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TOPICS IN THIS EDITION | COMMUNICATION | COMMUNITIES | FIRE | WARNINGS

BLACK SATURDAY TEN YEARS ON - WHAT DID WE DISCOVER?

SUMMARY

It has been ten years since Australia's most deadly bushfire, in which 173 people lost their lives and thousands of houses were destroyed. Like Black Friday, Ash Wednesday and other catastrophic bushfires in Australia's history, the lessons from Black Saturday, 7 February 2009, are still resonating today. This *Hazard Note* highlights the key findings of the Bushfire CRC report *Victorian 2009 bushfire research response*. This research was supported by a substantial database of scientific observations, photographs and interviews, and the findings led to the second stage of research by the Bushfire CRC (2010 to 2014), which investigated the issues arising from the Black Saturday bushfires in depth.



▲ **Above:** WITH SOME FIRES STILL BURNING, RESEARCHERS QUICKLY BEGAN LOOKING INTO THE FACTORS THAT TOOK THE LIVES OF 173 PEOPLE. PHOTO: DAVID BRUCE, BUSHFIRE AND NATURAL HAZARDS CRC

BACKGROUND

Less than 48 hours after the bushfires began, a group of researchers from various state fire agencies and research organisations was assembled by the Bushfire CRC to look at key issues arising out of the fires.

The purpose of the research was to provide the Australian fire and land management agencies with an independent analysis of the factors surrounding the fires. The research focused on three aspects - fire behaviour, human behaviour, and building and planning issues. Three research teams looked at the impacts of a sample of fires in order to gain a broader understanding of all the fires.

In one of the largest post-hazard studies ever undertaken, the research task force assessed more than 1,300 homes, interviewed more than 600 residents and took more than 21,000 photographs.

FIRE BEHAVIOUR

Key findings

Researchers considered which fires were

ordinary or extreme, and which were extraordinary; that is, exhibiting fire behaviour outside known experience. They found that ember spotting - the distance that an ember can travel in the wind - was an influential factor in the progression of the fire. Some spotting was recorded as reaching more than 30 kilometres in front of the main fire, exacerbated by wind gusts that reached up to 100 km/h.

The fire behaviour models under-predicted the speed that the fires spread, with a key recommendation suggesting that further work was required to understand the detailed progression of the fire across the landscape. The research team also measured and compared the intensity of the Black Saturday bushfires with other similar fires, including Black Friday in 1939 and Ash Wednesday in 1983, to determine the differences in vegetation, humidity and conditions.

Since 2009, much research has gone into fire spread simulators, with researchers

working alongside fire operations personnel to improve modelling accuracy. In turn, this has enabled agencies to issue more informed emergency warnings for the safety of firefighters and communities. When the predicted path of a fast-moving bushfire places a community or firefighting resources in great potential danger - specific warnings can be immediately enacted, firefighting resources redirected, and the safety of all those in the fire path can be ensured.

Current Bushfire and Natural Hazards CRC research is building on this by investigating extreme bushfire behaviour further, including how bushfires influence weather, as well as create their own; how spot fires impact bushfire spread; how to detect fires quickly using satellites; developing satellite-based tools to assess how dry vegetation is and if it will burn in a bushfire; and informing the first major update to the fire danger rating system since the 1960s.

HUMAN BEHAVIOUR

Key findings

Key human behaviour issues examined included planning and preparedness; information and warnings; intentions and actions. Many people were not prepared for the severity of the fires; most only took last-minute measures on the day to combat the fire threat.

Several weak links resulted in a lack of planning and preparation and affected people's ability to implement their fire plan. Many residents waited to assess the severity of the bushfires before deciding whether to stay or go. They identified public buildings, ovals and facilities with emergency services as relatively safe places of refuge during the bushfires.

Over the last ten years, fire agencies have adapted their community engagement approaches. They now place emphasis on the reality that the safest place to be is away from the fire, and that under severe weather conditions, defending a house from a bushfire will be impossible.

