of intervention that can inform new pathways to resilience. A report that consolidates the thoughts and experiences of over 200 workshop participants about the ways people and systems are vulnerable when emergencies and disasters happen is nearing official release. The report distils the project findings into narratives that people can interact with, including:

- how we build and where we place people, homes, infrastructure and assets
- how essential goods and services are accessed and supplied
- the type of health care system we have
- how we share information and communicate
- how we identify and manage what is at risk, and
- how values shift with changing circumstances.

The purpose of this work is to promote discussion, provide ways to talk about the complex systems that support livelihoods and draw attention to how values influence decisions and how those values shift with changes in circumstances. The work informs proactive, integrated planning and action.

The project intentionally speaks to vulnerability; the least understood dimension of disaster risk and to frame the problem in a way that connects with and mobilises our collective efforts. Engaging one another early and often will help identify synergies with existing work, create links to other aligned projects, provide advice and guidance and potentially collaborate on solving other complex national challenges. In this way we will collectively invest in resilience by re-imagining and better connecting existing activity, resources and investment streams.

Australia will face extreme events in the future and these events will adversely impact the nation. Understanding where we are vulnerable allows vulnerability to rise as a strength and lies at the heart of building resilience and prosperity. Successfully living with natural hazards requires a systemic, cross-discipline, collaborative and inclusive approach to being better prepared.

# Engaging businesses in shared responsibility

Renae Hanvin, *corporate2community*

As the south-east coast of America recovers from the aftermath of Hurricane Florence, there have been some great examples of how the private sector has contributed to community readiness, response and recovery.

U-Haul offered 30 days of free storage for those affected by the storm allowing residents to leave and store possessions in a secure location. A number of airlines waived fees for baggage and pets to support people travelling out of the area and phone carriers gave free text and data to its customers.

An inspiring collaboration between a business and the USA government is the 'Waffle House Index', created by Federal Emergency Management Agency (FEMA) former administrator Craig Fugate. The index is an unofficial metric used to track the potential impacts on affected areas. Waffle House is a 24-hour restaurant chain with 2000 locations across the south of the USA. While the index isn't an official metric it allows FEMA to monitor the status of neighbourhoods using information shared by the chain.

'If a Waffle House is closed because there's a disaster, it's bad and we call it red. If they're open but have a limited menu, that's yellow. If they're green, we're good,' says Fugate.

The concept has many advantages including providing information about how quickly a business can rebound and how the local community is coping post-incident. It enables FEMA to identify any transportation or utility issues (as reflected by store trading status) and also provides a place for FEMA crews and emergency responders to get fed.

## Sharing responsibility in Australia

In Australia, the 2011 *National Strategy for Disaster Resilience* set the scene for a shared-responsibility approach following the Victorian Bushfires Royal Commission Final Report 2010 that acknowledged community readiness, response and recovery cannot be achieved by one sector alone. It highlighted that Australia needs an all-inclusive, collaborative effort between government, communities, businesses and individuals to work together to share the responsibility.

Over the last decade natural disasters in Australia have cost an average of \$18.2 billion each year. As predicted by the Australian Business Roundtable the economic cost of disasters is increasing steadfast, estimated to hit \$39 billion a year by 2050. As such, existing resources

of government and relief agencies cannot support affected communities. Disaster prevention, response and recovery needs an all-inclusive effort using a whole-of-nation approach.

The COAG National Disaster Resilience Statement in 2009 outlined the important role that businesses play in supporting resilience. Businesses provide many of the essential services to communities including water, electricity and transport. They are also providers of resources, expertise and critical infrastructure. COAG identified private sector contributions to be understanding what risks they face and to mitigate these risks so they can provide services during or soon after a disaster situation.

The opportunity for businesses are twofold:

- 1. Organisational resilience:** refers to how a business can adapt and evolve as the world around it changes – in good times and bad. The capacity of a business to manage risk and remain flexible contributes to its level of survival, and that of its local community, in times of disaster and the aftermath.
- 2. Good corporate citizens:** are businesses that focus on more than the organisation itself. Programs that support corporate social responsibility allows businesses to help those in need outside the organisation and demonstrates how companies are morally committed to improving society. Consumers embrace organisations with a social purpose, and when a disaster strikes, it's often businesses that step up and help out that win the support of customers.

## Time for a cultural change

Australia is experiencing a cultural shift to shared responsibility that fosters preparedness and it is vital that effective collaboration is driven by trust, shared knowledge and accountability. This is the time for Australian businesses to play a greater active role in disaster preparedness, response and recovery. Businesses, with a seat at the discussion table, can contribute to the solutions that strengthen organisation and community resilience.



# Collective trauma events: towards best practice

Kate Brady, Australian Red Cross

Emergency management organisations are increasingly responding to trauma events in Australia and internationally. Australian Red Cross has undertaken research to develop best-practice guidelines to help organisations support communities before, during and after these distressing events.

Events in Australia and around the world have seen highly traumatic incidents played out in public places resulting in people witnessing injury and deaths in a violent manner. These events have a significant impact on communities as they challenge public norms, undermine perceptions of safety and provoke significant public grieving.

Such events don't fit neatly into the traditional parameters of emergency management arrangements. They can also attract a lot of media attention and have previously become highly politicised.

While emergency management organisations have been activated to respond, there is a concern that more or different support may be needed. Businesses and community groups are often left wondering what they can do to support their communities in the wake of such events.

To address this concern, Australian Red Cross investigated similar situations and current good practice. This followed incidents such as the disappearance of Malaysia Airlines flight MH370 (2014), the Sydney Siege (2014), the tragedy at Dreamworld theme park in Queensland (2016) and an attack on pedestrians in Bourke Street in Melbourne (2017).

Working with expert advisors, Dr Rob Gordon, Professor Louise Harms, Kate Fitzgerald and Dr Anne Eyre, Red Cross has developed a set of psychosocial guidelines based on current international practice. The guidelines draw on existing literature and have been tested with 300 practitioners, policy makers and researchers from around the world.

The aim of the guidelines is to inform the future work of Red Cross and to support a range of decision makers, practitioners, policymakers and leaders striving to assist their communities.

The value of the guidelines lies in their contribution to operational planning and are deliberately broad in order to assist all organisations in their approaches to



On 20 January 2017, a car was driven into pedestrians in Bourke Street, Melbourne, killing six people and injuring 30 others leading to weeks of public mourning and a sea of flowers.

Image: Zayne D'Crus

preparedness, response and recovery when dealing with collective trauma events. The guidelines complement the range of support material already available and in use and are not designed to be used as a stand-alone operational guide.

The guidelines can be found on the Red Cross website: [www.redcross.org.au/get-help/emergencies/resources-about-disasters/help-for-agencies](http://www.redcross.org.au/get-help/emergencies/resources-about-disasters/help-for-agencies).

For more information, contact Kate Brady at [kbrady@redcross.org.au](mailto:kbrady@redcross.org.au).

# Lessons Management Forum

Nicola Laurence, Australasian Fire and Emergency Service Authorities Council

In August 2018, practitioners from Australia and New Zealand gathered in Melbourne for the third annual Lessons Management Forum, hosted by AFAC and the Australian Institute for Disaster Resilience. Building on the success of recent years, the program focused on effective coordination and evaluation of lessons management as areas for growth; from the grassroots level through to high-level policy.

The challenges and opportunities around system-wide approaches emerged early on as a key theme. Emergency Management Australia's Director-General Rob Cameron set the tone with a presentation on coordinating genuinely 'national' lessons management. Lead emergency management agencies from around Australia followed suit. Among these were Emergency Management Victoria that presented its first state-level, multi-agency approach and a joint session delivered by Queensland's Inspector-General for Emergency Management together with the Fire and Emergency Service and Police Service. South Australia's State Emergency Service highlighted the importance of systems approaches for cascading disaster events, with a presentation on the infamous state-wide power outage of 2016.

While effective leadership was emphasised, the community perspective remained central. The forum heard from Sarah U'Brien of Dungog Shire and Kris Newton of the Mountains Community Resource Network. Through an armchair session facilitated by Louise Mitchell of the Victorian Department of Health and Human Services, participants asked questions to deepen their appreciation for the experience of disaster and recovery in those communities.

The local perspective was also celebrated in the presentation of the inaugural AFAC Lessons Management Award to Logan City Council. The award celebrated the development and delivery of a formal lessons management program in tandem with the council's existing disaster management function, spearheaded by Carla Bailey, Laura Cooper and Margaretta Burton. The Lessons Management Award was made possible by the generous support of ISW, a recognised leader in lessons management software solutions.

Over the two days, many presenters also wrestled with the issue of evaluating lessons management effectively; in the words of Knoco's Nick Milton, who Skyped in from the United Kingdom, 'how do you know if your organisation is a good learner?' Milton looked at various methodologies for measuring quality, efficiency and effectiveness. Others explored the strengths of real-

time evaluation, after action reviews and incident welfare checks.

The program also highlighted insights from beyond the 'traditional' emergency management sphere, including from the Department of Defence, local government, and the health, agricultural and maritime sectors. These sessions offered participants the chance to view lessons from a different lens, such as the biosecurity perspective shared by Jason Males of the Department of Agriculture and Water Resources.

As well as broader networks and different ideas, participants were equipped with practical tools to support teamwork in their organisations. The Bushfire and Natural Hazards Cooperative Research Centre launched the Emergency Management Breakdown Aide Mémoire and Team Process Checklist; the lead researcher, Associate Professor Chris Bearman of CQUniversity, taking participants through the guidance these tools contain for teams before, during and after emergencies. The New South Wales Office of Emergency Management launched its Lessons Management eLearning Course, which is aimed at people at all levels who are participating in, or will be required to participate in, lessons management activities.

Reflecting on areas for future growth, conversations revolved around capability development, change management, skills implementation, facilitation and approaches for measuring culture to enable improvement.

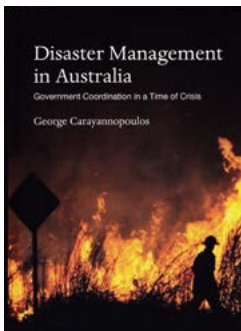
## Learn more:

Proceedings from the AIDR and AFAC 2018 Lessons Management Forum are available on the AFAC website: [www.afac.com.au/initiative/research](http://www.afac.com.au/initiative/research).

A Lessons Management Collection is available on the Australian Disaster Resilience Knowledge Hub, featuring the Lessons Management Handbook as well as research and resources from around Australia: [www.knowledge.aidr.org.au/lessons-management](http://www.knowledge.aidr.org.au/lessons-management).

# Disaster Management in Australia: Government Coordination in a Time of Crisis

Reviewed by Ed Pikusa, South Australia Department for Environment and Water, Adelaide



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Author: George Carayannopoulos

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A significant challenge for the emergency management sector is achieving national coordination in the face of significant disasters. In times of

crisis, the community expects governments to present a single, unified and cohesive response. The theme of Australian national coordination for emergencies and disasters has been a topic of national debate since the early 2000s, with national statements and strategies being produced by the Council of Australian Governments to promote national coordination.

Since 2000, significant disasters have captured national attention. Bushfires in Canberra and Victoria, floods in Queensland, Victoria and New South Wales and several tropical cyclones tested emergency services ability to coordinate across services and jurisdictions. These events, scrutinised under a growing social media focus, put increasing demands on governments to coordinate above traditional arrangements and think differently about how they communicate and are perceived as much as how the response is executed.

Terms such as 'whole-of-government', 'all-hazards' and 'shared responsibility' are now commonly used across Australia in high-level emergency management planning documents and strategies. While there is general agreement in principle that such approaches are required, challenges remain in implementing them on the occasions when they are required.

George Carayannopoulos, in the course of his PhD research, reviews the theory of whole-of-government coordination and examines its implementation to historic disasters in his book *Disaster Management in Australia: Government Coordination in a Time of Crisis*. The book investigates whether, in the heat of a crisis, the principles and commitments to whole-of-government response are applied or put aside, or as the book says, 'whether they were "rhetoric" rather than "reality"'.

Literature on the idea and application of the whole-of-government approach is reviewed, then documents are analysed and outcomes of interviews with key people are presented. These are associated with two recent national crises, the 2009 Black Saturday Bushfires and the 2011 Queensland Floods.

The analysis succinctly illustrates the public policy environments during 2009 in Victoria and 2011 in Queensland in which the crises occurred. It then clearly examines the events and the government responses using the themes of whole-of-government, crisis management, leadership, coordination, organisational culture, social capital and institutions.

Each state's 'whole-of-government' response is compared and contrasted. Victoria turned out to be more fragmented at the time, where Queensland was able to unify more effectively. Narratives of 'failure' and 'success' in the two responses are analysed further; analysing political, bureaucratic and operational responses. The themes that emerge are clear and may not surprise many who have participated in reviews and strategies in this area. However, the academic analysis based on the two recent and iconic national emergency events adds new weight to the findings. These include issues such as:

- institutional barriers of working in a whole-of-government manner outside of crises during 'peacetime'
- the need for closer social and cultural ties between government agencies
- the restrictions of legislation that limit agencies to be adaptable in the face of a crisis.

The final reflections echo the author's research approach, posing more research questions about legislation, governance and inquiries and their links to the management of future crises.

Reading the book as a policy practitioner in a government agency, it has a clear audience in managers seeking to improve planning, governance and crisis management across agencies and governments. This is an area that is often discussed but rarely analysed. This work is welcome in providing new insights to the debate.

Thinking of the desired audience, the academic style of the book makes it hard at times to uncover the findings and reforms that policy practitioner's desire. A summary of key findings, qualities of 'success' versus 'failure' in achieving effective whole-of-government coordination would greatly improve the accessibility and utility of this research.

The potential benefit of this work is in influencing future policy frameworks and governance, improving whole-of-government responses and reducing the losses of future crises and disasters. This is a valuable piece of research to the emergency management sector and useful when considering future policy and governance reforms.

## ABSTRACT

MyFireWatch is a public-access fire information system that shows the location of satellite-derived hotspots on a map layer. Originally developed for expert users, MyFireWatch was created with a user-centred design methodology. This paper describes a study of the on-screen viewing behaviour of non-expert users of MyFireWatch, using eye-tracking technology to observe their use of the system. Non-experts between 20 and 80 years of age were able to use the online system to locate current fires and burnt areas. This validated the design. The study showed that younger users appeared more familiar with interactive map conventions that allowed them to search more quickly than older users. However, older users were able to substitute their prior navigation knowledge for some features. Using aggregated eye-tracking data for different areas of interest on the MyFireWatch interface, maps and fire information functions were viewed by participants the most. Areas on the interface containing menu bars and logos were viewed the least. This paper considers the usability for non-experts of an interactive map designed to visualise the location of remotely sensed fires.

# Usability of MyFireWatch for non-expert users measured by eye-tracking

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## Introduction

The release of GPS for civilian use in the 1980s, first in car navigation systems and later in mobile devices, has enabled access to interactive map navigation. In a review of user studies on interactive maps, Roth *et al.* (2017) urged researchers to 'reenvision the map reader as the map user' and adopt qualitative and mixed methodologies for studying the phenomenon. Fire maps are complex assemblages of geographic information, including satellite-derived data. They often incorporate a standard map layer overlaid with fire-related information and search and navigation tools. Examples of such maps in Australia include North Australia and Rangelands Fire Information<sup>1</sup>, Sentinel Hotspots<sup>2</sup> and FireWatch.<sup>3</sup>

## Remote sensing and mapping of fires

The FireWatch mapping service commenced in the 1990s and provides near-real-time fire mapping together with information about lightning strikes, burnt areas, vegetation coverage, aerial photography and topography (Steber *et al.* 2012). A web-based interface ensures query and distance measurement capabilities. However, the format of this information requires users to understand fire remote-sensing jargon to optimise the use of the service.

The FireWatch online fire map is produced by Landgate, a Western Australia government agency responsible for collecting and communicating spatial information. Fire locations are derived from satellites that can detect fire locations as they pass overhead roughly once every 2-4 hours. Fire locations are detected by determining whether a particular area of the Earth's surface is hot relative to neighbouring areas. The output from the algorithms used to detect fire locations comprises latitude, longitude, sometimes a confidence level and fire intensity. FireWatch overlays these fire 'hotspots' on a base map. Fire locations are usually produced within 45 minutes after a satellite pass.

1 North Australia and Rangelands Fire Information. At: [www.firenorth.org.au](http://www.firenorth.org.au).

2 Sentinel Hotspots. At: <https://sentinel.ga.gov.au>.

3 FireWatch. At: <http://srss.landgate.wa.gov.au/fire.php>.

## Redesigning FireWatch for public use

Between 2012 and 2015, a redesign of FireWatch for greater community access was undertaken during a period of intense scrutiny about bushfire response and a developing understanding about shared responsibility for fire safety (McLennan & Handmer 2012). Loss of property and life in bushfires that occurred during the project emphasised the need for timely information and increased public access to information (e.g. Keelty 2011, 2012). Non-expert users were envisaged from an early stage, using a scenario-based design process (Haimes, Jung & Medley 2012). Following prototyping of the redesigned site, side-by-side user testing in a regional community was employed using card sorting of features to refine the design (Haimes 2015). A new site, MyFireWatch, incorporated contemporary design principles and implemented the results of this community-based research in regional Western Australia (Haimes *et al.* 2013). Since July 2014, MyFireWatch<sup>4</sup> has been accessible from internet-enabled devices. Its responsive design allows viewing on tablets and mobile devices (see Figure 1). MyFireWatch usage has grown steadily from around 700 unique users in 2014 to a peak of 20,226 users during the Waroona and Yarloop fires in January 2016. People could access visual information about the fires using MyFireWatch via online news sites and social media.

## How users ‘see’ MyFireWatch

Design for public websites must necessarily make assumptions about its users. MyFireWatch was redesigned with regional users in mind, however, the open-access site is available to all users. This study investigated the usage and viewing behaviour of non-expert users, particularly those in different age groups, through eye-tracking technology and direct observations. Two questions were considered:

- Can non-expert users of different ages and backgrounds use MyFireWatch to locate fire information?
- What does eye-tracking reveal about how users ‘see’ the MyFireWatch site?

## Methodology

The methodology for this project acknowledges that maps are representative models and reflect the social systems in which they are created (Harley 1989). User understanding of fire maps is dependent on individual contexts, including user education and experience. FireWatch was created for expert users who are familiar with the conventions of interactive maps in fire and land management. The redesigned MyFireWatch retained features developed for expert users, but improved the visual representations and functionality. Of particular interest was how non-expert user ‘saw’ a tool originally designed for experts and whether any features were constraining. Use of eye-tracking provided a side-by-side user testing protocol and provided information about on-screen focal points for participants (Çöltekin *et al.* 2009).

## Sample

A purposeful sample of users was recruited based on three criteria: they were computer users, had a current driver’s licence and were new users of MyFireWatch. Four types of users were identified for investigation:

- grey nomads
- rangers
- international tourists
- 20-somethings.

For each user group, recruitment aimed to deliver subjects who shared some attributes of potential users. The sampling was based on personas as developed by Haimes, Jung and Medley (2012).

Grey nomads is a colloquial term used to describe retirees who travel by caravan throughout regional Australia. To represent this type of user, participants were over the age of 60 who were in good health, interested in travel and had a current driver’s licence (although they may not have been ‘grey nomads’ at the time of the study).

For the rangers group, participants were sought with occupations that included an outdoors or spatial component. The final rangers sample included a traffic officer, a security guard, a retired agronomist and a performance artist

As analogues of international tourists, international university students were recruited who were aged under 26 years and had a driver’s licence (nationalities of the final sample were German, Chinese, Singaporean and Polish).

For ‘20-somethings’, participants had a range of occupations.

The study sample collapsed into two broad age groups (see Table 1) and consisted of eight men and eight women. Gender was equally divided across the older and younger age groups.

Table 1: Numbers of participants by study type and age range.

Type of user (average age)	Older users (age 35–83)	Younger users (age 19–26)
Rangers (61)	4	-
Grey nomads (75)	4	-
International tourists (26)	-	4
20 somethings (21)	-	4
<b>Total</b>	<b>8</b>	<b>8</b>

<sup>4</sup> MyFireWatch. At: myfirewatch.landgate.wa.gov.au.

## Procedure

Side-by-side user testing was conducted in an eye-tracking laboratory to determine how the types of users interacted with the MyFireWatch site. The test protocols involved participants locating particular features on the site (e.g. finding the location of an actively burning fire in their path of travel). A preliminary interview about their use of technology was followed by a 25-minute eye-tracking experiment covering four tasks (see Table 2). On completion, individual sessions were replayed to participants who were encouraged to ask questions.

The eye-tracking set-up was a 17-inch LCD screen with a Tobii T-120 eye-tracking monitor. Users were given an information letter and provided their written consent to participate.

**Table 2: User tasks of MyFireWatch using eye-tracking equipment.**

Order	Task	Description of task
1	Familiarise	Two unguided minutes for the participant to explore MyFireWatch.
2	Search	Determine if there were active fires within 50 km of Broome.
3	Search	Determine whether the area surrounding Mt Isa had burnt in the last two years.
4	Plan	Plan the route from Perth to Port Hedland, taking fires into consideration.

After the eye-tracking recording, areas of interest were defined as focal points for analysis and to investigate the use of different features of the site (see Figure 2). Fixation counts (the number of times individuals fixated on particular locations) and fixation duration (the time in seconds of each fixation) were recorded by the Tobii T-120 eye-tracking monitor. The time taken for each task, in minutes, was scored manually after replaying the video and screen captures of each session. These were used to discern differences in usage between participants and groups.

## Results and discussion

### Familiarisation

During the preliminary interview, users were questioned about their use of technology. All but three participants (one ranger and two grey nomads) had used a desktop computer and smartphone or tablet to access the internet. Only two participants in the older age group

used a smartphone to access the internet and had used a smartphone-based navigation system (e.g. Google Maps). All participants in the younger aged group had accessed the internet via a smartphone and all but one used a navigation system. No participants had used MyFireWatch previously. The familiarisation task provided an opportunity to observe and record how participants viewed MyFireWatch and how they experienced it for the first time (see Figure 3).

Eye-tracking data revealed that most participants gazed at the map area and side menu bar of the site preferentially. This finding is consistent with Ooms, De Maeyer and Fack (2014), who found that eye movements of both expert and non-expert viewers of screen-based maps were similar in focusing on the map area. In the present study, areas of interest were assigned after eye-tracking recording to measure the usage of components of the map interface. Combining data for all participants, 66 per cent of fixation time was spent on the map area (see Figure 2 for defined areas). Current fires, satellite and greenness, burnt areas and lightning activity were the major areas of interest viewed (see Figure 4).