CRC research continues to uncover better ways to warn communities under threat as identified in the Black Saturday report. Science is identifying not just the limitations of current warnings and emergency information but helping to construct a new language that has impact and elicits the desired response. In recognition of the complexities involved in community warnings, CRC research has helped emergency managers and community groups incorporate planning for animals – both pets and livestock – and continues to influence the development of children's bushfire education across the country.

BUILDING AND PLANNING

Key findings

The level of detail in house design, building quality and the age of the property were all considered to be crucial factors that contributed to the likelihood of house loss during the fires.

In all, 2,029 houses were destroyed during

the Black Saturday fires. This included houses further than 380 metres away from continuous bush. Brick houses were more fire-resistant than mud brick and light-weight construction clad with timber or cellulose cement sheet, while vegetation overhanging or immediately adjacent to houses, either isolated or continuous, was a key factor influencing the likelihood of house loss. Metal and concrete water tanks were more likely to maintain an effective water supply for house defence compared to polyethylene and fibreglass tanks, while the design, location and degree of protection of water pumps and piping were important factors in maintaining an effective water supply.

Soon after 2009, this research informed new building standards that were strengthened to account for fires at the most extreme. The changes made to Australian Standard 3959 ensure that new buildings in bushfire prone areas are safer and more likely to survive during a fire. CRC scientists are now working with urban planners to mitigate risk across wider geographical areas in the design and management of communities as they expand into potentially hazardous zones.

A FOUNDATION FOR FUTURE STUDIES

The themes covered in the *Victorian 2009 bushfire research response* research report remain points of concern for fire and land agencies, governments and planning authorities today.

The Bushfire and Natural Hazards CRC continues to play an active role in research after major fires and other natural hazards, particularly in preparedness, warnings and mitigation strategies for hazard-prone communities. These post-event studies are highly valued by CRC partners and are an effective way to gather important data.

Since 2009 many studies have been undertaken, each building on previous research that has combined to create an invaluable long-term database for emergency policy makers and other researchers.

This includes data collected after major

bushfires in Western Australia in 2011 and 2014 (Department of Fire and Emergency Services), New South Wales in 2013, 2017 and 2018 (NSW Rural Fire Service), South Australia in 2014 and 2015 (Country Fire Service), and Tasmania in 2013 (Tasmania Fire Service). Fire and Rescue NSW also received additional insights into the effectiveness of equipment and training provided to their community fire units during the Blue Mountains bushfires in 2013. Research for the Queensland Fire and Emergency Services after 2015's Severe Tropical Cyclone *Marcia* investigated how the cyclone would impact vegetation for the following fire season and beyond.

The report *Victorian 2009 bushfire research response* and all other post-event studies are available online at the websites of the Bushfire CRC and the Bushfire and Natural Hazards CRC.

FURTHER READING

Every C, Reynolds A, Clarkson L, Bearman C, Matthews R, Haigh L, Dawson D (2016), Sampson Flat community bushfire experiences, Bushfire and Natural Hazards CRC *Hazard Note 15*

McLennan J and Elliott G (2012), Community bushfire safety issues: findings from interviews with residents affected by the 2009 Victorian bushfires, Bushfire CRC *Fire Note 98*

McLennan J (2015), Capturing community bushfire readiness: post-bushfire interview studies 2009-2014, Bushfire and Natural Hazards CRC *Hazard Note 4*

Victorian 2009 bushfire research response: final report (2009), Bushfire CRC

Whittaker J and Taylor M (2017), Community preparedness, warnings and responses: NSW fires 2017, Bushfire and Natural Hazards CRC *Hazard Note 45*

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Hazard Notes are prepared from available research at the time of publication to encourage discussion and debate. The contents of *Hazard Notes* do not necessarily represent the views, policies, practises or positions of any of the individual agencies or organisations who are stakeholders of the Bushfire and Natural Hazards CRC.

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