The features included in MyFireWatch, based on user testing during the redesign (Haimes *et al.* 2013), were confirmed by this study as attractive for non-expert users. However, a very low number of views resulted for zoom buttons, site information, the search box, the top menu bar and the logo and scale. One explanation for these results is that, because the map was easy for users to understand, they were less likely to obtain full value from the site due to lack of familiarity with the possibilities of interactive map use. Observation of the screen capture data from the eye-tracking experiment indicated that older users were less likely to use double clicks or the scroll wheel for zooming in and out. Older users were also less likely to change the map layers during the familiarisation task. These results may also be explained by older users fixating more on the centre of the screen at the expense of peripheral regions, which has been previously observed by Bergstrom, Olmsted-Hawala and Jens (2013).

The eye-tracking software produced opacity plots that average the areas of the interface 'seen' by users (see Figure 5). While it is perhaps obvious that the map is the most important feature, opacity plots are worth considering as much of the interface design efforts focus on providing easy-to-use features and tools. Taken together, the areas of interest analysis and opacity plots show that users do not necessarily attend to all interface elements, such as menus. We assumed that at least the older group would have used printed road maps in the past. For such users, additional map features behind menus may not be 'seen' regardless of the additional functionality they offer.

## Search tasks

Locating the township of Broome was chosen for the first search task as there were active fires in the region at the time of the study period. All but one participant understood the fire icons without explanation. Most participants were able to locate the town of Broome and determine whether fires were present. Participants used a variety of methods to achieve this. Five participants were not able to complete the task. The younger users were generally faster, using features such as the search box (see Figure 6). They were also more likely to use the mouse to pan and zoom, while older users were more likely to use the zoom buttons. Five younger participants versus only two older participants used the search box. Participants from both groups were disoriented when they searched for a location via the search box and the map zoomed in to the centre of the town. Younger users were less likely to note the scale bar on the map in relation to the instruction.

For the second search task, determining burnt areas, the township of Mount Isa, Queensland, was chosen, as it was less familiar to residents of Western Australia and international students. As expected, most participants had to use the search tool to locate Mount Isa, including all but one of the younger participants. They then had to turn on the correct display for burnt areas using the side menu bar. All but one participant indicated that the task was complete when black shaded areas (i.e. burnt areas) appeared on-screen. This confirmed that the visual elements were understandable.

Of these two search tasks, users struggled with zooming to the scale required to detect fires and burnt areas, although MyFireWatch has multiple zoom options (buttons, double-click, scroll and rectangle). Manson *et al.*

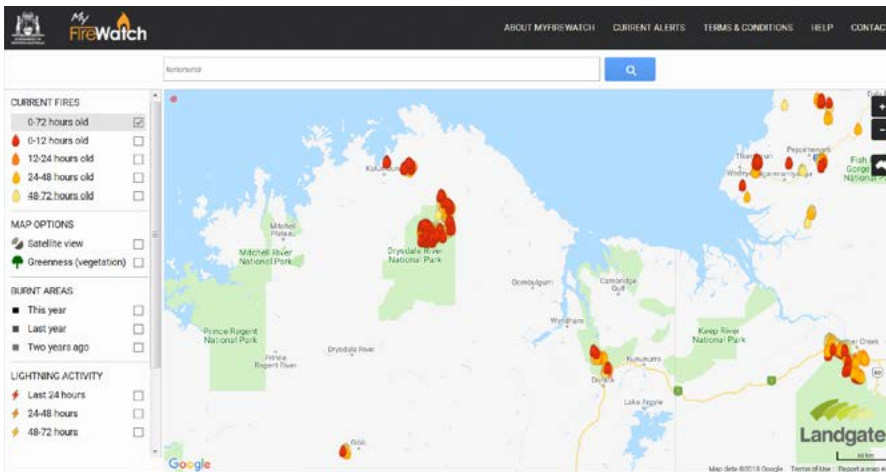


Figure 1: MyFireWatch screenshot of fires overlaid onto a satellite-produced map.

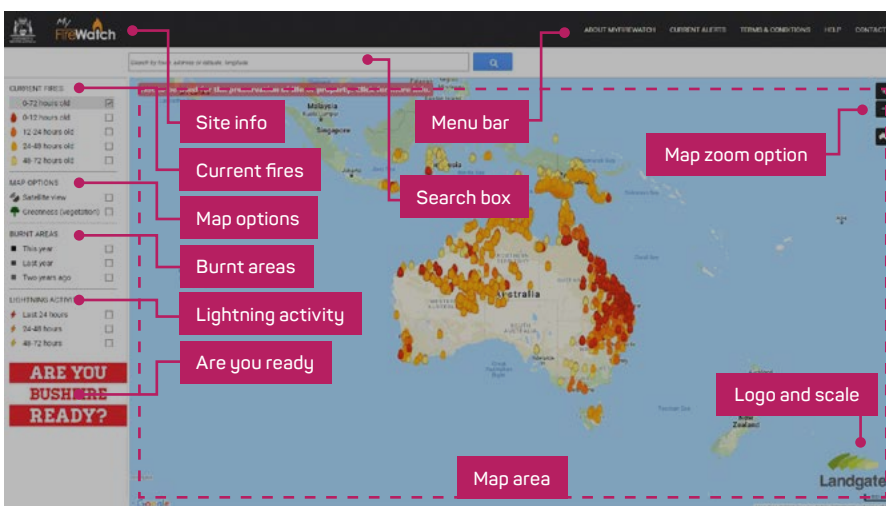
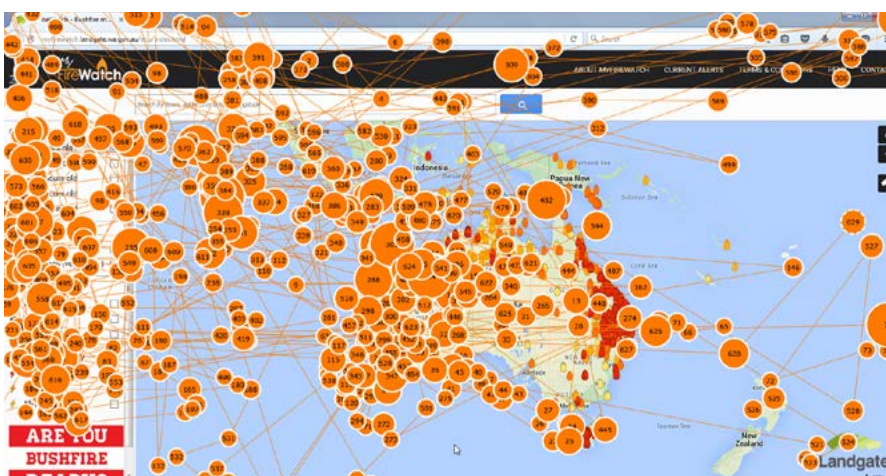


Figure 2: Areas of interest overlaid on the MyFireWatch interface.



Note: Numbers represent eye fixations in sequence. The dot size represents the duration of gaze at a particular location.

Figure 3: Gaze plot of a grey nomad during the first two minutes of familiarisation with MyFireWatch.

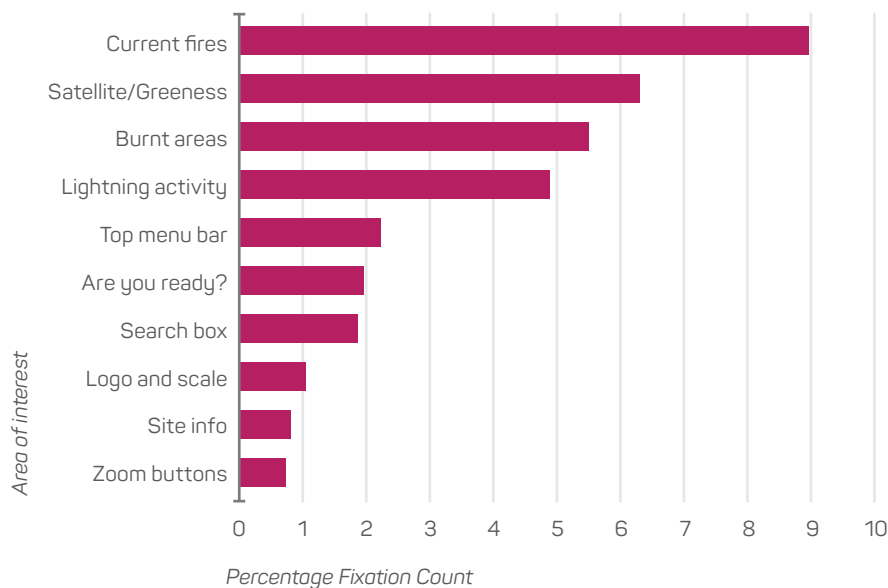


Figure 4: The percentage fixation counts for areas of interest (excluding map area) for how participants 'saw' the information during the first two minutes of familiarisation with MyFireWatch.

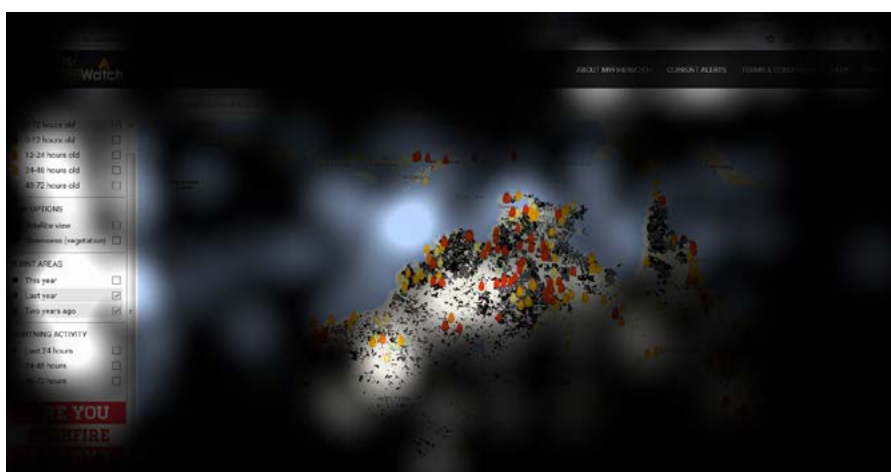


Figure 5: Gaze opacity plot showing areas of the interface 'seen' by a grey nomad participant in the first two minutes of familiarisation with MyFireWatch.

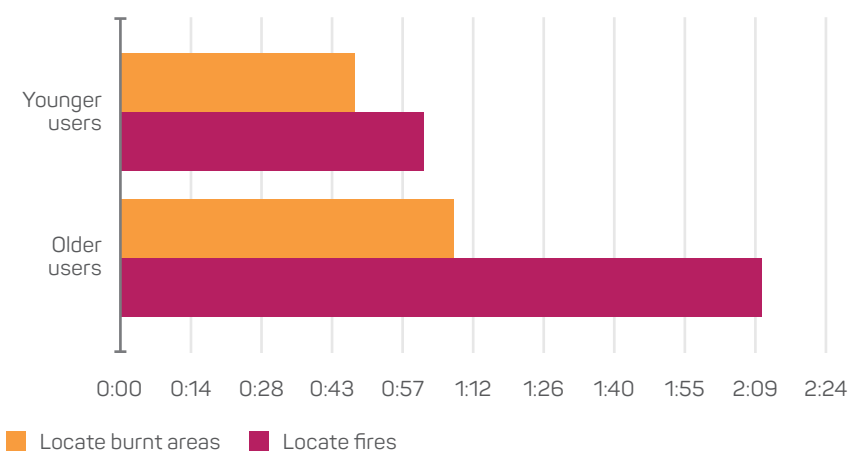


Figure 6: Median duration time of task in minutes for participants who completed search tasks using MyFireWatch.

(2012) cited studies documenting expert and novice users of interactive maps experiencing difficulty with zoom and pan functions. Observation during this eye-tracking experiment indicated that unfamiliarity with zoom and pan functions lead to longer task completion times. The older group took longer to complete the search tasks than the younger group (Figure 6). There were no significant differences within the two age groups.

## Planning task

During the study, there were several fires on multiple routes that led to Port Hedland, Western Australia. This task was designed to evaluate whether participants could integrate fire information while planning a driving route. It is noted that MyFireWatch is not an emergency notification system and the planning task was not intended to replicate choices made in a fire emergency.

In the preliminary interview, participants were asked to give examples of how they had previously used maps on smartphones. Younger participants provided a range of examples such as 'When travelling on buses—to confirm route and where to get off' and 'Finding the location of a particular beach'. Only three of the eight older participants had used maps on smartphones in this way.

One of the grey nomad group was able to complete the planning task. Three of the ranger group who completed the task did so in less time than the younger participants. This provides tentative support for the contention that they had greater spatial ability (see Table 3).

Observation during the task revealed that unfamiliarity with moving the map interface was the primary barrier for older group users who tended to pan as though they were 'driving' across the map. However, they



Table 3: Use of MyFireWatch features and median time to plan a route to a specified location taking fires into consideration.

	Used search box (%) n = 4	Zoomed out (%) n = 4	Noted fires (%) n = 4	Median minutes to complete (n)
Grey nomads	25	25	50	1:59 (1)
Rangers	50	75	25	1:01 (3)
International tourists	75	100	0	2:12 (3)
20-somethings	100	100	25	3:23 (3)

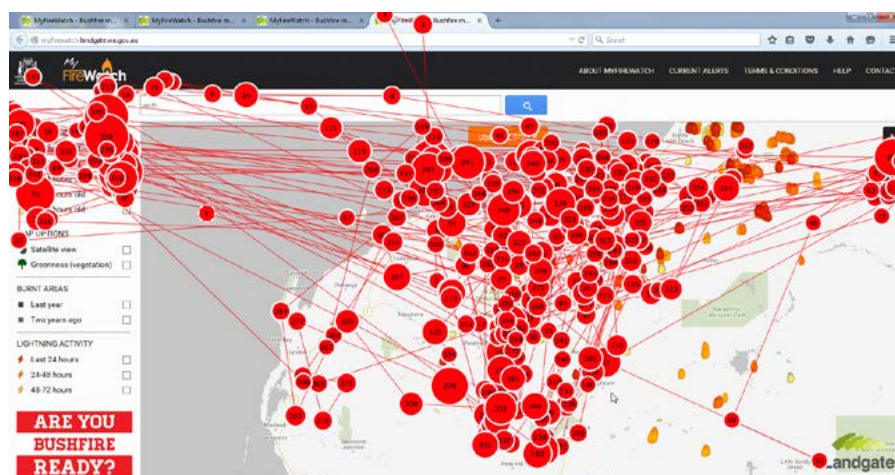


Figure 7: Gaze plot of an international tourist user considering fires during route planning using MyFireWatch.

gave more verbal clues that indicated they were actively comparing routes than did younger participants. While younger participants took longer to complete the task, they were more likely to use the search box and zoom. They were less likely to integrate tasks or verbally note the current fires. Several users expected navigation features like Google Maps by typing 'Perth to Port Hedland' in the search box. Younger users spent more time looking in the region of Port Hedland (Figure 7).

Current alerts provided by state fire and emergency services are provided in a drop-down menu, which is also activated when a user clicks on an individual hotspot. The pop-up link to the alert page also provides the time of the last satellite pass. Across the experiment, only three users examined the drop-down alert page accessible from the top menu. Eight users activated the pop-up hotspot alert box.

## Conclusion

The users of interactive maps effectively co-create the interface with the designer because they are able to use the site functions to change the display of information. The way that different users respond to the

functionality of the site and the information displayed after their interaction with it, depends on their prior knowledge of maps and screen-based technology. In this study, users aged between 20 and 80 years could use the MyFireWatch site. Older users were well educated, but most of their working lives predate the internet. Hence, older group participants sometimes substituted their geographical knowledge of Australia to use the interface more efficiently. This can be viewed as 'active' engagement as they use the site to suit their needs and abilities. Increasing lifespans and use of internet-enabled devices means that the needs of older people must be considered in the development of map applications.

Striking the balance between providing public access to fire information and avoiding the risk of misunderstanding is perceived to be difficult. However, the use of interactive maps for other purposes means that non-experts are increasingly seeking fire information outside an emergency context.

The current study is limited by the small sample size, which was dictated by the use of the eye-tracking technology. However, visualisation of eye movements showed that patterns primarily reflected the map area and key features. An online fire map like MyFireWatch is a complex mix of information from multiple sources. This

study confirmed the usability of map features chosen for the user-centred redesign of MyFireWatch for non-expert users. The study also confirmed that interactive map functions, such as pan and zoom, influence the time taken by non-expert users to search for and locate information.

Future development could investigate explicit labelling of navigation tools that may improve effective use by non-experts. Restricting the level of zoom could be considered to reduce any disorientation experienced by users after searching for locations and to avoid any misunderstanding about the accuracy of hotspot representation. MyFireWatch can be used as an additional source of information by non-expert users to improve their spatial understanding of fire events and to plan travel. It may also have a role to play in education about the frequency and seasonality of fires in Australia.

## Acknowledgements

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## ABSTRACT

Volunteer turnover is a continuous concern for emergency services organisations. Using a psychological contract perspective, this paper examines how meeting the initial expectations of volunteers when they join an emergency service is related to the volunteer's intention to remain with that service. A survey was undertaken by 539 emergency services volunteers in Western Australia after volunteering for about a year. The survey included questions about reasons why volunteers joined the service, activities they expected to undertake as a volunteer, their evaluation of the volunteering experiences in the first year and their intent to stay. Using Latent Class Analysis of their expectations, three types of volunteers were identified. These were 'focused' volunteers (having well-defined expectations), 'lost' volunteers (lacking clear expectations except for serving the community) and 'overenthusiastic' volunteers (expecting status, reputation and career progression among other things). The results showed that the focused volunteers had participated in more activities and had a higher intent to remain a volunteer. Having too few or too many expectations seems to have negative consequences. Therefore, emergency services organisations could strive to understand and shape volunteer expectations to match a new volunteer's experience by using better aligned recruitment practices.

# When joining is not enough: emergency services volunteers and the intention to remain

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## Introduction

Many communities in Australia rely on the crucial services provided by emergency services volunteers, especially in the states and territories that are relatively less densely populated. In Western Australia, the Department of Fire and Emergency Services (DFES) currently supports over 26,000 volunteers across six services, including the Bush Fire Service and State Emergency Service (DFES 2018). However, these volunteer emergency services organisations can be exposed to high levels of volunteer turnover, with annual rates as high as 23 per cent. This turnover rate is problematic because it potentially puts the delivery of crucial emergency services in jeopardy. This leads to a loss of expended finances, time and human resources. McLennan (2004) estimated at that time it cost \$710 to recruit and train a new emergency services volunteer in Australia.

The reasons for the high rates of volunteer turnover are not well understood. Locke, Ellis and Smith (2003) conducted a comprehensive review of the literature on volunteer retention and found many areas of disagreement among researchers about the factors that cause volunteers to stay. Unfortunately, despite additional research conducted since that review was published, the literature on volunteer retention remains limited (Newton, Becker & Bell 2014) especially with respect to the retention of emergency services volunteers.

One study found that intentions to remain a volunteer firefighter were positively associated with better leadership and higher inclusiveness within the volunteer brigade, group or unit (McLennan *et al.* 2009). Studies of State Emergency Service volunteers found aspects of support and recognition to be strong predictors of volunteer job satisfaction (Fallon & Rice 2015). Moreover, supervisor support, recognition, interactional justice and group cohesion were positively related to ongoing commitment to volunteer (Rice & Fallon 2011). A comprehensive report on emergency services volunteers in Australia identified five main challenges to volunteer retention. These were:

- limited time available for volunteering
- excessive amount of training required
- personal costs involved in volunteering
- lack of recognition for volunteering
- conflicts and tensions with other volunteers (Esmond 2009).

Studies into emergency services volunteer turnover are often limited in the reliance on data collected from exit surveys. Opinions expressed in exit surveys are prone to being plagued by hindsight bias and may provide an overly negative account. In addition, exit surveys do not provide insights into volunteers' decisions to stay with the service. Existing research provides little

theoretical guidance as to how to identify volunteers who are at risk of leaving the service, nor the initiatives to improve volunteer experiences with the service.

This paper builds on the theoretical framework of the 'psychological contract' (Rousseau 1995) to explore how emergency services volunteer expectations shape first-year experiences of volunteering and influence intentions to remain with the service. An innovative data analytic technique—Latent Class Analysis (LCA)—was used to identify distinct profiles or 'types' of volunteers based on their reasons to join and their expectations of the volunteering role. Grounded in the psychological contract perspective, an explanation is provided of how mismatched volunteer expectations may lead to higher turnover. Practical guidance for managers to identify volunteers at risk of leaving and ways to retain these volunteers in the service is offered.

## Literature review

Extant research conducted with emergency services volunteers in Australia offers suggestions as to why volunteers leave. A study of volunteer firefighters in South Australia and Victoria suggests that dissatisfaction with the volunteer role accounts for about 25 per cent of those withdrawing from volunteering (McLennan *et al.* 2009). But why do volunteers become dissatisfied with the role? If volunteer initial expectations of the role and the purpose of the organisation do not match their actual experiences, they may become disenchanted and, thus leave the service.

In a volunteering context, the psychological contract refers to the obligations, rights and rewards that a volunteer believes he or she is owed in return for continued work and loyalty to a manager, group, team or organisation (Rousseau 1995). In other words, a psychological contract is what a volunteer *expects* the volunteering experience to be like, based on what was promised by a manager, group, team or organisation.

In contrast to a traditional written contract, the psychological contract:

- is implicit rather than explicit
- can be shaped by experiences the volunteer has before and during the volunteering experience
- can be unique for every volunteer rather than standardised for all volunteers (Stirling, Kilpatrick & Orpin 2011).

When a volunteer perceives a psychological contract breach, they may feel that trust has been violated and may respond with aggressiveness, negative behaviour and/or leave the service (Vantilborgh 2015). For example, Vantilborgh and colleagues (2012) found that helping other volunteers was perceived as an integral part of the volunteering role, although this task was not expected when joining an organisation. Consequently, some volunteers did not want to undertake this additional task, presumably as a way of reconciling a psychological contract breach.

It is important for organisations managing volunteers to understand that the 'terms' of a volunteer's psychological contract can be formed even before the organisation has interacted with that volunteer. For example, strong stereotypes about a volunteering role (e.g. firefighters rescuing people from burning buildings) might create expectations, accurate or otherwise, about the volunteering experience and what needs or goals might be satisfied by that experience. Recruitment messages and activities will also impact on the expectations volunteers have about a volunteering role.

After a volunteer is recruited, their psychological contract is influenced during 'socialisation' experiences. Effective socialisation transforms a volunteer from being an 'outsider' to an 'insider'. Socialisation is the process through which 'an individual acquires the social knowledge and skills necessary to assume an organisational role' (Van Maanen & Schein 1979, p. 211). Socialisation can include induction, onboarding (i.e. the process of integrating volunteers into the team) and training. During these activities, psychological contracts can be solidified or transformed. There is also a risk of psychological contract breach if these early activities do not meet the expectations a volunteer had before or during recruitment.

A psychological contract will continue to evolve as a volunteer becomes familiar with a manager, group or organisation. However, it is perhaps the pre-recruitment, recruitment and socialisation experiences that will determine most strongly a volunteer's intent to remain with an organisation. Therefore, to reduce premature turnover, it is firstly important to understand what volunteer experiences are in his or her early tenure and how these experiences match (or fail to match) the volunteer's expectations. This study addresses this issue by identifying the expectation profiles of first-year emergency services volunteers and examines how these relate to intentions to remain with a service.

## Method

In partnership with the DFES, data from 539 volunteers who completed a survey of their first-year experiences was analysed. The survey was distributed in 2015–2017 to all new volunteers with approximately 12 months of service. A total of 4535 volunteers were invited to complete the survey and 555 valid responses were received (response rate of 12 per cent). However, 16 responses were missing data on all key variables, thus the final sample used in the analyses was 539.

The survey was designed by DFES staff and requested demographic and service-related information. Respondents were asked to select reasons why they had joined the service (e.g. 'Help the community') and the activities they expected to be involved in (e.g. training). Figure 1 shows a list of reasons and activities. Respondents further indicated whether they have undertaken the training and activities expected, how many hours a month they volunteered with the service and how long they intended to stay. Finally, volunteers were asked to agree or disagree with a number of statements about their experiences with that service

and its leadership (e.g. 'I feel included and part of the team' or 'Experienced volunteers and leadership keep to themselves').

The LCA statistical technique was used to analyse the data. In general terms, LCA identifies different sub-groups (profiles) of people within a larger population (Muthén & Muthén 1998-2012). In concrete terms, the LCA was used to determine whether different types or profiles of emergency services volunteers existed based on the reported reasons for joining and the activities they expected to be involved in.

Three statistical criteria were used to determine how many sub-groups of emergency services volunteers exist. These were:

- the Bayesian Information Criterion (BIC)
- the measure of latent classification accuracy (entropy)
- the Adjusted Lo-Mendell-Rubin likelihood-ratio Test (Adjusted LRT).

The preferred solution should have the lowest BIC value, entropy values closer to one and significant Adjusted LRT statistic (Wang & Wang 2012). Finally, non-parametric Kruskal-Wallis tests were used to compare the identified volunteer profiles on the status of other variables collected in the survey, such as demographics, experiences and intentions.<sup>1</sup>

## Results

Selected demographic characteristics of the sample are presented in Table 1. Respondents represented all Western Australia regions with the majority (42 per cent) from within the Perth metropolitan area, 20 per cent in the South West, 11 per cent in the Great Southern.<sup>2</sup> Interestingly, 12 per cent reported volunteering with two services. Overall, these distributions are representative of the volunteer population in terms of demographic characteristics, location and service.

The respondents' selected reasons to join the service and the expected activities (both coded as zeroes and ones) were used to identify the profiles of first-year emergency services volunteers. Based on these criteria, a three-profile solution was the best fit with the data<sup>3</sup> (BIC=11,721, entropy=0.84, Adjusted LRT=314.3,  $p<0.05$ ).

Figure 1 shows the profiles along with the estimated probability that a volunteer from a given profile will select the corresponding reason to join the service and the activity expected once in the service. The three identified profiles of volunteers are labelled 'focused', 'overenthusiastic' and 'lost'. There was no difference in the gender composition for each profile.

The focused volunteers (57 per cent of all respondents, orange bars in Figure 1) reported a fairly clear and focused idea of why they joined the service; to help the community, learn new skills and seek camaraderie. The focused group also had a well-defined set of expectations regarding what their volunteering activities entail, especially with respect to training.

Table 1: Demographic characteristics of respondents.

Sample characteristics	Percentage of sample
Female	28%
Aged under 25	17%
26 to 35 years	21%
36 to 45 years	21%
46 to 55 years	19%
Over 56 years	23%
Bush Fire Service	41%
Volunteer Fire and Rescue Service	20%
State Emergency Service	19%
Volunteer Fire Service	13%
Volunteer Marine Rescue Service	12%
Volunteer Fire and Emergency Service	6%
Other service	3%

The overenthusiastic volunteers (13 per cent, maroon bars in Figure 1) mentioned a variety of factors to join the service and were the only group to report status, reputation and career path as reasons to volunteer. This group also expected to be involved in many different activities. A larger proportion of overenthusiastic volunteers were under 36 years of age (54 per cent compared to other profiles (i.e. focused, 41 per cent; lost, 24 per cent;  $p=.001$ ).

The lost volunteers (30 per cent, blue bars in Figure 1) did not have a clear idea of what influenced them to join, aside from helping the community. Volunteers in this profile also did not have strong expectations regarding what they would do in the role, aside from providing emergency response and general help. A larger proportion of lost volunteers were over 55 years of age (34 per cent) compared to other profiles (i.e. focused, 18 per cent; overenthusiastic, 21 per cent). Further, a significantly larger proportion of lost volunteers were located in regional areas (39 per cent) as compared with metropolitan areas (17 per cent,  $p=.001$ ).

1 With binary variables of location and attendance at the call-out, the standard t-test was used to establish significance.

2 In the analyses, all respondents from the areas other than Perth metropolitan are referred to as 'regional'.

3 Fit statistics for the two-profile solution (BIC=11,880, entropy=0.76, Adjusted LRT=870.1,  $p<0.01$ ). Fit statistics for the four-profile solution (BIC=11,721, entropy=0.79, Adjusted LRT=156.2,  $p<0.05$ ).

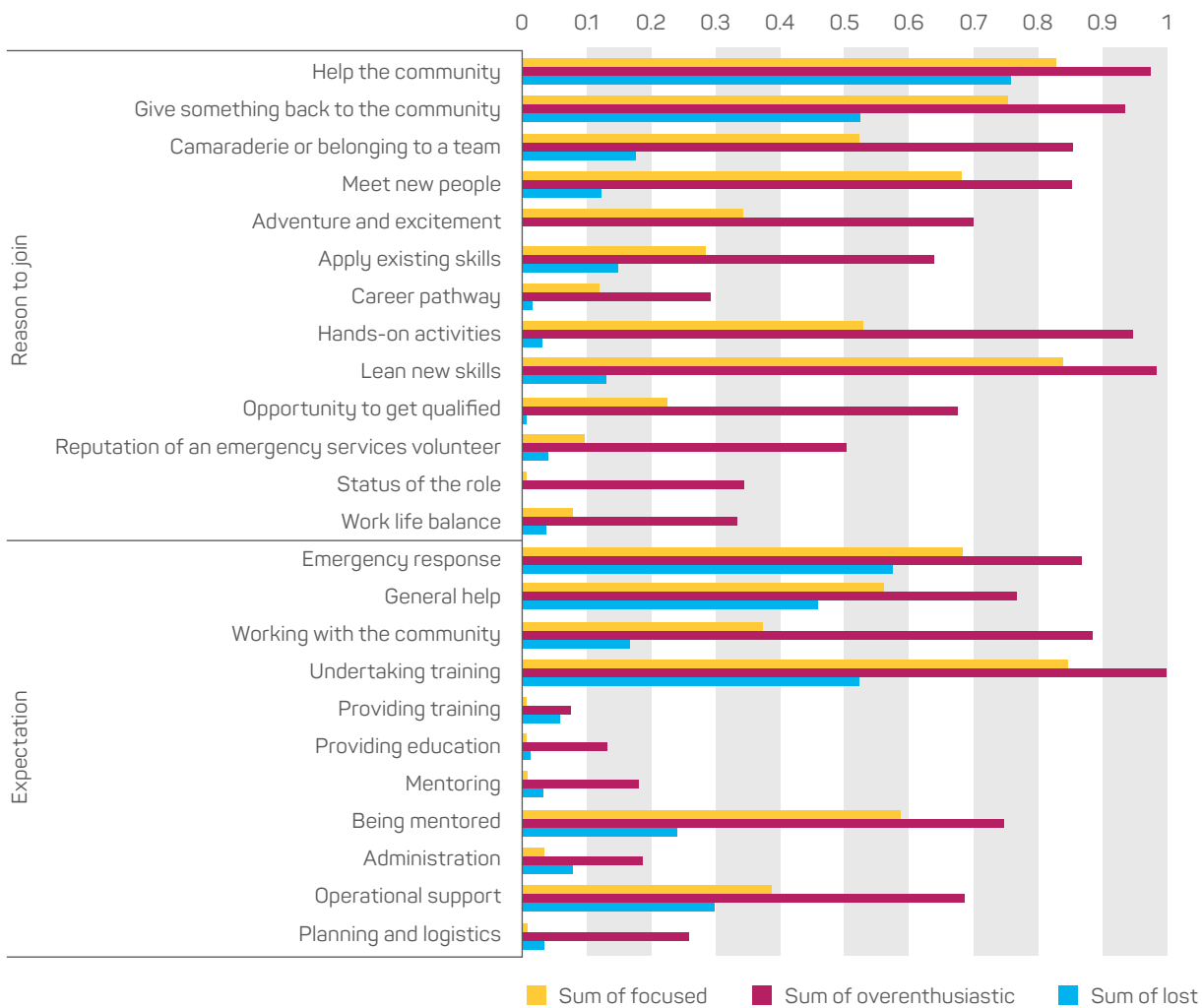


Figure 1: Estimated probability for citing the different reasons to join the service and activity expected by volunteer profile.

Figure 2 shows the volunteers responses when asked if they had undertaken the expected activities. 10 per cent of lost volunteers reported no activities in their first year. A larger proportion of overenthusiastic volunteers reported being involved in only some expected activities (31 per cent,  $p=.064$ ).

A larger proportion of lost volunteers reported volunteering for ten hours or fewer a month (46 per cent), compared to focused (37 per cent) and overenthusiastic volunteers (22 per cent,  $p=.059$ ). A similar proportion of focused and overenthusiastic volunteers reported greater than 20 hours a month, on average, dedicated to the service. Only 64 per cent of lost volunteers reported attending a call-out in their first year, compared to 76 per cent of focused and 78 per cent of overenthusiastic volunteers.

On average, focused and overenthusiastic volunteers reported more positive experiences (mean of 3.2 and 4.0, respectively), compared to lost volunteers (mean of 2.1,  $p=.001$ ). Finally, when asked how long they intended to remain with the service, a smaller proportion of the lost volunteers intended to volunteer in the long term (48 per cent), compared to overenthusiastic volunteers (66 per cent) and focused (59 per cent,  $p=.055$ ). Figure 3 shows the intention to remain with the service by volunteer profile.

An interesting result was the larger proportion of overenthusiastic volunteers considering leaving the service in the near future or unsure about their length of volunteering (13 per cent), which was comparable to the lost volunteers (12 per cent).

## Discussion

The aim of this study was to identify profiles of first-year emergency services volunteers based on their reasons to join and expected activities. The study sought to identify how these expectations influence volunteers' experiences with the service and their intention to remain.

The three distinct profiles of first-year emergency services volunteers—focused, overenthusiastic and lost—primarily differed in the *number* of activities volunteers expected to be involved in and the *number* of motives they expected to satisfy by joining. The focused volunteers had a well-defined set of expectations about the activities they would undertake and the reasons for joining the service. Whereas the lost volunteers had barely any expectations and the enthusiastic volunteers were expecting many things. Having a well-defined set of expectations meant that focused volunteers had better experiences in their first year with the service

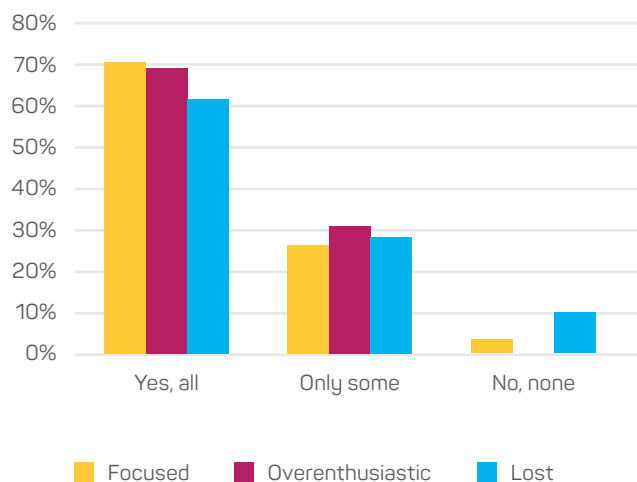


Figure 2: Participant responses to 'Have you undertaken activities that you expected?'

and were intending to continue volunteering for longer. This is consistent with the psychological contract perspective where realistic initial volunteer expectations (relative to the actual experiences of volunteering) lead to reduced turnover. However, there is a potential danger in that the focused volunteers might be too rigid in their expectations and lack the flexibility required to deal with the unexpected demands of the volunteering role (e.g. Vantilborgh *et al.* 2012).

The overenthusiastic volunteers were somewhat scattered in their expectations of the activities and their reasons for joining the service. Although having volunteers who are passionate and enthusiastic can be very beneficial for a service, there is a danger of a psychological contract breach occurring. For example, overenthusiastic volunteers might expect more activities than is actually possible, hence they report lower involvement with volunteering activities in the first year. Ultimately, this might lead to a lower intention to remain with the service for these volunteers, which is consistent with the psychological contract perspective.

Lost volunteers had minimal clarity about their reasons for joining the service and the expected activities. In line with the psychological contract perspective, these initial volunteer expectations influenced their experiences in that lost volunteers were involved in fewer activities, possibly because they did not know what they were expected to do as a volunteer. The findings suggest that the breach of psychological contract may occur when volunteers have *too little* expectations. This is evident as lost volunteers reported a significantly lower number of positive experiences in their first year and had a lower intention to stay with the service. Of concern was the finding that a large proportion of lost volunteers reside in regional areas, as these areas are potentially more reliant on volunteer services. Research suggests that emergency services volunteers are most frequently recruited informally, via existing social connections (Baxter-Tomkins & Wallace 2009). It is speculated that informal recruitment is especially widespread in regional areas and this could partially explain why a higher prevalence of the lost volunteers are in these areas.

The results of this profiling are consistent with previous research in the general volunteer population in Australia,

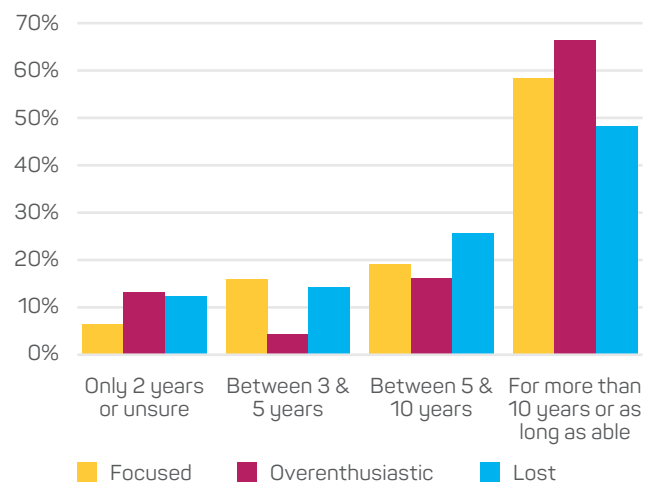


Figure 3: Intention to stay with the service by volunteer profile.

which identified six psychographic segments of volunteers based on their motivations (Dolnicar & Randle 2007). The overenthusiastic volunteer profile is similar to 'dedicated volunteers' who perceive each of the motives for volunteering as relevant.

## Practical implications

The findings demonstrate the importance of applying psychological contract perspective in the recruitment and retention of volunteers. Active recruitment is often the first point of contact between a service and a prospective volunteer and interactions during the recruitment process can shape expectations. Emergency services organisations must be mindful that they provide positive, accurate and realistic information about the volunteering opportunity, lest new volunteers be disappointed by a mismatch between their expectations and experiences. For example, anecdotal evidence suggests that emergency services volunteers are often unprepared for the amount of training they need to undertake before becoming operational and do not realise how much idle time there might be between calls to assist. Such misconceptions of the volunteering role could be clarified by designing accurate recruitment materials and educating recruiters and managers in setting the right expectations.

Research suggests that volunteer managers and volunteers often have different expectations and obligations of the volunteering role (Taylor *et al.* 2006). It is possible that the mismatch between volunteer expectations and actual experiences occurs because managers communicate organisational expectations of volunteers at the recruitment stage rather than the expectations of volunteers of the organisation. Therefore, it is important that managers involve existing volunteers in the recruitment and socialisation stages of new volunteers. Existing volunteers can clarify actual roles and activities and facilitate a better match of volunteer expectations.

Finally, there are significantly more lost volunteers in regional areas. Regional communities depend heavily on the service rendered by emergency services volunteers.

Therefore, it is important to employ realistic recruitment messages as well as existing volunteers to elicit and clarify expectations.

## Conclusion

This study considered and addressed an important issue of retention of emergency services volunteers through the lens of the psychological contract perspective. Using survey data from 539 first-year volunteers in Western Australia, profiles of volunteers based on their reasons to join the service and expected activities were identified. The three profiles—focused, overenthusiastic and lost—primarily differ in the quantity of expectations. The study showed that having *too few* or *too many* expectations may lead to higher volunteer turnover. While the study is somewhat limited due to the small response rate and the use of cross-sectional data, the findings emphasise the importance of employing realistic recruitment messages and clarifying expectations for new volunteers to reduce turnover.

## Acknowledgment

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## ABSTRACT

# Disclosing volunteers as 'human capital': analysing annual reports of Australian emergency services organisations

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Annual reports of 11 volunteer-based emergency services organisations were analysed to determine how volunteers are valued in terms of human capital. A simple method was designed to enable comparison between agencies on nine categories of human capital being volunteer numbers, gender, age, length of service, diversity (three types), training and awards. The results were compared to the disclosure of the same categories pertaining to paid staff. Results showed that narratives of annual reports gave recognition and praise to volunteers but human resources sections reported primarily on paid staff. Data on volunteer numbers and diversity are poorly reported in many annual reports. It was found that human capital, if applied to both paid staff and volunteers, could be a suitable tool to validate volunteers in an annual report.

## Introduction

Emergency services organisations (ESOs) assign highly trained responders to respond to events such as bushfires, floods, storms and road accidents. The workforce of the majority of these organisations is volunteer-based such as the various state emergency services and country and rural fire brigades and services.

In Australia, ESOs are predominately funded by government via levies that property owners pay through home insurance or council rates (depending on the state or territory). If volunteers were replaced by paid staff, the cost to the community would be significant (Ganewatta & Handmer 2009, McLennan 2008). Communities, businesses and governments therefore have a vested interest in the good management of ESOs particularly in respect to statutory obligations, accountability and sustainability.

The *National Emergency Management Volunteer Action Plan, 2012* (Attorney-General's Department 2012) includes recruitment and retention of emergency services volunteers as issues of national importance. The plan includes nine focus areas with specific actions that include training and volunteer support. The plan also highlighted a lack of community awareness about the roles and value of volunteers and recommends this to be a priority action for government and communities.

This research looked at how ESOs articulate volunteer value and reasoned that annual reports, as corporate performance reporting publications, provide disclosure of the number of volunteers in the service, the fluctuations by year and the composition of this workforce with respect to gender, diversity, training, education, length of service and age groups.

Different jurisdictions have different classifications of the term 'ESO'. This paper defines ESOs as fire services and state emergency services as described in Volume D of the *Report on Government Services 2016* (Productivity Commission 2016). This definition excludes police and ambulance services.

In Australia, ESOs are required by law to declare an annual financial statement that includes an audit report according to standards set by the Australian Standards Board (Kilcullen, Hancock & Izan 2007). An annual report commonly includes a vision statement, a CEO or Commissioner message, an overview

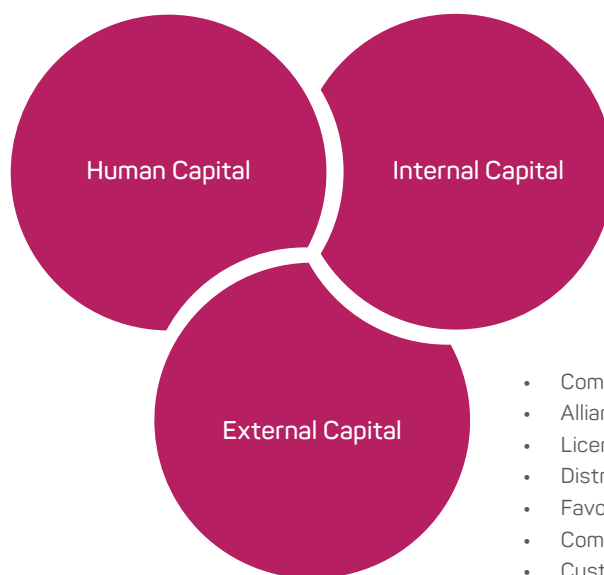
of the reporting year activities and performance achievements and forecasts. Increasingly annual reports incorporate human resources details such as the number of personnel, age profiles, gender, diversity, skills and other benchmarks. These voluntary disclosures are also increasingly included in government-level reporting. In general, ESOs follow state and territory government guidelines for the compiling of annual reports, most of which are tabled with respected state parliaments and territory legislative assemblies.

## Corporate social responsibility

Voluntary disclosures in annual reports follow a trend by business and not-for-profit organisations to meet the demands of varied stakeholders who increasingly want to see more transparency in the organisation's performance, compliance with government regulations and reflections of societal expectations. This practice acknowledges the social and environmental impacts organisations have on communities and is closely tied to what is termed corporate social responsibility (CSR). It includes philanthropic outreach such as corporate volunteerism, returning a percentage of profits to communities, environmental-positive policies (for example, see Metropolitan Fire Brigade 2017) or supporting campaigns that address the concerns of a community (for example, see Northern Territory Police, Fire and Emergency Services 2016 White Ribbon Australia accreditation).

Carroll (2010) defined CSR as comprising 'the economic, legal, ethical and discretionary or philanthropic expectations that society has of organisations at a given point in time'. While not enforced, the principle is now well developed in many businesses and has been incorporated into standards that provide guidance to organisations and government departments on how to implement CSR initiatives (International Organisation for Standardization 2017).

- Innovation
- Knowledge
- Equal opportunity and diversity
- Education and Training
- Learning and Development
- Employee Demographics
- Customer Relations
- Supplier Relations
- Work Related Competencies



- Management Philosophy
- Organisation Culture
- Organisation Structure
- Service and Product Quality
- Management Processes
- Information Systems
- Intellectual Property
- Research and Development

- Company name and Brands
- Alliances and Partnerships
- Licensing and Franchising
- Distribution Channels
- Favourable Contracts
- Community Relations
- Customer Relations
- Supplier Relations
- Financial Relations

## Intellectual capital

The advances made in technology and science in the last 50 years have led to 'knowledge-based' societies and economies (Boedke, Guthrie & Cuganesan 2005). In an attempt to validate 'knowledge', the term 'intellectual capital' was coined in 1990 (Sullivan 2000) as the intangible or non-physical assets that may give an organisation an advantage over others (Guthrie & Petty 2000, Sullivan 2000). More specifically, Boedker and colleagues (2005) and Nerantsidis and co-authors (2013) define it as the 'sum of human, internal and external capital that positively influences an organisation'. Figure 1 provides a model of intellectual capital showing the internal, human and external factors.

Although reporting of intangibles such as intellectual capital have been slow to develop in routine accounting procedures, several models have been proposed and discussed by Petty and Guthrie (2000) and Starovic and Marr (2003). Once implemented, organisations benefit by streamlining managerial processes, in particular human resources, and find it to be an instrument for effective strategic decision-making (Veltri & Bronzetti 2014a). It is also suitable for not-for-profit organisations to build and develop robust public images (Veltri & Bronzetti 2014b).

Fletcher and colleagues (2003) studied stakeholder perceptions for intellectual capital in the Australian Red Cross Blood Service. Dumay and Rooney (2011) investigated if intellectual capital measurement in the former NSW Department of Lands was necessary for effective management. Veltri and Bronzetti (2014b) studied a not-for-profit organisation with over 9000 volunteers that used intellectual capital for image building. Marr and colleagues (2003) caution that more research is needed into the positive and negative effects of disclosing intellectual capital information.

Figure 1: The tripartite model of intellectual capital.

Source: Reproduced from Boedker, Guthrie & Cuganesan 2005

## Human capital disclosure in volunteer-based ESOs

Human capital is inherently based on the education, training and the uniqueness of an individual's capabilities to deliver tasks for which he or she is employed, regardless of function. Birch (2011), in research of volunteer fire brigades, introduced Putnam's concept (2000) of volunteering as social capital. In accounting terms, individual capability, or social capital, could be termed as goodwill (Adler & Kwon 2002) to the organisation. Organisations benefit from a person's talent and personality (individual capability) and from a person's social networks, trust and social skills that facilitates interactions with others (Degli Antoni & Portale 2011, also see Payne *et al.* 2011 for a comprehensive overview).

Several literature reports (Cordery & Narraway 2010, Cordery, Proctor-Thomson & Smith 2011, Cordery *et al.* 2013, Hyndman & Jones 2011, Mook *et al.* 2005, Mook, Handy & Quarter 2007, Narraway & Cordery 2008, Sinclair & Bolt 2013) developed methods for validating volunteers. Surprisingly, intellectual capital was not identified as an accounting tool for valuing volunteers in annual reports. There have been suggestions that volunteer hours should be reported in financial reports as revenue using the same rigour where staff salaries are reported as a cost (Cordery & Narraway 2010, Mook *et al.* 2005, Narraway & Cordery 2008, O'Brien & Stuart 2013). Australian accounting practices class the financial value of contributions by volunteers as 'non-reciprocal transfers' that can only be expressed as a revenue 'when they create assets, require specialist skills and would have been purchased if not provided by donation' (Kilcullen, Hancock & Izan 2007). Ryan and colleagues (2010) argue for alternative financial reporting for not-for-profit organisations to reflect the needs of their particular stakeholders.

Handmer and Ganewatta (2007) used two models to estimate value of volunteers being the 'global substitution method' (based on an average wages) and the 'task specific substitution' method (based on the market wage for each task). The authors reflected on the nature of emergency services volunteering where considerable time is given to training, administration and being on stand-by compared to operational activities. This requires detailed record keeping by the organisation that may not be feasible for smaller organisations. These were found to be barriers for disclosing volunteer value in a study by Cordery and colleagues (2013).

## Volunteer numbers

Previous research on volunteer retention in ESOs (Baxter-Tomkins 2011, Birch 2011) noted the difficulty in obtaining reliable data on volunteer numbers. The *Federal Report on Government Services 2016* (Productivity Commission 2016) lists the number of volunteers in ESOs; however, data from four states were not included. The Australian Bureau of Statistics publishes regular statistics on emergency services volunteers 'involved in search, rescue and disaster relief' from data collected

through the General Social Survey. These numbers include relief volunteers in the Red Cross Disaster Recovery Service, the Salvation Army Disaster Services and possibly others (Australian Bureau of Statistics 2016). Thus, statistics from this source provided minimal utility for this research.

## Research analysis

O'Brien and Stuart (2013) analysed over 400 Australian not-for-profit organisations for volunteer disclosure in the narrative of their annual reports. They counted the frequency of acknowledgment of volunteer contribution, human resource measures and hours contributed. This study advanced this work by looking specifically at the annual reports of the volunteer-based ESOs. The research questions were:

- To what extent is human capital disclosed in the annual reports of volunteer-based ESOs?
- Is human capital disclosure similar for paid staff and volunteers?
- Could the expression of human capital in annual reports be a suitable process to validate volunteer contribution in ESOs?
- How many volunteers serve in the ESOs?

## Method

The annual reports of 2015 and 2016 from 11 Australian volunteer-based ESOs were accessed via each organisation's website. Table 1 provides a summary of ESOs included in this study. The agencies were allocated a random number to avoid identification as the aim was to analyse the sector as a whole. Umbrella organisations are indicated with an asterisk.

A template was designed to record the number of staff and volunteers, their age range and classification of role in the organisation, diversity (gender, disability, cultural and linguistic diversity and number of Aboriginal and Torres Strait Islander employees) in each ESO. These categories were considered the most important for stakeholders interested in the operational capacity of an organisation.

The reporting of the organisation's vision, volunteer hours committed, length of service, medal and award presentations, qualifications and training of staff and volunteers were noted. In some reports, staff and volunteers are quoted as 'members'. The study distinguished between paid staff and volunteers. ESOs in New South Wales, South Australia and Victoria submit an independent annual report. Volunteer-based ESOs in the other states and territories are administered by government departments or directorates that encompass several agencies (umbrella organisations). In addition, over 6000 volunteers were involved in community fire units that are administered by Fire and Rescue NSW. They were not included in the annual report analysis but were included in the number of ESO volunteers.

**Table 1: Australian volunteer-based ESOs that are members of the Australasian Fire and Service Authorities Council (AFAC) as at 30 December 2016.**

State	Volunteer-based ESO
Australian Capital Territory	*ACT Justice and Community Safety Directorate <ul style="list-style-type: none"> <li>• ACT Emergency Services Agency: <ul style="list-style-type: none"> <li>– ACT Rural Fire Service</li> <li>– ACT State Emergency Service</li> <li>– Maps</li> </ul> </li> </ul>
New South Wales	NSW Rural Fire Service NSW State Emergency Service
Northern Territory	*Northern Territory Police Fire and Emergency Services: <ul style="list-style-type: none"> <li>• Northern Territory Fire and Rescue Service</li> <li>• Northern Territory Emergency Service</li> <li>• Bushfires NT<sup>1</sup></li> </ul>
Queensland	*Queensland Fire and Emergency Services: <ul style="list-style-type: none"> <li>• Rural Fire Service Queensland</li> <li>• Queensland State Emergency Service</li> </ul>
South Australia	*South Australian Fire and Emergency Services Commission (SAFECOM) <sup>2</sup> South Australia Country Fire Service South Australia State Emergency Service
Tasmania	**State Fire Commission Tasmania Fire Service (also employs career firefighters) Tasmania State Emergency Service <sup>3</sup>
Victoria	Country Fire Authority (also employs career firefighters) Victoria State Emergency Service
Western Australia	*Department of Fire and Emergency Services <ul style="list-style-type: none"> <li>• Bush Fire Service</li> <li>• Fire and Rescue Service</li> <li>• State Emergency Service</li> <li>• Volunteer Emergency Service</li> <li>• Volunteer Fire and Rescue Service</li> <li>• Volunteer Fire Service</li> </ul>

\* The 'umbrella' administrative body for the ESO.

1 Bushfires NT was not compared in this study. Their 22 units (~500 volunteers) were individually incorporated; annual reports are not available online.

2 As the 2015-16 reports for the South Australia volunteer-based ESOs were not available at the time of writing, data from SAFECOM was used for both years.

3 Data for the Tasmania State Emergency Service were taken from the annual reports of the Department of Police and Emergency Management for 2015 and the State Fire Commission for 2016.

Nine human capital categories were recorded for each annual report where the sum of these categories could total the maximum value of 100 (Table 2). The scores were allocated by increments of five.

For the staff and volunteer numbers category, a score of 20 was given only when the position classification (for volunteers the breakdown of 'operational' or 'support' was considered a full classification) was disclosed. Absence of such resulted in a score of 10. Annual reports that mentioned the numbers in the narrative without any further details scored 5. Annual reports that gave an approximate number scored 5 (this is the category 'Numbers, approximate' in Figures 2 and 3).

For the gender analysis category, a full score of 10 was given to data that provided a breakdown of staff and volunteers by gender but was reduced to 5 for data that showed gender as a percentage of the total workforce rather than providing numerical data.

The other categories (age profile, length of service, diversity and Aboriginal and Torres Strait Islander peoples) were either fully reported in the annual reports (score of 10) or not at all (score of 0). For example, Table 3 shows the score for Agency 7.

## Results and discussion

The annual reports were analysed of selected volunteer-based ESOs for 2014-15 and 2015-16. Some were found to be highly individual, engaging and richly illustrated with images, figures, data and events and praise for volunteers.

### Stakeholders

Many of the annual reports mentioned external stakeholders or relevant stakeholders as being important to be considered at all levels of operation. However, only four ESOs defined who their stakeholders were, of which three were umbrella government departments. Two agencies included volunteers as their stakeholders and one mentioned the community.

### Human capital disclosure in annual reports

Figures 2 and 3 show the number of ESOs that reported on the human capital categories listed in Table 2. The data compares paid staff to volunteers for the two reporting periods. The numbers are represented in three separate data series to express the difference in disclosure (numbers and the staff and volunteer position, numbers only and approximate numbers, or numbers given in the narrative). Five ESOs reported the number of staff according to this study in Table 1 (both years). Four reported volunteer numbers and positions. It was similar for both years. Two ESOs reported approximate volunteer numbers and staff in the annual report of 2015 and three did so in the 2016 report.

Volunteer numbers are subject to fluctuation and record keeping at a brigade or unit level can be a challenge.

Table 2: Score for human capital disclosure in annual reports of volunteer-based ESOs.

Human capital category	Score
Staff and volunteer numbers	20
Gender analysis	10
Age profile	10
Length of service	10
Diversity: Aboriginal and Torres Strait Islander peoples	10
Diversity: Disability	10
Diversity: Cultural and linguistic diversity	10
Training	10
Awards	10
<b>Total score</b>	<b>100</b>

However, it reflects poorly on ESOs when approximate volunteer numbers, rounded to the nearest 100, are reported.

### Gender and diversity

A breakdown of staff and volunteer numbers by gender was reported by seven ESOs in 2015. One organisation did not publish this data the year after. By contrast, data on the gender of volunteers is largely missing with only three agencies reporting this in 2015. Only two agencies disclosed the breakdown in 2016 annual reports.

The *Workplace Gender Equality Act 2012* (Australian Government 2013) requires private sector organisations in Australia with more than 100 employees to report annually against gender equality indicators including employment status, pay analysis and policies that support families. The disclosure of such data in annual reports, irrespective of the number of employees or the type of business or service, could be considered a social responsibility as stakeholders can verify if organisations comply with gender equality expectations.

### Age and length of service

The age of staff was reported by five ESOs (both years). However, the breakdown of age for volunteers was included in only two reports in 2015 and one in 2016. There was very little disclosure in the annual reports on the length of service of the workforce (one report) and its diversity. However, scarce as this data is, volunteers were considered in one report in 2016.

Table 3: Human capital score for ESO 7 based on its annual report of 2015-16.

Human capital category	Score	Volunteers
Staff and volunteer numbers	20	20
Gender analysis	10	0
Age profile	10	0
Length of service	0	0
Diversity: Aboriginal and Torres Strait Islander peoples	10	0
Diversity: Disability	10	0
Diversity: Cultural and linguistic diversity	10	0
Training	0	5
Awards	0	5
<b>Total score</b>	<b>70</b>	<b>30</b>

### Training and recognition

Training was better reported for volunteers than for staff while recognition in terms of awards or medals was overall poorly reported. Some agencies wrote about outstanding training programs that were developed or brought to Australia from another country. These programs add enormous value to the organisation and can be considered as 'internal capital'.

Overall, Figures 3 and 4 show that ESOs provided more detail on staff human capital compared to volunteers. Data on workforce diversity and length of service were especially lacking. Training was one aspect where agencies were keen to report and more so for the volunteer workforce than for staff.

Figures 4 and 5 express the total human capital score (Table 2) per organisation. Scores under 20 correspond to the numbers of staff and volunteers only.

Some variation exists between the two reporting periods. Organisations disclosed more one year than the following year or vice versa. For example, Agency 2 reduced the score of human capital from 65 to 55 for staff and 40 to 30 for volunteers in 2014-15 and 2015-16, respectively. The difference of ten is due to the gender breakdown not being provided in 2015-16. Similarly, Agency 11 scored higher in 2015-16 due to clearer reporting of medals and awards for both staff and volunteers. Agency 4 reported on gender for staff and volunteers in 2014-15 but omitted this in 2015-16. The higher score of volunteers compared to staff for this organisation is due to the reporting of training, medals and awards for volunteers only. Agency 10 gained a score of 20 in 2015-16 compared to the year before due to the breakdown of

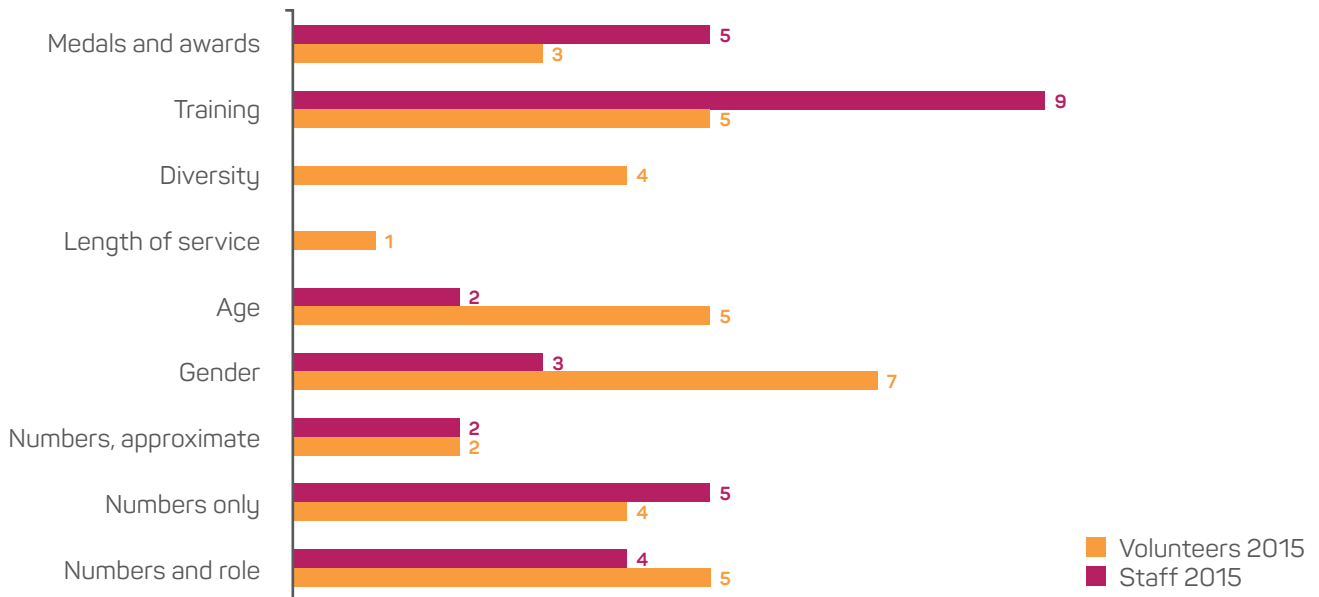


Figure 2: Numbers of volunteer-based ESOs that reported the human capital categories in 2014-15 according to the categories in Table 2.

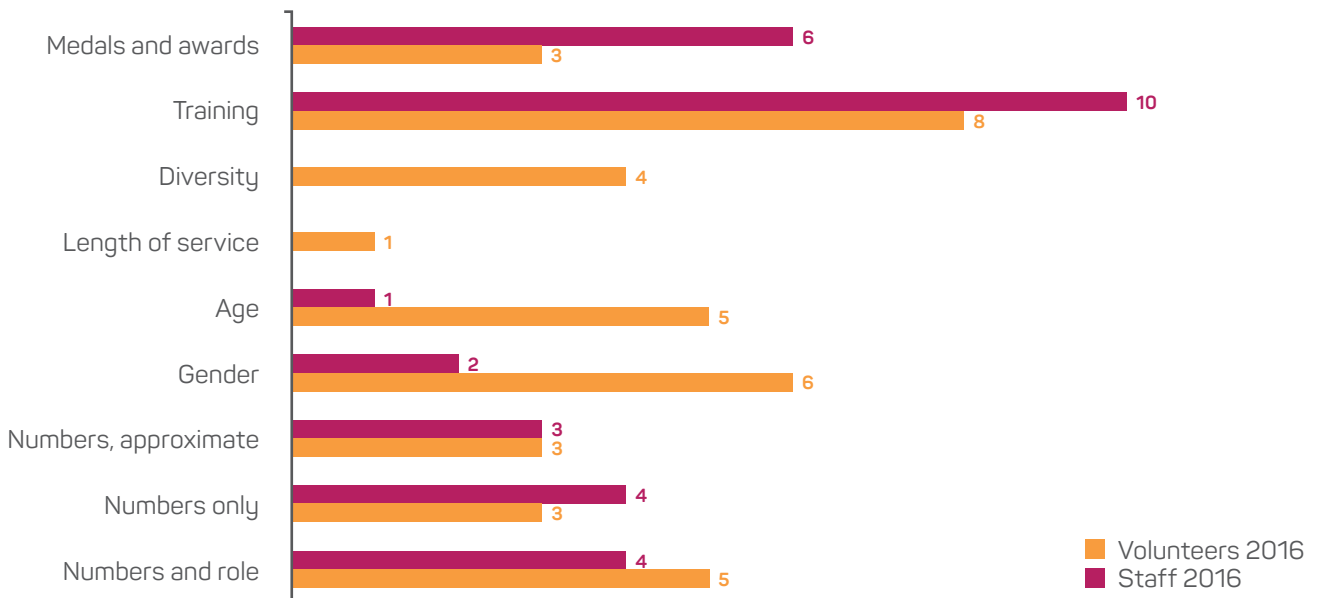


Figure 3: Numbers of volunteer-based ESOs that reported the human capital categories in 2015-16 according to the categories in Table 2.

gender and age for staff in that year. These categories were missing for volunteers in the same annual reports.

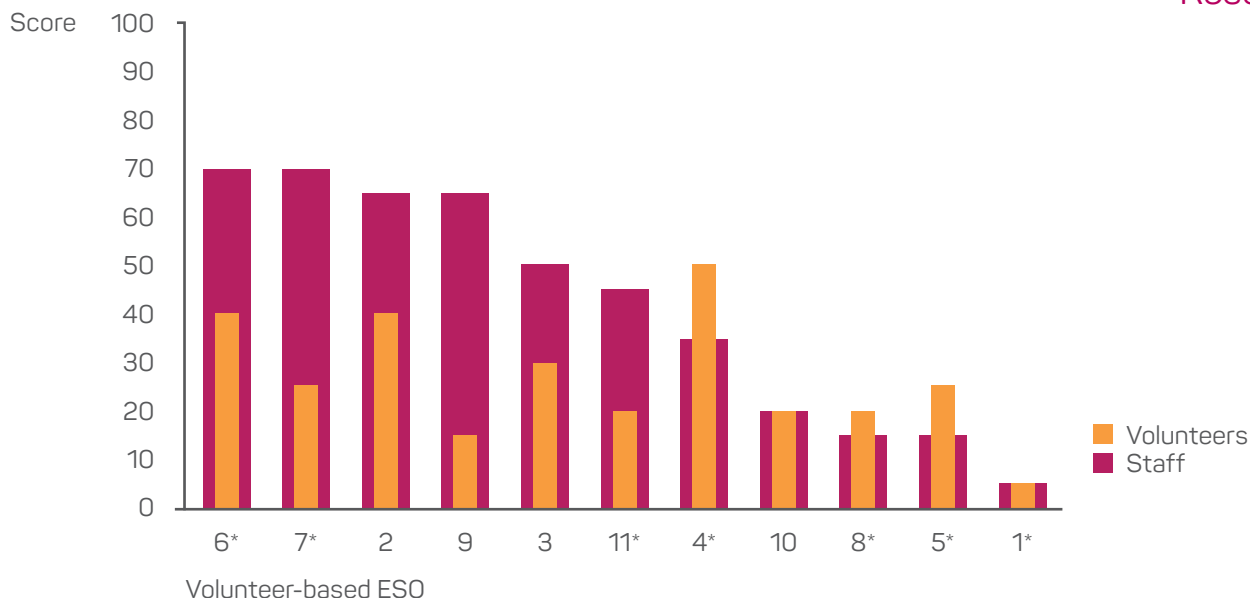
ESOs 6 and 7 scored 70 for staff in both years. This corresponds to staff numbers and position, gender, age and diversity. One of those agencies also reported on the length of service of staff. In contrast, these agencies had a much lower score for volunteers. ESOs 1, 5 and 8 and all umbrella government departments reported minimal human capital disclosure. The reduced score of ESO 8 in 2015-15 could be due to the restructuring of departments.

### Volunteer numbers

The number of volunteers in volunteer-based ESOs for two consecutive years is given in Figure 6 and is based

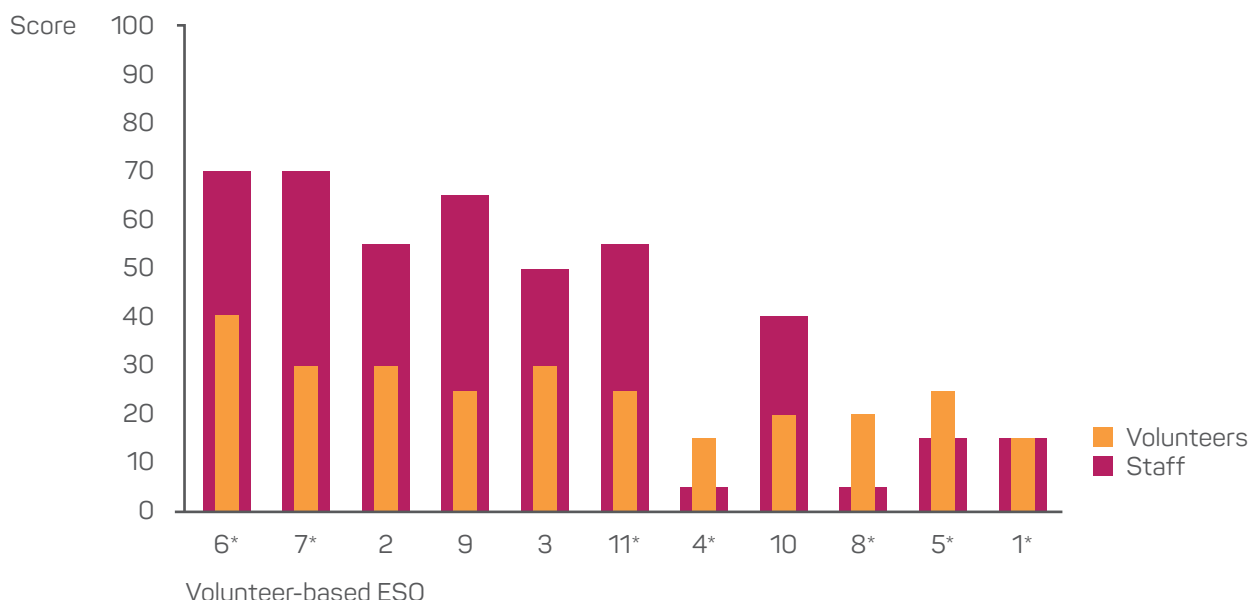
on the disclosure in annual reports. One organisation did not provide volunteer numbers in 2015 and another did not do so in 2016; in this case the numbers from the next or previous year were used. Some agencies used volunteer estimates by providing a rounded number.

The data show a reduction of 2555 volunteers during the 2016 reporting period. This is largely due to a loss of volunteers in NSW (~1500) and Western Australia (~2100). In Queensland the number of ESO volunteers increased by ~1300. Volunteer hours were not reported consistently. Only six agencies disclosed the hours in 2015 and eight did so in 2016. Due to incomplete data on gender or volunteer roles, no further analysis could be made.



The asterisk indicates an umbrella government department.

Figure 4: Disclosure of human capital in annual reports for 2014-15 of volunteer-based ESOs.



The asterisk indicates an umbrella government department.

Figure 5: Disclosure of human capital in annual reports for 2015-16 of volunteer-based ESOs.

## Conclusion

Volunteers are the *raison d’etre* of the majority of Australian ESOs. Paid staff cannot fulfil the operational requirements of the organisation and volunteers fulfil support and strategic roles. The narrative of annual reports gives recognition and praise to volunteers, yet human resources sections disclose more human capital details for staff than they do for volunteers. This is of concern in a climate where volunteer retention is paramount to the survival of volunteer-based organisations.

The scoring system used for nine categories of human capital provided a numerical tool to analyse and compare 11 volunteer-based ESOs. This system contributes to

existing information and provides a tool to compare human capital categories between similar organisations. Results indicate that large variations exist in the disclosure of human capital in ESOs and that reporting of staff and volunteers is asymmetrical.

There are possible factors that can explain the variety in disclosure. Organisations may need to adhere to certain guidelines that stipulate what can be disclosed outside the annual report. Stakeholders may have influenced additional guidelines and the organisation has not yet embraced a suitable accounting and validation method for their volunteer administration. Differences in reporting between states and territories could also be a factor.

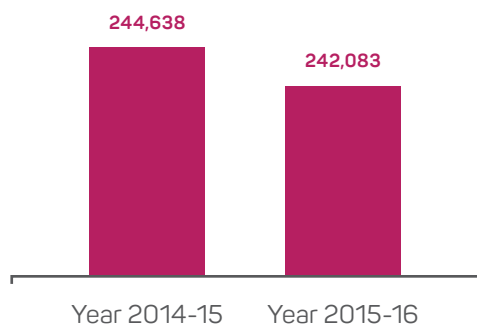


Figure 6: The number of volunteers in ESOs. The data includes volunteers in Fire and Rescue NSW that operate community fire units (6812 in 2015 and 6318 in 2016).

Taking into account that 55 per cent of agencies already disclose some human capital information in their annual reports, further development in accounting procedures that includes substantial volunteer data would be a suitable method to validate volunteer contribution in ESOs. Several ESO annual reports contain a concise overview of numbers of volunteers, numbers of incidents and operational hours.

The omission of gender and diversity disclosure (for both staff and volunteers) was unexpected as the Australasian Fire and Emergency Service Authorities Council (AFAC) acknowledges that 'changes (are) required to increase attraction, recruitment and inclusion across gender, racial and cultural diversity' (AFAC 2016).

This research confirms a previous study on annual reports of Australian Government departments that found that mandatory reporting on human resources is below average (Herawaty & Hoque 2007). In the light of the finding that three out of the seven umbrella organisations disclosed little human capital information compared to independent agencies, the question arises whether an amalgamated annual report (one that includes several ESOs) serves the interest of the organisations. For example, the ACT State Emergency Service published a snapshot report of the organisation online that includes a wide variety of volunteer statistics including gender, age group, length of service and training competencies (Borrett & Slarke 2014-15). This information was not detailed in the annual report of the ACT Emergency Services Agency for that year.

While some agencies disclosed volunteer numbers and other relevant details, other agencies gave only an estimate of volunteer numbers (rounded to the nearest 100) and two agencies omitted volunteer numbers altogether in their report. The calculations and estimates used here show that volunteer numbers were 244,638 in 2015 and 242,083 in 2016. However, no further breakdown of numbers in roles, gender and diversity could be made.

This research is of a preliminary nature and future work to support intellectual capital disclosure in volunteer-based ESOs could build on previous case studies. The

human capital reporting could be expanded from the nine categories used in this study to include other categories such as education background and level of training. Introducing intellectual capital into bookkeeping may involve initial costs and present a cultural challenge, however, Veltri and Bronzetti (2014a) suggest it can be gradually introduced and adapted to the specifics of an organisation.

ESOs build operational capacity with a predominantly volunteer workforce. Validating volunteers in annual reports to the same level as paid staff creates a visible shift towards recognising and valuing the work of the emergency services volunteer. A workforce, regardless of being paid employees or volunteers, would feel pride in an organisation that gives due recognition to the sum of its human endeavour.

## Acknowledgement

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## ABSTRACT

Planning for animals in the response and recovery phases of disasters is crucial to mitigate the negative effects that the loss or separation of animals can have. The human-animal bond can influence people's decisions during emergencies including how they will respond and when or if they evacuate. This paper uses results of a survey of residents in the Blue Mountains, NSW, who own animals to identify their emergency preparedness and their intended actions in an emergency event. The survey revealed complex animal ownership patterns and respondents showed strong bonds with their pets and were motivated to protect their animals. There was a high-level of self-reported general emergency preparedness and almost three-quarters of respondents said they included their animals in their emergency planning. However, more than half were unsure where they *would* take them and a third were unsure if they *could* take them. Findings suggest that preparedness information be locally specific and consider the complexities of animal ownership, including the need for species-specific resources and information about animals that cannot be evacuated. A case study is used to examine and understand the links between the human-animal bond, disaster preparedness and resilience and the recovery of individuals and communities.

# Emergency preparedness and planning for animals: a case study in the Blue Mountains, NSW

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## Introduction

The strength of the human-animal bond influences people's decision-making during emergencies. Pet ownership is associated with failure to evacuate (Brackenridge *et al.* 2012; Heath, Voeks & Glickman 2001; Fritz Institute 2006) as well as people undertaking risky behaviours to rescue animals in areas before they are declared safe (Brackenridge *et al.* 2012; Heath, Voeks & Glickman 2000; Heath, Voeks & Glickman 2001; Wilkinson, Eriksen & Penman 2016; Zottarelli 2010). People feel anxiety when separated from their pets (Wilkinson, Eriksen & Penman 2016) and many people have lost their lives attempting to save their animals in an emergency (Thompson 2013). In this context, there is increasing recognition that considering the needs of and planning for animals in disasters can have positive implications for animal welfare, public health, the emotional wellbeing of animal owners and the economy (Austin 2013).

Hall *et al.* (2004, p. 373) argue that understanding human-animal relationships is 'a critical element in promoting the resilience of individuals and communities'. Pets play an important psychosocial role in people's lives and the relationship is associated with positive mental health outcomes. For many individuals, companion animals are considered family members providing comfort and affection, routine and stability (Coombs *et al.* 2015, Trigg *et al.* 2016). Cats and dogs facilitate social interaction, thus reduce isolation and loneliness and help to create a sense of community (Friedmann & Son 2009, Wood *et al.* 2007).

Conversely, the loss of a pet is associated with poor wellbeing and mental health outcomes. The emotional or psychological connection some people feel with their pet has been likened to that experienced in close human relationships (Beck & Madresh 2008). Therefore, the 'grief following the death of a pet manifests itself in similar ways to that experienced after human loss in terms of sleep disruption and social and psychological challenges' (Packman *et al.* 2014, p. 335). Yet, the grief resulting from animal loss is frequently diminished or ignored (disenfranchised) in society (Cordaro 2012; Kemp, Jacobs & Stewart 2016; Stewart, Thrush & Paulus 1989). In these cases, those who are grieving are not recognised as having experienced a

significant loss, leading to feelings of isolation and a lack of support (Packman *et al.* 2011).

Disenfranchised grief as a result of pet loss during a disaster has negative implications for the recovery phase. Numerous studies have found that the loss of a companion animal can be a traumatic experience leading to significant negative psychological outcomes (Chan & Rhodes 2014, Coombs *et al.* 2015, Hall *et al.* 2004, Lowe *et al.* 2015). Hunt, Al-Awadi and Johnson (2008) in a study of pet loss following Hurricane Katrina found that there were significantly higher levels of acute stress, depression and post-traumatic stress disorder among those who had lost a pet. Indeed, the experience of Hurricane Katrina led to the passing of the *Pets Evacuation and Transportation Standards Act* (PETS) in the United States ensuring that pets and service animals were included in state emergency plans for evacuating residents to improve animal welfare and avoid separation between animal and owner. Although most studies in this area have been conducted in the United States, similar findings have emerged from studies in Japan (Goto *et al.* 2006) and New Zealand (Coombs *et al.* 2015). Coombs and colleagues (2015, p. 74) found that companion dogs appear to have influenced human health and wellbeing during and after the Christchurch earthquakes. This study highlights the significance of the human-companion dog bond and its positive therapeutic benefits by recommending that where possible, 'emergency management practitioners and policy makers ensure that humans and their canine companions stay together following disaster events'.

In Australia, many emergency services organisations and other stakeholders (emergency management and animal welfare) have developed strategies and resources to assist their staff members and animal owners. However, there is an absence of research on the roles animals play in the recovery phase in the Australian context. This research is part of the Bushfire and Natural Hazards CRC Managing Animals in Disasters project that indicates pet loss has a significant negative impact on recovery. A study examining recovery after the Canberra bushfires in 2003 found that one of the most popular community gatherings was a memorial service for animals that died in the disaster (Camilleri *et al.* 2010). This indicates that remembering pets is important and social support and recognition are crucial to the recovery process for individuals and communities (Kemp, Jacobs & Stewart 2016).

Planning and preparedness for animals in disasters are crucial components in mitigating the negative effects of animal loss and separation in the response and recovery phases (Glasse 2010). Effective disaster planning for animals must incorporate an understanding of the human-animal bond and be flexible and responsive to the local context applying knowledge about geography, the local people and their animal ownership patterns (Edmonds & Cutter 2008).

This paper examines the results of a survey of Blue Mountains residents and provides the starting point for a community profile to develop knowledge of animal ownership and preparedness activities and to identify local needs and gaps when planning for animals. How this

information can be used to better prepare community members and their animals is considered. It is argued that understanding the specific needs of a community in planning and preparedness can strengthen resilience.



Planning for pets and other animals is important for mitigating the negative effects of animal loss and separation.

Image: Jenny Bigelow

## Method

A questionnaire was developed to assess resident characteristics, pet ownership patterns, emergency preparedness for animals and needs and gaps when it comes to preparing and planning for animals in emergencies. Respondents needed to be current residents living in the Blue Mountains and surrounding areas (including Lithgow, Hawkesbury and Penrith) who either own, care for or work with companion animals, livestock or wildlife. Only a few respondents reported having a service animal. It is not within the scope of this paper to consider the needs of these owners and their animals. This paper uses a subset of the full dataset, reporting responses received during the initial 12 weeks of the survey period between February and April 2017.

The questionnaire was administered using Survey Monkey. The survey was promoted on the Blue ARC<sup>1</sup>

<sup>1</sup> Blue ARC: Animal Ready Community is a community-led group that was formed in the Blue Mountains in 2015. The aim is to support community resilience in emergency events through better awareness, preparedness, planning and response for all animals. Blue ARC works with formal response agencies to produce outputs relevant to the local community.

Facebook page, in local newspapers and through organisations such as neighbourhood centres in the Blue Mountains. Respondents were asked to share the survey link with friends and neighbours. Hard copy questionnaires with postage-paid return envelopes were made available at local libraries, bookshops, neighbourhood centres and other public spaces for those who did not want, or were unable, to complete the questionnaire online. The questionnaire was detailed and took approximately 20 minutes to complete; longer for those who had experienced an emergency event and completed that section.

Data were analysed using IBM SPSS software (V.25). Simple descriptive statistics and frequencies provide an overview of some of the survey findings. Respondent quotes from open-ended questions and comments have been used to support the quantitative data. This study was approved by the Macquarie University Human Research Ethics Committee (Approval No. 5201600201).

## Results

### Sample description

In the first 12 weeks of data collection, data were collected from 292 respondents who met the inclusion criteria for this paper. A majority of respondents were resident in the Blue Mountains (82 per cent) with the remaining 18 per cent residing in the immediate surrounding areas of Lithgow, the Hawkesbury, Emu Plains and Penrith. The majority of the sample was female (88 per cent) and around half (49 per cent) were aged 45–64 years, with 40 per cent aged under 45 years and 11 per cent aged 65 years or older.

Around two-thirds of respondents (64 per cent) had lived in the area for more than 10 years. A further 20 per cent had lived in the area for 5–10 years. This paper does not specifically consider the experiences of respondents during the 2013 bushfires, however, these data indicate that most respondents were resident in the area at that time.

To get an indication of how many residents might be away from home and unable to get back to their homes and animals in an emergency situation, a question asked how much of the time adults in the household were more than 30 minutes away from home on a 'typical' week day. Thirty nine per cent of respondents reported that all adults are away from home 'a lot of the time' or 'quite often'. Around a third of respondents (36 per cent) stated that all adults are 'rarely' or 'very rarely' over 30 minutes away from home on a week day. Most respondents (92 per cent) usually had access to a private vehicle, four per cent indicated that they sometimes did and four per cent did not have access to a private vehicle.

### Animal ownership

Respondents were asked about the animals they own or care for on their property. Almost all respondents (98

per cent) owned at least one cat or dog. The five most frequently owned animals were dogs (76 per cent), cats (54 per cent), chickens (27 per cent), fish (14 per cent) and birds (14 per cent). More than half of dog owners (53 per cent) owned two or more dogs, and two-thirds of cat owners (66 per cent) owned two or more cats. Twelve per cent reported owning larger animals, such as horses, sheep, cows, goats, alpacas and pigs. Only 14 per cent of respondents owned a single animal, for example, one dog. More than 60 per cent owned multiple types of animals. Figure 1 shows the complexity of the animal ownership profile.

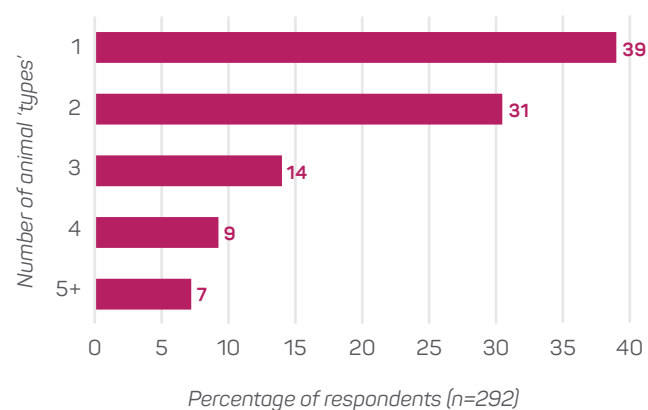


Figure 1: The number of animal 'types' owned by respondents (i.e. dogs, cats, chickens, horses). Most respondents own a mix of multiple animals, even those with only one 'type' of animal own more than one of them, for example three dogs.'

A small proportion of respondents had responsibility for animals owned by others, with three per cent running animal-related businesses and six per cent involved with fostering, sheltering or re-homing animals (these respondents will have fluctuating numbers of animals on-site). A further 16 per cent of respondents felt responsible for another person's pet in an unpaid capacity, for example a pet owned by a neighbour or family member and 27 per cent of respondents feel a sense of responsibility for local wildlife that visit their property, for example, birds and possums.

### Emergency preparedness

Respondents were asked how prepared they felt for an emergency and how they intend to manage their animals in an emergency situation. Around two-thirds of respondents (63 per cent) reported feeling 'somewhat prepared'; having thought about what they might do and having discussed this with household members. Only 20 per cent reported being 'very prepared'; having a written or well-rehearsed plan for an emergency event. A further 16 per cent felt they were 'not really prepared'; having no definite plan and no discussions about what to do. Only a small proportion of respondents (one per cent) reported feeling 'unprepared'. Most respondents reported that they had included their animals in their emergency

planning (72 per cent) and 18 per cent reported that they had planned for some animals but not others (i.e. some animals were not included in plans).

### Logistics

When asked if they had a clear plan for where they would take the animals they intended to evacuate, less than half of respondents (47 per cent) stated they had a definite plan and 26 per cent felt they 'probably' had a plan for only some of their animals. Around a quarter (26 per cent) had no clear plan in place. Only a few respondents (one per cent) did not plan to take any animals with them in an evacuation.

Participants were asked if they were able to take their animals on public transport if this would help to evacuate in an emergency or relocate animals on 'high-risk' days. Overall, more than a quarter (28 per cent) stated they were 'likely' to or 'might' use public transport if permitted. This proportion was much higher (88 per cent) for those without access to a private vehicle. Although most respondents reported having access to a private vehicle (92 per cent), allowing animals on public transport could encourage early evacuation.

Respondents were asked if they were advised to evacuate by authorities how their decision would be influenced if they could not take their animals. Forty three per cent reported they 'definitely would not' evacuate and a further 42 per cent 'might not' evacuate or would question the need to leave. Only 14 per cent said they would 'probably' or 'definitely' evacuate without their pets. Many respondents commented how difficult this decision would be because of the close bond they have with their animals. Survey responses include:

*If I'm leaving my dog is too!*

*This would be a traumatic experience if I was required to make this dreadful decision.*

*I am lucky as cats are so portable. I would take them and nothing else in my car if I had to.*

*Having lost a dog in a bushfire there is no way I would leave without our current dog, saying that if we had to leave (were given evacuation notice) I would leave, but with the dog. I'd like to see someone try and argue with me about it.*

*I would rather burn to death than leave my cats.*

### Transportation

In the case of evacuation, two-thirds of respondents (66 per cent) stated they would or could take all their animals with them. The remaining respondents felt they 'possibly' (22 per cent) or 'definitely' (12 per cent) would or could not take at least some of the animals in their care with them if they evacuated. For many respondents this was due to the difficulties of transporting particular species. In addition, there were uncertainties about what to do for the animals if they were left behind:

*I do not have for-purpose carriers for all five chooks (without crowding), so would need supplementation (e.g. large cardboard box) to transport all at once. Also depends on whether I am in the vicinity, or working down the Hill on the day, and able to get back in time.*

*The Aviary birds would be difficult, I may have to consider opening the door so they could fly free.*

*We have not thought about the large goldfish in our outside water feature. I am not sure what to do for them or whether we need or can evacuate them.*

*Two sheep would be hard to catch and would not fit in car. If possible I would put pig in car but would depend on her willingness to get in and dogs and teenagers would be prioritised.*

These quotes indicate that some animals may take priority over others, or people may not have solutions or know what is best to do for some of their animals. Although 80 per cent of respondents felt they could evacuate all their animals and people in a single trip, transport concerns contribute to uncertainties about how long it would take to evacuate animals, with some relying on more than one trip to take more difficult or lower priority animals. For some, evacuation decisions were related to who may be present to help them:

*I think we would only be able to evacuate the chickens if two people were home and we had two vehicles here. I don't think they could fit in the one vehicle with the dog and cats.*

*I don't think I could physically lift the goats onto the ute (or coax up a ramp) if my husband was too far away from home to arrive in time in a bushfire situation. My neighbours would be busy in similar situations so I cannot assume I can rely on them to help with the manual lifting or handling them to go up a ramp. If this were to happen we have discussed letting them free to hopefully escape if there was no other option.*

### Seeking information and help

Forty four per cent of respondents felt they had all the information they needed to prepare and plan for their animals. Almost half (49 per cent) felt 'unsure' and the remaining seven per cent felt they did not have all the information they needed. Respondents were asked where they intended to seek information from about what to do with their animals in an emergency. Figure 2 summarises the sources of information that respondents felt they would go to if they needed information or advice about what to do with their animals in an emergency.

Respondents were asked to consider a scenario where they were unable to get home to evacuate their animals and were asked whether they had a neighbour or nearby friend or family member who could do it for them. One-fifth (20 per cent) reported they had someone who could help and they had discussed this with them. Almost half (48 per cent) stated they had someone who could probably help but they had not discussed it with

them and 31 per cent did not have anyone nearby who could help. Figure 3 shows a breakdown of responses by respondent age. It indicates a trend that shows younger people are more likely to have *not* discussed the possibility of help with a neighbour, friend, or family member (in situations where there is probably someone who could be of help to them).

### Animal behaviour and characteristics

The behaviour of animals may also add challenges to evacuation. When asked if their animals had any special needs, 28 per cent of respondents had one or more animals with behavioural issues, for example, aggression or anxiety, 26 per cent had elderly animals

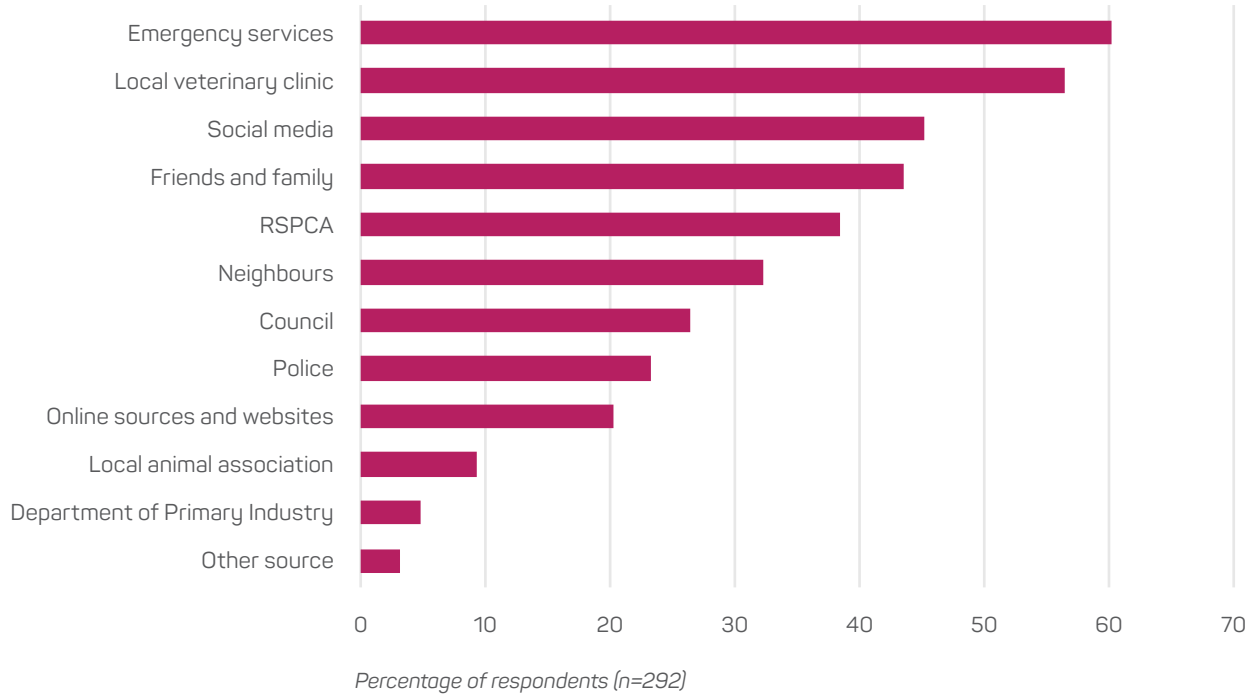


Figure 2: Where respondents would go for information or advice about what to do with their animals in an emergency.

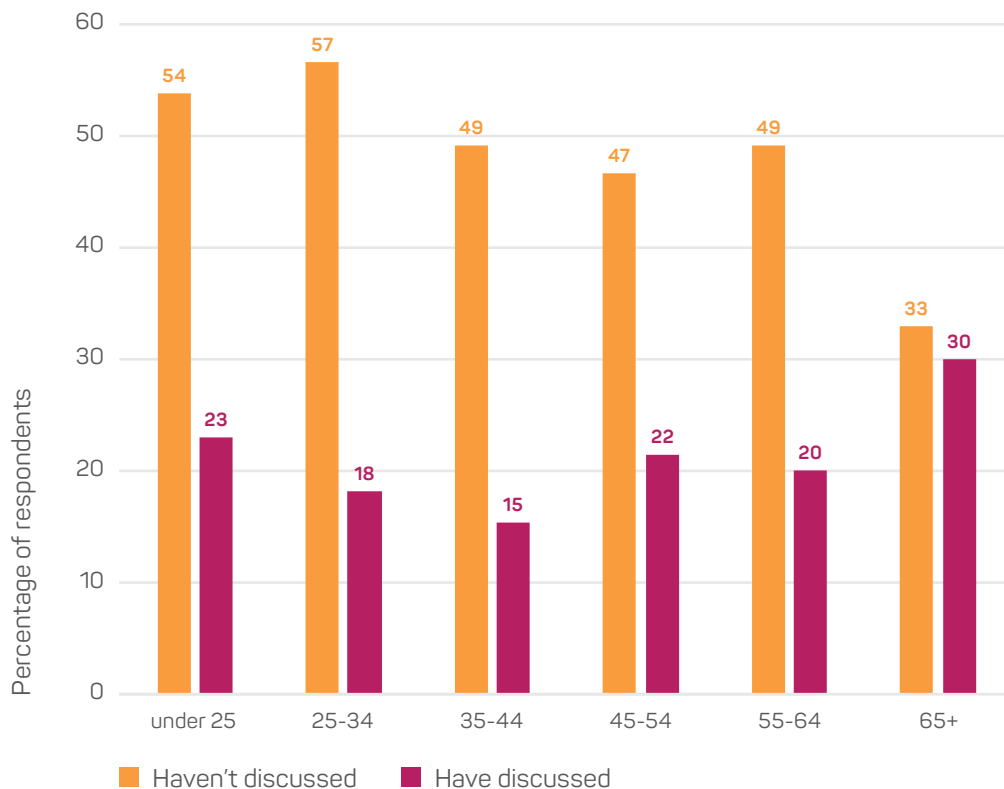


Figure 3: Percentage of respondents by age who have and have not discussed plans for their pets with someone who could help them.

and 11 per cent had sick animals with medical needs. Some respondents mentioned specific concerns about animal behaviour that may add stress and time to an evacuation:

*Cats can be scared to get in the carrier, especially if they sense urgency.*

*It can also be difficult to catch the Rooster and would cause more stress to both animals and humans.*

*Indoor bird. Too aggressive to catch and put in a travel container.*

*It may be possible that I would not be able to find one or both of my cats. If they were frightened they would hide somewhere they felt safe, so, if time was a constraint, then it may be possible I would not be able to find them before we had to leave.*

## Discussion

This paper provides the beginning of a profile of animal ownership in the Blue Mountains, revealing high levels of ownership of diverse animal species with differing needs. In addition, the Blue Mountains is an area at high risk of bushfire, with limited road and public transport access and a high number of commuters. This research suggests that bushfire preparedness advice needs to extend beyond the current mantra of 'your pet, your responsibility' to be detailed and flexible, including the needs of people in diverse situations and encouraging the creation of contingency plans for multiple scenarios and species.

Current preparedness advice regarding animals is focused on evacuating with cats and dogs and preparing livestock and horses for bushfire. There is scant information for preparing other species that may have different requirements, such as how they are transported and contained. In this study, respondents commonly referred to being unsure about preparing for or evacuating with chickens and fish, indicating a need for additional species-specific information. Furthermore, over 60 per cent of respondents own more than one type of animal, which is likely to mean that planning and preparation is more complicated for these owners. Residents with constantly fluctuating numbers of animals such as animal-related business owners, boarding facilities and those who foster or agist animals have specific challenges in planning and preparedness.

A specific challenge in the Blue Mountains is access and egress. Residents without regular access to a private vehicle face additional challenges when planning for themselves and their animals. Pets are not currently allowed to travel on NSW trains and can only travel on buses with permission of the driver.<sup>2</sup> A recent study recommended that community members in the Blue Mountains be able to access public transport with pets during times of declared disaster (Ingham & Redshaw 2017). These findings support this recommendation and suggest this could be extended to high fire danger days

as an overwhelming majority of respondents without access to, or with unreliable access to, a private vehicle suggested they would consider using public transport to move their animals if permitted.

Where respondents expect to find information does not often correspond with official guidance. The *Fire Safety for Your Pets* fact sheet available on the Blue Mountains Rural Fire Service website<sup>3</sup> states that long before a bush fire people should consult with local council, Department of Primary Industries (DPI) or the RSPCA for information on animal refuges in the local area. These organisations were not highly ranked as information sources by respondents. The local council was listed by around a quarter of respondents and DPI was selected by only five per cent of respondents. The most frequently cited sources were emergency services organisations and local veterinary clinics. This suggests information, support and resources are needed to allow emergency services and local veterinarians to become more involved in this area as trusted information sources.

Risk communication materials generally assume someone is at home at the time bushfire threat becomes apparent. Therefore, communicating with neighbours, friends and family about contingency plans for pets needs to be done prior to a fire event to avoid unnecessary risk to humans and animals (Wilkinson, Eriksen & Penman 2016). This study demonstrates that people are often not at home during the day and are unable to return quickly. In addition, many residents, especially younger people, do not discuss their emergency plans for their pets with neighbours. To help overcome these situations, Heath and Linnabary (2015) recommend community-based approaches by emergency managers to assist animal owners, such as buddy systems among neighbours.

Clearly, people consider their animals a valuable part of the family indicating that the human-animal bond is an important consideration in all phases of emergency management. This study reported on a self-selecting sample, implying these respondents have strong bonds with their animals and are engaged with emergency planning. Nonetheless, they still indicate that they require support and guidance to create contingency plans suitable for their individual situations to protect human and animal welfare. An understanding of the challenges and complexities that animal ownership adds to emergency planning and preparation is crucial to bring about improvements that will lead to increased resilience and recovery for individuals and their communities.

2 [www.transportnsw.info/travel-info/using-public-transport/travelling-with-animals-pets](http://www.transportnsw.info/travel-info/using-public-transport/travelling-with-animals-pets).

3 [www.rfs.nsw.gov.au/\\_data/assets/pdf\\_file/0006/9429/Fire-Safety-for-your-Pets-Factsheet.pdf](http://www.rfs.nsw.gov.au/_data/assets/pdf_file/0006/9429/Fire-Safety-for-your-Pets-Factsheet.pdf).

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## ABSTRACT

Effective preparedness is often communicated as physical actions such as having a survival plan and an emergency kit or reinforcing, moving and clearing property. However, the physiological responses to an overwhelming threat can disrupt the best-laid preparations and plans. Psychological and emotional preparedness during the response phase of a disaster helps identify and manage fear to reduce the impacts on cognitive and behavioural functioning. Rates of psychological and emotional preparedness are generally lower than for physical preparedness. This presents particular challenges when communicating this type of risk. This paper reports on qualitative research with residents and agencies in south-east Queensland about what psychological and emotional preparedness means to them, what prevents people from engaging with this type of risk and how best to communicate it.

# 'That psychological bulls\*\*t': surprising findings from community research are improving preparedness communication

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## Introduction

Prior to and during threatening, high-risk situations such as a emergencies and disaster events, people can experience high levels of stress and fear that adversely affects adaptive risk perception, decision-making and attention needed to implement plans (Reser & Morrissey 2009). Threats may be overlooked because attention narrows, physical tasks take more time and there is a greater number of mistakes. Intrusive thoughts can distract people from the task at hand and fear can prevent them from remembering survival-related information (McLennan *et al.* 2011).

However, even in the face of such stresses, these effects of the autonomic nervous system on decision-making can be effectively managed, helping people make decisions about safety during disasters (Morrissey & Reser 2003). Psychological preparedness is:

*...an individual's anticipated psychological and emotional ability to cope with the threat, uncertainty, unpredictability and confusion that may be experienced in the warning phase and at a bushfire's [or other disasters] point of impact.*  
(Boylan 2016, pp. 92-93).

A person who is psychologically prepared can have a general understanding of how an emergency situation might 'behave' and the associated risks. They will generally be willing to plan and prepare, anticipate how they can cope with the threat, be able to ward off negative thought patterns and feel they are emotionally supported (Boylan 2016). Being psychologically prepared is linked to greater physical preparedness as well as lower anxiety and greater confidence in adapting to the changing conditions (Every *et al.* 2016, Morrissey & Reser 2003).

Emergencies and disaster events are complex and challenging and the risks and desired responses may be difficult to communicate and can be plagued

with inconsistent use of terminology (Eriksen & Prior 2013). The term psychological preparedness is often used, but other terms including mental preparedness, mental fitness, emotional preparedness, psychological competency and psychological readiness are used. A further challenge is engaging people in an issue that may not feel relevant to them. While physical preparedness is relatively easily understood and conveyed, emotional and mental preparedness is perceived as 'touchy-feely', more complex, less useful and unfamiliar or alien. The question is: how then can we engage people in other aspects of preparedness in ways that are easy to understand and that encourage people to see its value?

Rather than repeat traditional ways of communicating (e.g. from 'experts' to the community) this research took a bottom-up approach. Residents and emergency services personnel in southeast Queensland were asked what they understood by the term 'psychological preparedness', what terms they feel comfortable with and who they would trust to communicate these ideas. It was important to reach people from various age groups and with different education backgrounds to explore the accessibility of current practices. The sometimes surprising, sometimes challenging responses are changing the way psychological preparedness is communicated to better reach people from diverse age groups and education backgrounds.

## Method

Data were gathered via interviews and focus groups held in the Bundaberg local government area and in Brisbane in August 2017. Twenty-three residents of Bundaberg and its immediate surrounds were interviewed and 23 employees of emergency, disaster management or community support services in Brisbane participated in two focus groups. Ages ranged from 26 to 78 years with equal numbers of men and women. Participants were recruited using fliers, Facebook advertisements and by local residents and emergency service partners asking their networks of colleagues to participate. All interviews and focus groups were audio recorded.

The interviews and focus groups were semi-structured. Residents were asked for impressions of existing guides to emotional and psychological preparedness. The three guides used as interview reference materials were:

- a two-page text-based fact sheet describing emotional preparedness for cyclones and other disasters produced by the Queensland Government<sup>1</sup>
- the *Psychological Preparedness for Disasters* guide produced by the Australian Red Cross that is a 16-page booklet describing how to prepare psychologically for an emergency using related disaster imagery alongside text-based information
- a four-page fact sheet produced by the Australian Psychological Society titled *Psychological Preparation for Natural Disasters*.<sup>2</sup>

Interviewees were asked to describe their responses to the language, imagery and structure of these materials as well as their comprehension of any central

messages, the intent of the guides, trust and credibility considerations and their perceived usefulness prior to a disaster experience. Interviewees were asked about the ongoing usefulness of the guides as well as what information they would like to see. Emergency service personnel were also asked about their understanding of psychological preparedness, the challenges they faced communicating this and what education they thought could be effective.

Qualitative data were examined using thematic analysis (Braun & Clarke 2006), a technique that involves de-constructing and interpreting the meaning of interview content and expression using multiple codes that identify patterns in content. This is repeated to condense codes and identify relationships between themes (Corbin & Strauss 2008). Analysis involved data familiarisation, broad theme generation, sub-theme identification and pattern description.

## Findings

### What's in a name: finding the right term

'Psychological preparedness' is currently the most widely used term to describe a person's capacity to anticipate and manage stress during stages of disaster warning and time of impact, particularly in research. However, other terms used in research and community education include psychological preparedness, emotional preparedness and mental fitness.

When participants were asked what term they preferred, the results were unanimous; 'psychological' is not a term with which they resonated.

*...it could be an old bloke that is reading that and he is going, 'psychological bullshit'.  
(Female resident, 56)*

*Psychological, please take that out.  
(Male resident, 67)*

The term 'emotional preparedness' had fewer negative responses. It was broadly appealing and was considered more relatable to by the participants.

*Most people probably would feel better about their emotions than psychological in the first place, it is just more of a normal word that people feel their emotions from something [...] Emotionally is probably easier to think about than your psychological preparedness  
(Male, 46)*

*The psychology word is clinical. This is just emotional, everybody knows what that word means. And we can relate to it on every lives of our lives.  
(Female resident, 78)*

1 Queensland Government fact sheet. At: [www.bundaberg.qld.gov.au/files/Emotional\\_Preparedness\\_Brochure.pdf](http://www.bundaberg.qld.gov.au/files/Emotional_Preparedness_Brochure.pdf).

2 Psychological Preparedness for Disasters guide. At: [www.redcross.org.au/files/RED\\_Prep\\_Psyc\\_Booklet\\_F.pdf](http://www.redcross.org.au/files/RED_Prep_Psyc_Booklet_F.pdf).

This presents researchers and emergency services organisations with a dilemma; how can research findings and education materials that have used the term 'psychological preparedness' be conveyed to people who don't resonate with this term? This paper has used a combined term of psychological and emotional preparedness to illustrate the terminology challenges. This may not be workable in a community education setting. Better alternatives for referring to the psychological aspects of managing stress without using the term 'psychological' included terms like 'mind' or 'knowing'.

*In mind and body. Keep it simple. And then you can either say 'well in mind' 'knowing what you need to do', 'knowing what is coming', or 'having an idea of what is coming'. 'Not allowing your imagination to go over the top'.*

(Male resident, no age given)

*I use a lot of 'head in the game', so I am touching on this idea that there is something else going on in here that is going to be a factor in whatever comes next*  
(Emergency manager)

*We refer to as 'preparing their mind' so it takes away some of that stigma.*

(Emergency manager)

## Who you love: trusted sources of psychological preparedness

We asked participants which sources of information they trusted the most. The benefits of communicating any preparedness information through credible authorities are well established. However, who people trust is not always as expected. While the majority of the participants felt the Red Cross was the most trustworthy source for emotional preparedness information, the government was the least trusted source and additionally aroused some strong antipathy.

*I think anything government-based is full of shit. [...] It is all fear tactics. [...] I just don't have faith in a lot of their stuff.*

(Female resident, 40)

*There's a lot of things that people don't like about our government. Yes, they try and prepare us and that kind of stuff, but the logo itself is not always trustworthy.*

(Male resident, 41)

*That is the government's thing. They do stuff because that is what would make their lives easier.*

(Male resident, 26)

*I would be wary of anything put out by government*  
(Male resident, 53)

This finding reflects other population trends that indicate record historical lows of trust in government. Global trends also show governments are the least trusted institution (Edelmen 2017). In Australia, levels of trust in the Australian Government have fallen steadily since 2010, reaching a low in 2016 when 29 per cent of people

felt the government can be trusted most of the time (Markus 2016).

In contrast to perceiving communication from government as reflecting the government's self-interest, the Red Cross was perceived as being experienced in working alongside the community 'on ground level' (i.e. trust was linked to action).

*I would trust them [The Red Cross] more over any of the others, to be honest, because they are not someone that sits in an office behind walls and just delegates. [...] The Red Cross is more about people. People helping people, so these are the people that are on ground level, that actually deal with people and have a relationship with people more so and will do the dirty work. I see 'manage your feelings'. These are the people that do the caring.*

(Female resident, 40)

Despite their *prima facie* expertise in relation to 'psychological preparedness' and in line with people's concerns about the clinical nature of the term, participants did not perceive the Australian Psychological Society to be a trustworthy source for information.

*That [the Australian Psychological Society fact sheet] is coming from a clinical point of view.*

(Female resident, 78)

The concerns people expressed about psychology reflect other research findings on trust. In an Australian study, psychology and psychologists were perceived as less accessible and practical for people facing emotional problems and less caring than social workers and counsellors (Sharpley 1986). Rather, people perceived as trustworthy those who had intimate experience of the situation, who worked alongside them like the Red Cross and the local council.

*If you put the council one in front of me I would pick that one first because they lived it, they know it, they felt it.*

(Female resident, 78)

For communicating psychological and emotional preparedness, using a source that people perceive as active, connected and caring is important.

## Reaching young, old and everyone in-between

The primary resources for communicating psychological and emotional preparedness are brochures and websites. For residents who were older, the small size of the text on the brochures and websites made much of the information inaccessible as well as uninteresting.

*I wish you had it in a bit bigger...because I forgot my glasses.*

(Male resident, 57)

Complex language and long sentences were also inaccessible and uninteresting to many people. It was felt to be particularly problematic in reaching audiences not familiar with emergencies and from different educational backgrounds.

*After the 2013 floods, a lot of people were saying that they didn't understand the technical jargon. If it is brought down...to a level they can understand, then they can learn from it [...] people have said to me after [community meetings], 'I didn't understand what you were saying because it was so technical'.*  
(Emergency manager)

All the materials participants were asked to consider did not truly engage them across all ages and education backgrounds. Instead, participants wanted stories; audio and visual resources of real stories and real events that could help them and others 'feel' what might happen to them in a similar situation.

*The things we found really useful is sharing anecdotal stories [...] people go 'ah, hang on I can relate to that'. [...] We have found that by sharing those anecdotal stories...actually it resonates with people and it turns it into being real, something that they have never experienced before as being real*  
(Emergency manager)

*That sound [of a category five cyclone warning] for 30 seconds for someone just to understand what it is going to be like to be in there. Those sorts of things, I think is the only way really to start doing this, the emotional side of it.*  
(Emergency manager)

Rather than 'facts in brochures', people also suggested using audiovisual material disseminated through forums like social media.

*I would go more video. As well put together as those [brochures] were, it's human nature for people to be 'I don't need that'. [...] It would probably be more useful to have a different media type and have more human interaction with it because people will more empathise and respond to that.*  
(Female resident, 38)

*There are other avenues that I feel would get that out there better...you could put it on ads or whatever, Facebook or YouTube. [...] A short 10 or 15 second ad on YouTube or whatever...if I see a 30 second long ad I will skip it...but if it is a 10 or 15 second one usually I will sit through it, usually I will wait. [...] Just enough to pique someone's interest, to make them go 'maybe I should, maybe I should think a little bit more about this'.*  
(Male resident, 26)

The importance of using imagery and videos was linked to the need to increase the likelihood that people engage with the issues. Participants felt that emotional preparedness was more challenging to convey than physical preparedness because it requires people to anticipate the physical and sensory stressors of a natural disaster.

*People don't know what they don't know.*  
(Emergency manager)

*I think it is a really difficult task that we have to try and equip people with the tools and the knowledge that they need to be psychologically prepared for*

*something that they have no idea what is actually going to look and feel like.*  
(Emergency manager)

*The community doesn't understand or see what state they need to be in until they are actually impacted, and then it is too late. [...] It's not real.*  
(Emergency manager)

## Improving psychological and emotional preparedness communication

The research described here has changed the practices of the emergency managers who were partners in this study. While traditional approaches such as brochures and text-based web information remain an important part of practice, it is clear that a multi-modal approach, similar to the findings of this research, will help a greater number of citizens.

The Local Disaster Management Group (LDMG) that was a partner in this research, now use better-designed and simpler brochures based on the findings. Existing locally created paper-based products have been redesigned to reduce jargon, increase font size and integrate relevant imagery. The emergency services partners in this research now use non-clinical language when communicating psychological risks and preparedness.

Locally created content now explicitly includes 'emotional preparedness' as an important focus area. Local practitioners are creating a narrative with the community, especially vulnerable groups, that includes what happens in a person's mind and emotions when disasters threaten. Specifically, emergency management staff are helping people 'anticipate stress', 'recognise feelings' and 'manage reactions' as much as they are talking about what to put in an emergency kit or what their evacuation trigger might be.

Enhancing the emotional preparedness of disaster and emergency services personnel has also emerged as a priority. For example, while many of the Bundaberg LDMG members are experienced in emergency management and often have peer-support mechanisms available through their organisations, the greater complexity that a disaster brings magnifies uncertainty, stress and anxiety. Disasters are not the same as emergencies (Quarantelli 1997). Thus, LDMG exercising now includes a component that encourages members to anticipate how they may react emotionally, recognise the feelings as they emerge and to have a plan for how they will manage those reactions. A simple example used in a recent tsunami exercise invited participants to consider whether graphic imagery presented to them effected their emotional state and if that impacted on, say, the rate at which they spoke or the tone they used when exchanging information. An awareness of these effects helped LDMG members moderate their communication styles. This not improves communication within the LDMG and helps LDMG members feel they have control in a stressful environment. This is a positive psychological outcome in and of itself.

It was apparent from the research that people from local organisations are most trusted when delivering disaster-

related information. Thus, local emergency managers have ramped up the co-delivery and co-facilitation of information with local non-government organisations. Representatives from agencies that include Uniting Care, Lifeline, Australian Red Cross and the Salvation Army, with local council officers and regional ABC Radio staff have increased the work they do together, which includes public presentations, media broadcasts and interviews and door-knocking.

A very favourable outcome occurred when Lifeline counsellors were involved in the provision of flood mapping information to vulnerable people. These counsellors helped break down barriers that existed between the community and 'officials' and reduced the technical nature of previous communication efforts. The community had greater confidence that the information was useful. The effect of this activity is measurable in that there has been an observed 20-fold increase in the use of Bundaberg Regional Council's interactive flood mapping in the lead-up to significant rain events.

## Conclusion

Findings that visuals and stories are powerful methods to reach the young, old and in-between is compelling for emergency planners. This research has helped emergency managers realise that they need to 'put on a show' of localised resilience that is consistent, factual and engaging, and perhaps entertaining, in order to attract and hold the attention of the community. As such, the Bundaberg Regional Council upgraded its audiovisual equipment to include a large-format interactive touch screen. This has become a vital tool for formal presentations as well as television and internet presentations. Lessons from commercial TV have informed how visual display equipment is used. For example, during the 2018 cyclone season in Queensland, the Bundaberg Regional Council overlaid animated weather models and Bureau of Meteorology cyclone tracking maps on local maps. This type of content is used by regional television stations on the evening news and is popular on platforms such as Facebook Live.

The disaster resilience message is penetrating deeper into community than previously experienced. An offshoot of this study is that emergency managers may need to establish a public profile as sections of communities want to feel that they know and trust the people who are a source of truth during an event. This study shows that ways the ways delivery of emotional preparedness are changing to better involve and prepare communities to build resilience.

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## ABSTRACT

Homelessness can decrease the disaster resilience of individuals and communities. This paper presents the findings of ten in-depth qualitative interviews conducted at a homelessness support service to explore homeless individual's experiences of natural hazards and how they access support during disasters. Thematic analysis identified three themes: disconnection (isolation causing a reliance on non-durable forms of support), service provider trust (participants accessed services they trusted) and personal disaster (homelessness increased vulnerability to relatively minor natural hazards). Findings were applied to the role of community service organisations (CSOs) using the Adaptive Cycle of Resilience as a framework. The results imply that CSOs could minimise structural pre-disaster vulnerability by engaging people who are homeless in disaster preparedness and response activities. Disaster plans need to be 'all-people' and provide tailored support for the needs of specific populations. These plans could include word-of-mouth information, emphasising the strengths of people who are homeless and anticipating their priorities during disaster. CSOs could also employ vulnerability mapping to prepare for the needs of homeless populations. The impacts of disasters should be assessed in the context of an individual's exposure and vulnerability to their effects. Disaster recovery provides opportunities to promote strengths and increase social integration for people who are homeless.

# Homelessness and natural disasters: the role of community service organisations

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## Introduction

Disasters expose and exacerbate social inequalities related to health and housing inherent in complex, urban communities (Morrow 1999, Paidakaki 2012). Extreme weather can have a particularly magnifying effect on the physical and social problems faced by people who are homeless (Pendrey, Carey & Stanley 2014). Access to housing is therefore a key factor in the resilience of individuals and communities (Paidakaki 2012). However, disaster responses targeting the homeless population can be uncoordinated and ineffective (Washington 1998, Leung *et al.* 2008). There has been limited research to date analysing the experiences of homeless people during natural disasters, despite their unique and elevated vulnerability to these events (Fothergill & Peek 2004, Cusack *et al.* 2013, Every & Thompson 2014, Fortin *et al.* 2015, Silver 2018).

The marginally homeless (in overcrowded or temporary housing) are the most vulnerable to becoming chronically homeless during a disaster (Greene 1992). People with lower socioeconomic status will also spend longer in emergency shelters after a disaster (Brown *et al.* 2013). Homeless people can have limited protective factors such as higher education, financial resources and stable social networks (Greene 1992) and are less able to evacuate to alternative shelters (Norris *et al.* 2002). However, this population does have access to certain skills, knowledge and resources they can draw on during emergencies and disaster events. These include social and kinship ties, experience finding sources of food and shelter, knowledge of the local area and coping mechanisms to manage displacement and resource scarcity (Fortin *et al.* 2015, Settembrino 2017).

The strengths and vulnerabilities of a community responding to a natural disaster can be understood in terms of resilience, which is a key element of disaster management planning (Djalante *et al.* 2013). Resilience is understood as the ability of a community to tolerate disruptive influences without interruption to essential services and functions, and recover to pre-disaster levels (Washington 1998). The Adaptive Cycle of Resilience model expands the concept of disaster resilience by dividing the development of complex systems into four stages:

- growth
- development
- collapse
- reorientation (Burkhard, Fath & Müller 2011).

Resilient socio-ecological systems are those that not only absorb the effects of disaster and respond effectively, but are also able to employ the critical knowledge gained from the event to rebuild a durable and more equable community (Burkhard, Fath & Müller 2011; Fath, Dean & Katzmaier 2015). In the context of homelessness, this means recovering from episodes of extreme weather and using that experience to develop societies that mitigate systemic vulnerability (Gunderson 2010). The Adaptive Cycle of Resilience is applied in this paper to interpret findings and develop recommendations that support this form of societal renewal.

CSOs often have long-term engagement with people who are homeless and may be best placed to coordinate disaster preparedness, response and recovery for this population (Queensland Government 2015). To accommodate disruptions caused by natural disasters, CSOs require robust plans based on the experience and priorities of the local homeless population. There is limited research on the role of homelessness-focused CSOs in disaster response (Biederman & Nichols 2014). A more detailed understanding of the experience of homelessness during natural disasters and how to optimise support for this population via CSOs could reduce vulnerability and increase resilience for homeless individuals and the wider community.

The research questions that guided this study were:

- What are urban homeless people's experiences of natural disasters?
- What forms of social and peer support do homeless people access when exposed to natural disasters?
- What is the perspective of homeless people on the role of CSOs during natural disasters?

## Methods

### Participants and data collection

The participants (n=10) were selected from a population accessing a homelessness drop-in centre in Brisbane, Australia, and were referred to the researcher by service staff. Participants were selected for inclusion if they were above 18 years of age, did not suffer from intellectual disability or cognitive impairment and had experienced flooding, severe storms or cyclonic weather while being homeless. Brisbane is a subtropical environment and frequently experiences high heat, tropical storms and flooding. Widespread flooding had occurred in 2010, 2011 and 2013. Table 1 summarises participant demographics.

The semi-structured interviews were conducted using an interview guide in a quiet and private room at the drop-in centre. Open questions were grouped around three focus areas: 'experiences of homelessness', 'experiences of bad weather' and 'support during bad weather'. Interviews ranged in length from 20 to 60 minutes.

Table 1: Demographics of survey participants.

Gender	Age	Ethnic background	Experience sleeping rough
Female=4	18-30	Indigenous	Less than 3 years=3
Male=6	years=3	Australian=3	
	31-50	Caucasian=6	3-10 years=4
	years=4	Maori=1	10+ years=3
	50+		
	years=3		

Minor alterations were made to the interview process based on information learnt from previous interviews. This included the adoption of 'street' terminology and local geographical references. Directed questioning was conducted to investigate discrepant or divergent information. Participants had the opportunity to volunteer additional topics of discussion and identify priorities that may not have been accounted for in the interview guide.

This study received ethical clearance from the Behavioural and Social Sciences Human Research Ethics Committee at the University of Queensland prior to the commencement of any fieldwork.

### Data analysis

Thematic analysis was used to interpret the data. The dataset was read over multiple times to ensure familiarity and then inductively coded to identify common or meaningful semantic data features. The second step of analysis required interpreting the significance and meaning of patterned semantic content, which led to the identification of themes within the dataset. This constant comparative method is a key feature of Grounded Theory that ensures theoretical concepts used to understand data arise directly from the dataset (Lauridsen & Higginbottom 2014). In this way, three themes were identified: disconnection, service provider trust and personal disaster.

## Results

The three discrete themes identified within the data were the nature of peer support within the homeless community (Disconnection), the credibility of support services in disaster contexts (Service Provider Trust) and the ways in which disasters exacerbate the unique vulnerability of people who are homeless (Personal Disaster). This thematic grouping was evident across participant responses.

### Disconnection

The majority of respondents frequently referred to the social ties between homeless people when discussing how they coped with disaster events. Participants

referred to a transient web of social supports that they relied on for information and protection from police, other rough sleepers and natural hazards. Participants considered these connections essential to long-term survival on the street and the main source of social support during extreme weather.

*Interviewer: If there's bad weather coming, how would you hear about that?*

*Jo: Well, like I said I've got a lot of friends on the streets, and rumours get around quickly. And everybody knows one another; it's the connection between all of us ... where I come from, words just fly like the wind.*

Several participants described the dual nature of these relationships between rough sleepers, which could fluctuate rapidly between camaraderie and 'hustling', (where briefly established friendships are exploited to obtain food, money or other resources). Participants emphasised that while this network would be their usual method of accessing information about oncoming severe weather, it did not constitute a trusted support network during those times.

*Interviewer: How would you hear about bad weather before it begins?*

*John: Well usually it's from friends who watched the news and they just tells us, 'oh yeah bro, storm coming'.*

*Interviewer: Other friends who are homeless?*

*John: Yeah, like everyone looks out for each other but then again they rip each other off because it's all for survival you see, like even though they're friends, they'll still take things that they're not supposed to, like phones; anything to make money.*

*Jo: I don't hardly sleep at night because we can't trust anybody out there.*

*Mary: There's a real camaraderie among homeless people at times. It can be very transient, it can be very transient, it can quickly disappear ... when people are staying out camping together, they'll give up their life for their mates, for somebody's sleeping bag, you know, and they've only known him four or five days, and I suppose that's just part of human nature.*

Prolonged supportive relationships between rough sleepers were rare in this sample. Small groups could quickly establish in particular camp sites and then disband within several months at the longest. This chronic unease was cited as another cause of trauma for rough sleepers and became a barrier to finding shelter during extreme weather. One participant observed how the rough sleepers who had been on the street for a long time were less likely to seek support from family or friends.

*Interviewer: What sort of help would you get from family or friends during bad weather?*

*John: A lot of help, yeah, roof over your head, a meal, you know, good company, because that's what you need on the street, like, you see streeties, since people rip each other off so much, they don't talk to anyone anymore. They become, like, shell-shocked, you know what I mean; they just always want to be alone.*

In addition to this social isolation induced by a 'hustling' culture, homelessness was described as isolating people from wider social networks and communities. During disasters, participants relied on brief connections with other 'streeties' even when family members with housing were nearby.

*Sarah: We pretty much look after each other, the homeless, because like, our friends are homeless too. We don't rely on family that much because they have their own family and things happening.*

One respondent referred to the trauma of becoming homeless that made it difficult to reintegrate into the housed population.

*Mary: I have some vague memory of being young and seeing a light on in a house and seeing people pulling up and just feeling... it's almost like that psychological thing where people are, um, what's it called, disconnected a bit, after shock or trauma, there's sort of that internalisation, because there's shame.*

Participants seemed to be describing homelessness as a form of severe social exclusion, a conceptualisation also identified by Rayburn, Pals & Wright (2012). Other respondents cited breakdowns in social relationships as triggers for becoming homeless, such as divorce, loss of parents or family conflict leading them to transition to this less reliable network of brief connections. An ethnographic study by Desmond (2012) observed these 'disposable ties' among poor urban families, where non-durable relationships are rapidly formed to allow resource transfer. This study identified the immediate gains achieved by this process coupled with the exacerbated instability it created over the long term. The theme of disconnection illustrated a dual process of isolation from society at large and from other homeless social contacts, with some people becoming more disconnected across the trajectory of a prolonged 'homelessness career' (Chamberlain & MacKenzie 2006).

## Service provider trust

Participants discussed access to services and frequently mentioned trust as integral to their decision-making during disaster events. There was a notable diversity in how much the participants trusted service providers. Participants aged 18-30 years reported minimal concerns, whereas older participants were sceptical of the capacity of service providers to support them effectively. They were also concerned about the stigma of using services, choosing instead to manage their disaster response actions independently.

*Bill: If you can't look after yourself, the government certainly can't do it ... I don't want to go too far in*



*an evacuation because they are just making an advertisement for the government ... look after yourself and be away from it all.*

All participants reported CSOs as their primary source of support during dangerous weather. Eight participants cited the drop-in centre as their preferred support service. All participants cited word-of-mouth as their primary source of information and police, local council or CSO workers as the main communication sources. However, there was little expectation that service providers could actually provide substantial assistance. Several participants felt that most service providers fundamentally could not comprehend the experience of rough sleepers, which limited their trust in service providers.

*Jack: Until you've been in that for six months, you guys have no idea. Until you really observe the ruthlessness and the crap and all the bullshit that they say ... Until you really observe first-hand what really goes on, you guys have no idea.*

While participants did not describe their independence from service providers as a strength, it could be interpreted in these terms. Participants referred confidently to their ability to manage their own disaster response and some felt that their past experiences had adequately prepared them for such situations. A lack of trust in CSOs and other services may have promoted a degree of self-sufficiency that increased participant's capacity to manage and recover from natural disasters.

## Personal disaster

Rough sleepers experience the effects of disasters more acutely than the housed population (Washington 1998, Brown *et al.* 2013). These effects include loss of vital possessions, loss of documentation and strains on physical and mental health (Cusack *et al.* 2013). Participants in this study reported losing vital possessions even during periods of heavy rain.

*Interviewer: So it was raining for two weeks?*

*Sarah: About two weeks, yeah and most of our stuff got wet. All our clothes and phone chargers and phones.*

Participants also emphasised the vulnerability that accompanies homelessness that can lead to maladaptive responses during extreme weather.

*Mary: You couldn't not be damaged by it... and especially if you're not skilled up ... the only other thing is to go down hard, and you just can't afford to ... You feel like you have to rebuild again, you have to have a positive attitude, most of those who don't just go to their drink or their drugs.*

*Jack: The homeless have a 24-hour mentality. They don't think long-term at all, but if you can think long-term you can hide your stuff, it's pretty okay, but most of them ... they get wet, they get cold, they get miserable, they drink more.*

Mary also felt that post-disaster support failed to recognise the impact on people who are homeless because impact assessments are usually oriented around the financial cost of damages.

*Mary: I lost all my suitcases ... it's sort of like, oh, 'you're homeless anyway', but you're still affected. And I might only have a suitcase, but that's my whole world, that is my house, my home, my survival, my security.*

This theme underscores the natural association of homelessness and disasters as reflections of community resilience and vulnerability (Paidakaki 2012). The varying effects of natural disasters across populations can demonstrate how the risk profile for homeless people is constructed by social, economic and political policy (Busch 2012, Paidakaki 2012). Participants in this study had forfeited financial support because they had lost contact with the government agency when their phone was damaged by rain. Others had been caught in storms because they could not move their possessions and could not afford to lose them. When moderate fluctuations in weather can easily exacerbate disadvantage for these citizens then disasters occur on a dangerous continuum of hazards not experienced by the housed population.

## Discussion

For CSOs engaging in disaster preparation or response, these findings illustrate several observations regarding people who are homeless during extreme weather:

- Peer relationships are an essential, but non-durable element, of disaster response.
- CSOs are a key source of support.
- Service provider trust relationships are important, complex and hard to develop.
- The acute vulnerability of homeless people to small changes in weather puts them at a disadvantage when exposed to natural hazards.

The Adaptive Cycle of Resilience (Fath, Dean & Katmir 2015) was applied to interpret the findings of this study.

## Growth and development phases

In the 'growth and development' stages before disaster events, CSOs can enhance community resilience by fostering deep engagement with people who are homeless and connecting with social networks within the community (Every & Richardson 2017, Silver 2018). Participants named social isolation and geographic transience as catalysts for homelessness. These factors are also major obstacles during a disaster response, which CSOs could assist in overcoming with long-term and local engagement with the community.

The dynamic and unpredictable social connections reported by participants can be a strength during disaster if they enable people to access support in a



Homelessness presents challenges for community service providers during disasters.

Image: Alex Coppel, Newspix

rapid and flexible manner. However, this chronic instability was more often reported by participants to erode their trust in others and in service providers. This dichotomy between camaraderie and hustling behaviours should also be interpreted within a wider context of trauma and disadvantage frequently associated with homelessness, which can compound the vulnerability of this population when exposed to extreme weather (Every & Richardson 2017). Addressing this lack of strong social connections prior to a disaster event could enhance resilience.

Participants identified that the degree of trust in service providers was crucial to their engagement. This appeared to be more difficult to develop for older people, those with mental health conditions and those who had become socially isolated after prolonged periods of homelessness. Many CSOs actively develop relationships with their clients by building credibility and providing consistent and reliable support (Silver 2018, Kuskoff & Mallet 216). Despite these efforts, these findings indicate that some within the homeless population have concerns regarding the practical capacity of CSOs during natural disasters and stigma still acts as a barrier to access help during these periods.

CSOs face challenges in terms of resources, funding and staffing constraints. Their capacity to engage in disaster preparation can be restricted (Gin, Der-Martirosian & Dobalian 2018) and their ability to maintain the trust and confidence of their clients can be destabilised during times of disaster (Vickery 2017). Other authors have observed this lack of trust to be a communication barrier between CSOs and the homeless community, emphasising the value of cultivated relationships that can facilitate access to services during disaster (Silver 2018). Vickery (2015) recommended developing strong connections with particular members within a homeless community to assist with spreading information about preparedness and evacuation operations. Communicating via representatives known to the local

homeless population could also increase CSO credibility during times of crisis.

Other recommendations include providing education to people who are homeless regarding disaster resilience throughout the equilibrium phase, focusing on issues such as communication and evacuation processes specific to people without stable accommodation (Every & Richardson 2017). These initiatives could help people who are homeless to respond appropriately and also identify the CSO as a reliable source of support during extreme weather and other events.

## Collapse phase

During the 'collapse' phase, when a disaster is occurring, planners standardly adopt an all-hazards and all-agencies approach (Yates & Bergin 2009). These plans often include people who are homeless in general lists of multiple 'vulnerable populations' (Vickery 2017). This study found that in comparison to other vulnerable groups, homeless people have unique responses to disaster situations, are often adversely affected by a wider range of weather events and rely on different forms of social support. Therefore, these findings suggest the need for plans to also be 'all-people', ensuring they are sufficiently adaptable to accommodate all populations that may be supported by the plan. This could include specific methods for communicating with homeless social networks, resources for evacuating homeless people and transporting their pets and possessions, and providing additional trained staff to help people with issues related to mental health or substance use that may affect their capacity to respond during disasters. This would be a plan that 'faces both ways', ensuring that, in addition to being able to respond to any hazard, the plan responds in the best way for the multiple distinct populations being affected.

Key elements of an all-people plan could include Community Vulnerability Maps (Morrow 1999) based on data gathered through active involvement of vulnerable communities. These maps provide a way to accurately estimate the needs of specific groups within a community and are invaluable tools for emergency managers. These maps are developed through deep and ongoing engagement with the community, thereby reflecting the forms of social support and methods of communication used within networks accessed by people who are homeless. This could assist CSOs to inform homeless people about disaster management initiatives such as evacuation procedures or food distribution. Related to evacuations, study participants cited word-of-mouth as the most reliable means of spreading information. Therefore, an all-people plan should include activities that support and foster this communication pathway (Vickery 2015). Examples include providing emergency and disaster event training for outreach workers, involving peer educators and using social media effectively.

### Reorientation phase

The acute stage of collapse when social systems are disrupted is followed by a prolonged 'reorientation' phase. During reorientation the lessons and experiences of the collapse phase are incorporated, enabling resilient social systems to be adapted and strengthened with new forms of preparedness and response planning (Burkhard, Fath & Müller 2011). Participants indicated that CSOs play a large role in assisting them to recover from extreme weather events. However, several participants felt that the assessments made by service providers were inadequate to measure the impact extreme weather could have on their health and finances. Therefore, impact assessments need to measure the relative and absolute effect of disasters on vulnerable populations (Buckle, Mars & Smale 2000) to interpret the loss of possessions or documentation and the impact on health within the individual's particular context. This should be based on a clear understanding of the client's situation prior to the event and could be aided by a standardised assessment tool specific to homeless populations.

Participants did not clearly identify their personal strengths related to a disaster recovery process and felt alienated from most organisational or community responses. This provides an opportunity for CSO intervention. Ethnographic data collected after Hurricane Sandy found that shelters provided a valuable and efficient service of donation distribution and support for the affected local community, driven by homeless volunteers (Settembrino 2016). Those volunteers felt the disaster recovery process provided a positive opportunity for them to contribute to their community by using skills partly developed through their experience of homelessness. CSOs could invite and encourage this valuable contribution when assisting during the reorientation phase of disasters. Actively engaging homeless people in this process could enhance their

community integration, skills development and build resilience to future weather events.

### Limitations

The data collection method restricted this study to a small number of participants. The participants were self-selecting and could therefore have been more willing to interact, more engaged with services and have had more social connections than the general homeless population. The researcher was a Caucasian male, which may have been a communication barrier for female and Indigenous participants. As a qualitative dataset, these findings have limited generalisability. This exploratory research could be supported by larger-scale quantitative assessments of the concepts and behaviours identified.

### Conclusion

CSOs were the main source of support during extreme weather events for the homeless participants in this study. These organisations therefore require comprehensive plans that address the unique strengths and vulnerabilities of people who are homeless. These findings support the development and implementation of 'all-people' planning that would account for the diversity of capacities and experiences within the affected population. This research concurs with previous authors in finding that vulnerability is socially constructed and that emergencies and disaster events reveal structural inequalities that exist outside periods of disruption.

The continuous, cyclical nature of disaster preparedness and response, while a daunting undertaking for resource-constrained CSOs, also presents an opportunity to access and promote strengths and increase social integration of people who are homeless. This concept of iterative regeneration contrasts strongly with the linear process of psychological decline and social isolation reported as a result of homelessness by some participants in this study. More research is needed to further explore experiences of disaster among vulnerable populations and to design effective, locally specific disaster management plans that access the unique skills and resources of CSOs and vulnerable populations themselves.

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## ABSTRACT

# Prescribed burning on public land in Victoria: redesigning team structures and tactical planning

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## Background

### Lancefield 2015: catalyst for change

In October 2015, a prescribed burn in the Cobaw State Forest north of Lancefield in central Victoria escaped control lines twice in three days. On the second occasion, the fire ran well beyond the burn boundary and resulted in the loss of houses, fences and other assets. Escapes of this scale trigger a review of operational practice. The investigation of the Cobaw State Forest fire and the associated government response (DELWP 2015a, 2015b) generated important recommendations to improve practice. However, while the investigation explored elements of the roles tied to prescribed burn delivery, it did not touch greatly on the design and tasking of burn teams. Rather, it presented recommendations related to the adoption of important new risk management systems and changed approaches to burn approvals and oversight. The scope of community involvement in the design of burn programs was also analysed.

At a practical level, the Lancefield incident accelerated the adoption of new approaches to burn planning and risk assessment in Victoria; namely the Planned Burn Risk Assessment Tool (PBRAT), which was being trialled by fire services in the Australian Capital Territory and New South Wales. PBRATs provide a structured and documented way to assess the operational complexity of a burn, the risks associated with its delivery and the key steps to mitigate risk such as establishing control line standards and operational resourcing (Levine *et al.* 2017).

One of the points made in the Lancefield investigation was that BOICs need to be involved in the burn risk assessment process (DELWP 2015a, p. 9). Use of the PBRAT has strengthened the relationship between BOICs and burn planning and approvals teams by providing a structured process.

However, redesign of on-ground burn delivery teams has the potential to connect operational practice more effectively to these new systems and to bring about a shift in standards and approaches that matches the evolution of broader policy and procedural changes.

Designing and delivering a planned burning program involves reliance on complex planning and operational expertise. On public land, fire agencies dedicate significant resources to these programs, many of which have increased in scope as government and community expectations evolve. Since Black Saturday in 2009, Victoria's fire services have shifted significantly in their approach to identifying and managing bushfire risk. Most notably, 'risk landscape' planning and the development of high-level policy statements such as Safer Together (State Government of Victoria 2015), have moved conversations about bushfire risk to a 'cross tenure' or landscape context and a community-based setting.

This paper argues that one element not yet greatly affected by these changes is the design of on-ground burn delivery teams. In Victoria, the Burn Officer in Charge (BOIC) has been a pivotal position in delivering prescribed burns. This role has many dimensions and, as policy and operational demands increase, the structure of operational burn teams and the associated role of BOICs needs reconsideration. Innovation in areas of weather services, community engagement and use of aerial resources has been driven by technological development and research over the last decade. Nevertheless, the way that burn teams are structured has not witnessed comparable change. This paper describes and recommends adoption of a revised burn team structure in pre-burn tactical planning and knowledge management. These changes offer significant outcomes for government and communities.



Prescribed burn in the Wombat State Forest, Central Victoria, in 2018.

Image: Anthony English

## Operational complexity

The on-ground delivery of a prescribed burn is inherently complex. This creates an ongoing need to review how burns are managed and delivered. This complexity is not necessarily influenced by the size of the burn. A range of factors can shape complexity. As an example, planning a small burn adjacent to houses or other assets can present significant challenges that a BOIC, crew and overseeing Burn Controller must account for.

In any prescribed burn, multiple variables exist:

- **Dynamic environmental factors:** weather, topography, fuel and smoke all interact in ways that can challenge expectations and require quick thinking by crews on the ground. Minor effects such as changes in relative humidity, the way that a gully system channels wind or the thickness of the canopy and associated shade can all influence fire behaviour and the outcome of a planned burn.
- **Team dimension:** effective delivery of a burn relies on good team dynamics and clear tasking. The ways that crews and BOICs manage communication, fatigue and decision-making are influenced by team member attitudes and experience, as well as their ability to read and anticipate conditions and the effects of decisions on future outcomes. A BOIC may have to manage different crew behaviours or views within the team about how and how much fire should be applied during an operation. This challenge can be heightened if a BOIC is allocated a crew from out-of-area who may be unfamiliar with the fuel and vegetation types present in the burn area.
- **Community:** this variable has many important elements. Depending on a burn's location, a BOIC may need to consider the effects on neighbours and manage the timing of operations to reduce

impacts on individuals, businesses and communities, especially from smoke. Burn windows can be dictated partly by the onset of events such as holiday periods, crop harvesting or community events. In some cases, crews and BOICs may need to deal with people who are concerned or frustrated about smoke or other risks of a planned burn. Burn operations may also involve management of traffic and road use.

- **Environmental and land management objectives:** in most cases a burn plan will include objectives that have been developed by district burn planning teams. A BOIC will need to consider these when designing lighting patterns and when allocating resources to patrol.
- **Complex and changing risk to crews and their safety:** there are good reasons why agencies emphasise that BOICs and crews use a Dynamic Risk Assessment approach before, during and after prescribed burns. Terrain, trees, smoke, powerlines, vehicle traffic, dehydration, variable crew experience, fatigue, poor communication or tasking and even comment from neighbours, can impact on crew safety and capacity to function well.

New risk analysis procedures such as the PBRAT system and the subsequent resourcing and planning that this analysis generates, represent an improved approach that, in part, helps to mitigate this complexity. The inherent quality of the leadership and direction displayed by BOICs is also critical in the successful delivery of a burn operation. Nevertheless, field operations are exposed to complex variables and this is a good reason to reassess how teams are structured. The picture painted here highlights the cognitive load borne by a BOIC during an operation. It is argued that the role of the BOIC needs to be supported by an effective burn team structure.

## Current practice in Victoria

The following information is drawn from the author's experience in central Victoria over more than a decade. While it does not necessarily reflect the variation that may exist across Victoria, it is illustrative of current practice.

The BOIC is fundamentally responsible for overall delivery and management of the burn once ignition occurs. This is emphasised in the most recent *Bushfire Management Manual* and associated *Joint Standard Operating Procedures (DELWP 2016)*. The BOIC role in Victoria requires accreditation as an Operations Officer Level 1 and at least 15 days experience in leadership roles at prescribed burns (DELWP 2017). The formal role statement indicates that the BOIC is 'the person on the line responsible for the execution of all aspects involved with the planned burning operation' (DELWP 2017). While every burn operation is overseen by a Burns Controller who, in Victoria, must be an accredited Incident Controller, the BOIC is primarily responsible for decision-making and the adaptive management of resources and tactics on the ground.

Typically, the BOIC is responsible for allocating staff to the roles of lighting crew leaders and sector commanders on the day of the burn. BOICs tend to choose people they know who are accomplished in these roles and who communicate well.

A BOIC may appoint other roles on the day such as spotters to observe and document fire and smoke behaviour. Most BOICs will also appoint a support person or 'scribe' to assist with key tasks such as managing radios, maintaining a log and taking weather and fuel moisture observations. Specialist equipment operators such as first attack dozer drivers, tanker drivers and vehicle-mounted drip torch crews will typically have been pre-planned through the resourcing process overseen by the district burn planning team.

In many cases, the crew assigned to the operation will not have seen the burn area prior to the day of ignition and will not have seen a copy of the burn plan or operations map before arriving at the site. This includes those who may be tasked to critical roles of lighting crew leaders or sector commanders. Therefore, there is an inherent reliance on the underlying experience of individuals, the pre-ignition SMEACQS briefings<sup>1</sup> and the use of common operating systems to manage burn operations.

Several challenges can emerge from this approach. These include:

- **BOIC as pivot instead of a team approach:** many BOICs will seek to closely manage the detail of a burn's delivery, partly because of the historical emphasis on the breadth of the role, but also because they tend to be the most aware of the burn unit characteristics, risks and associated burn plan. This can limit effective delegation of tasks to others and reduce collective accountability for burn operations. While there is already an agreed process of delegating roles in a team setting, the BOIC role

is a central point of decision-making that can mean there is lack of clear accountability for roles such as sector commander and lighting crew leader. Delegation and tasking for these roles usually only occurs in any detailed way during the pre-ignition briefing. Because of this, in some cases, the BOIC may not be clear about where their own role ends. Consequently, a Sector Commander or Lighting Crew Leader may defer decisions to the BOIC or perform their function without accepting or understanding the extent of their accountability or the scope of the whole operation.

- **lack of specialist training or accreditation for key roles:** there is currently no specific training for lighting crew leaders or patrol crews in their roles at a burn. Agencies rely on experience and mentoring to develop this capability. Thus, the potential for variability in approach can impact on the effective delegation of tasks across the team structure.
- **lack of pre-burn tactical planning as a team:** under current arrangements, crew familiarity with a burn unit, the challenges being managed by BOICs and detailed implementation plans will only be addressed on the day of the operation via the SMEACQS briefings delivered by the BOIC. This offers little scope for an effective team-based review of tactics and challenges.
- **tipping points for BOICs and loss of effective oversight:** the BOIC is often stretched across multiple issues and tasks. As a burn progresses, the BOIC may need to oversee variables as diverse as many active burn edges, increased community interest, requests for additional resources and the management of crew shift changes.

These factors increase the risk of something going amiss, such as a burn escape, injury to crew, inefficient use and allocation of resources, poor communication and a reduction in the overall situational awareness of a burn team. These can manifest as:

- the clumping of patrol crews or a failure to maintain a patrol pattern that reflects the complexity of control lines due to a lack of team awareness of the burn unit's geography and associated pressure points
- over resourcing by patrol crews of point-specific challenges such as individual burning hazardous trees due to the need for crews to manage not only general patrol, but also these more focused issues
- poor description or interpretation of observed fire behaviour and conditions by crews due to a lack of awareness of the overall tactical plan and, in some cases, lack of effective training and supervision
- poor whole-of-operation management of lighting patterns that can result in too much fire being put in, especially as crew members tire across the day or environmental conditions change.

<sup>1</sup> SMEACQS briefings encompass Situation, Mission, Execution, Administration, Communications, Questions and Safety of the burn operation.

These behaviours have the potential to lead to an injury or burn escape. While leadership exerted by key roles at a prescribed burn is critical, it is argued that challenges can be mitigated by better design, training and tasking of burn delivery teams.

## A new approach

Three steps are proposed to improve the functioning of the BOIC and the accountability of burn teams:

- The creation of specific roles and associated accreditation in burn teams for lighting specialist, patrol specialist, hazardous tree specialist and weather specialist.
- The rationalisation of the roles of BOIC and sector commander so these become more manageable and increase their capacity to exercise overall strategic operational control.
- The use of pre-burn field inspections and team-based tactical planning involving the Burns Controller, BOIC and the other specialists.

It is critical that proposals align with the fundamental principles of AllMS4; including unity of command and span of control (AFAC 2013). These new roles reinforce these principles and bring flexibility and scalability by embedding formal skills and experience by crews into a structure that better defines crew accountability. This approach supports the BOIC and sector commanders to maintain oversight of a prescribed burn operation. Table 1 outlines the proposed new roles.

The lighting specialist role would replace the current role of a lighting crew leader. The latter role is assigned at most burns but has no specific accreditation or training that relates directly to the application of fire to different

vegetation types or the management of a crew across the life of a burn operation.

The patrol specialist role is currently part of the sector commander role. Typically, a Sector Commander oversees the management of lighting, patrolling and hazardous tree management. The Patrol Specialist would report to the Sector Commander and provide focused attention on the quality of patrol by crews. A Sector Commander may lose this focus because they deal with a range of other issues that can lead to poor management of patrol resources.

Importantly, the patrol specialist role would not necessarily add value on a small sector or burn. In this situation the oversight provided by this role could be managed by the Sector Commander or BOIC. The patrol specialist role would be best used on large sectors where a Sector Commander is unable to effectively traverse the line due to distance or difficult terrain. In addition, all crews need specific training on what constitutes effective patrol in different conditions. This training needs to be formally developed, irrespective of whether a patrol specialist role is ever developed.

The other two roles allow hazardous tree management and weather and smoke observation to be effectively delegated in a way that ensures they receive consistent attention across the life of a burn. Both roles would require training beyond that currently supplied to crews as general competencies. For example, all crews in Victoria receive training in hazardous tree identification and marking. The hazardous tree specialist however, could be trained and mentored to achieve a higher level of capability in the identification and actual treatment of hazardous trees during an operation. They could also oversee the safe use and tasking of advanced fallers and plant equipment such as excavators.



Interface burning in the Hepburn Regional Park adjacent to the township of Hepburn Springs in 2018. This image was taken by a drone that was used as part of the operation to provide the BOIC with real-time updates on fire behaviour and the smoke column..

Image: Richard Adams, Parks Victoria



Prescribed burning in the Wombat State Forest, Central Victoria, in 2018.

Image: Anthony English



Clearly, not all operations require these suggested roles to be allocated to a structure. However, creating them would allow a burn team to be structured or scaled up to suit the operational complexity of a prescribed burn. They would allow a BOIC to formally allocate tasks against an agreed competency or role description that supports effective and, importantly, a formal delegation of functions.

## Benefits of the change

Burning operations are complex and the implications of failure or safety incidents are high. The changes outlined here potentially generate a range of benefits that help manage this complexity.

First, they create a formal process for developing expertise and performance standards that match the

complexity of operations and the implications of poor implementation.

Second, they provide a realistic and achievable scope of accountability for the BOIC as they create specific roles within teams. Operational procedures associated with crew safety, hazardous tree management, community engagement, shift management and other issues have become increasingly complex. The role of the BOIC as expert or pivot needs to be tempered by an emphasis on the team approach that places the BOIC in context.

Third, more effective tasking and professionalisation will benefit crew and community safety. The environmental risks present at a burn can be mitigated to some extent by good pre-burn management of hazards such as dangerous trees. However, the quality of supervision during a burn is as important as any pre-burn planning or physical management of risks. Role clarity and

Table 1: Proposed new roles, accountabilities and operational benefit.

Role	Responsibilities	Operational benefit
Lighting Specialist (replaces Lighting Crew Leader)	<p>Reports to the Sector Commander if the burn is sectorised, otherwise to BOIC.</p> <p>Oversees deployment of crew according to direction from Sector Commander and BOIC regarding lighting pattern.</p> <p>Monitors lighting crew safety and compliance with operational procedures.</p> <p>Updates BOIC and Sector Commander(s) on progress, issues and fire behaviour.</p> <p>Monitors and adjusts lighting in collaboration with the BOIC and Sector Commander(s).</p> <p>Prevents under or over application of fire, loss of effective communications between lighting crew members and loss of effective reporting to the BOIC.</p>	<p>Opportunity to formalise the role accountable for the application of fire during an operation. For example, the role could be trained to understand fire behaviour in different conditions and vegetation types.</p> <p>Limits potential for over or under application of fire.</p> <p>Provides more direct management of lighting crew performance and safety.</p> <p>Creates a team structure that encourages communication between crew members and upward to the BOIC.</p> <p>Limits potential for other staff to negatively impact on a prescribed burn by adding fire or directing lighting crew members to add fire outside the direction from the BOIC.</p>
Patrol Specialist	<p>Reports to the Sector Commander if burn is sectorised, otherwise to the BOIC.</p> <p>Monitors crew safety and their compliance with safe working procedures and tasking and reports on these factors to Sector Commander(s) or the BOIC.</p> <p>Updates the BOIC and Sector Commander(s) on the effectiveness of the patrol pattern.</p> <p>Assists the BOIC or Sector Commander(s) to prevent bunching of patrol resources or loss of coordination between patrol and lighting crews.</p>	<p>Opportunity to develop accreditation in the management of patrol tasks.</p> <p>Provides capacity for improved oversight of crew performance and safety at larger or more complex prescribed burns.</p> <p>Assists the BOIC and Sector Commander(s) to understand the effectiveness of patrol and resource allocation during the operation and supports BOIC and Sector Commander decision-making.</p>
Hazardous Tree Specialist (and team)	<p>Reports to Sector Commander(s) if burn is sectorised, otherwise to the BOIC.</p> <p>Assesses tree risk throughout the operation on defined sector(s).</p> <p>Monitors the condition of hazardous trees identified by crews on defined sector(s) and advises the BOIC and Sector Commander(s) on risk and treatment options.</p> <p>Oversees the management of dedicated crew or plant tasked pre-burn to manage hazardous trees during the burn operation.</p>	<p>Provides dedicated resources to safety and control issues that are not diverted by other operational needs such as patrolling or extinguishing spotting.</p> <p>Supports enhanced crew safety by providing expert assessment and targeted response by a dedicated team.</p> <p>Allows continuity in tree risk assessment during the operation.</p> <p>Assists patrol crews to maintain patrol discipline by providing a dedicated resource that allows them to focus on their core tasks.</p>
Weather Specialist	<p>Reports to the BOIC.</p> <p>Takes weather and fuel moisture readings at agreed times and locations and provides data to BOIC.</p> <p>Analyses trends in data and provides this insight to the BOIC.</p> <p>Observes smoke columns and advises the BOIC of any issues arising such as impacts on local communities, businesses, roads and traffic.</p>	<p>Provides the BOIC and the Burns Controller with regular and high-quality weather information and analysis.</p> <p>Enhances crew safety and supports BOIC decision-making.</p>

enhanced professionalisation would enhance the quality of supervision. Consequently, a safety culture that limits the effects of poor decision-making or inadequate risk assessment by crews due to fatigue, or lack of experience and training, could be fostered.

Finally, improving role definition and training assists with knowledge transfer in teams and generates a learning culture and agency agility. It assists agencies to adapt to changing circumstances such as staff retirement and associated loss of field skills as well as shifts in environmental conditions. These changes would also generate career paths in fire management that encourages continuous improvement and recognises the often whole-of-career dedication of staff.

## Combining with pre-burn field-based tactical planning

Even if these suggested changes are not formally adopted, there are opportunities to create shared team assessment and awareness of burn units and the approach to delivering a proposed operation. In the Western Basalt District at Parks Victoria, pre-burn field visit trials have taken place with key staff who are to be allocated to a burn. The focus of these on-site discussions is on tactics, risks and objectives. Historically, BOICs have tended to undertake this assessment in isolation and then rely on local knowledge and staff experience for safe delivery on the day. By pre-assigning the specialist roles flagged here and taking that team into the field before a burn, safer and more effective burn operations can be designed and delivered. This approach represents an attempt to access and share staff tacit fire knowledge at the team level (English 2016). Several tools can be used to stimulate discussion, such as the Pre-Mortem Assessment approach (e.g. Johnson 2011).

The value of this approach is enhanced if field inspections include operational delivery staff and the



Prescribed burning operations relies on the use and management of a diverse set of skills. Placing the BOIC role into a well-defined team setting helps mitigate inherent challenges associated with performing the role.

Image: Anthony English

district planning team, who are responsible for working with the BOIC, to develop the burn plan and the PBRAT.

## Conclusion

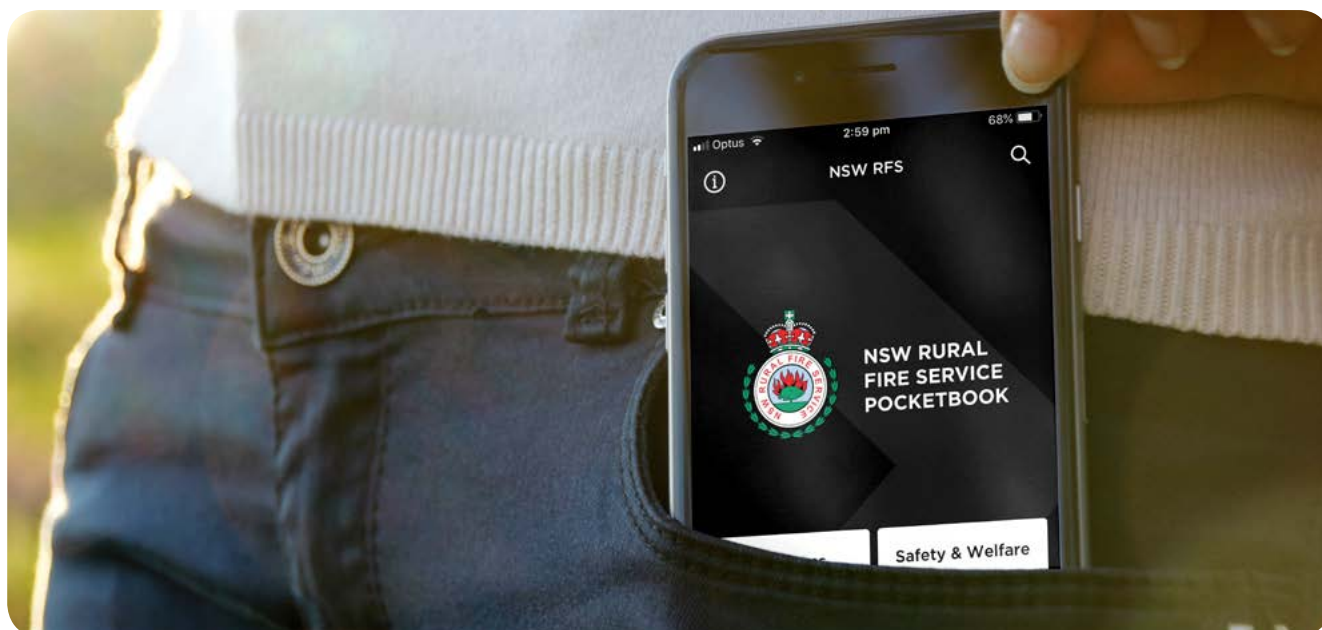
No system of work is foolproof. Safe and effective burn operations are dependent on people's behaviour and their skills, as well as constant vigilance, continuous training and review. What is proposed is not a panacea for preventing firefighter injuries nor prescribed burns that cause environmental consequences or escapes. The proposal does however, provide a pathway for operational practice to evolve and keep pace with the changes occurring in the policy area governing program design.

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### About the author

**Anthony English** is a district manager with Parks Victoria and undertakes the roles of Burn Officer in Charge and Operations Officer Level 2 at bushfires. Anthony has also worked in park and fire management in New South Wales and the Northern Territory. He has a strong interest in workforce planning and a background in cultural heritage management.



# NSW RFS Firefighter Pocketbook

The NSW Rural Fire Service Pocketbook app is designed as a fast, easy reference guide for volunteer firefighters and RFS staff.

A handy pocket tool for making operational decisions, this app can be used as a quick reference in operational planning and training. Key areas are covered including acronyms, safety and welfare, equipment, communications, organisational operations and fire tool calculators. Importantly, the app and its calculators can be used with or without mobile network coverage.

Kelsey Tarabini, a volunteer firefighter working at the Bush Fire and Natural Hazards CRC, says the app is an 'encyclopedia' for new and experienced firefighters and very useful during interstate deployments.

*If you are an interstate firefighter you are able to find information on specific things such as communication plans with radios or water supply as well as gaining a basic understanding of that state's operation so you can play 'catch up', rather than misunderstanding what they're on about.*

*If you are from NSW this app is very useful because, let's face it, we can't always remember everything we get taught, and having the app is a great alternative to going to the station, or online, to find the firefighting manual and trawl through 150-300 pages of formal writing to source information you require.*

**Kelsey Tarabini, volunteer firefighter  
@KTarabini**



# Disaster Resilience Handbooks

The Australian Disaster Resilience Handbook Collection provides guidance on national principles and practices for disaster resilience.

The Australian Institute for Disaster Resilience is contracted by Emergency Management Australia to manage the Australian Disaster Resilience Handbook Collection.

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