Hazard Note

Understanding the Black Summer bushfires through research

About the report

This Hazard Note presents *Understanding the Black Summer bushfires through research: a summary of key findings from the Bushfire and Natural Hazards CRC* – a report that summarises the key research findings from the wide-ranging Black Summer research program, undertaken by Natural Hazards Research Australia and the Bushfire and Natural Hazards CRC in the years since the 2019-20 bushfire season. This multi-discipline program will improve the capabilities of communities to prepare for, respond to and recover from future natural hazard emergencies.

The report presents findings from 23 projects within four research themes, covering different issues and knowledge gaps that arose from Black Summer:
→   fire predictive services
→   cultural land management
→   community-centred disaster risk reduction
→   bushfire data and reconstruction.

In addition to key findings from each of the 23 Black Summer projects, the report provides links to the final outputs for each project and information about which projects have since been expanded by the Centre.

The report also presents an integrated view of the way forward from the fires, including what new capabilities can be implemented and how Australia can best learn from its worst fire season on record. The findings summarised in the report and in final project outputs can be used as a scientific basis by governments, fire and emergency management agencies, industry and community organisations to influence decisions and create safer communities and landscapes in the face of future bushfires.

Understanding Black Summer

The 2019–20 bushfire season was devastating for much of Australia. Record-breaking high temperatures and low rainfall in the year leading up to it saw large parts of the country burn ferociously on a scale not seen previously, in what is now referred to as Black Summer; although the fire season started in the north of the country in August 2019 and progressed southwards through to March 2020.

Tragically, 33 people lost their lives in the fires, while thousands more were affected by smoke inhalation and other impacts. By season's end, bushfires had burned a record 19 million hectares, destroyed more than 3,000 homes, displaced tens of thousands of people, and estimated to have killed billions of animals.

In response, several states and territories held post-fire inquiries and reviews, and the Australian Government conducted the Royal Commission into National Natural Disaster Arrangements. Based on the severity and impact of the fires, the Government granted the Bushfire and Natural Hazards CRC $2 million funding to explore the immediate issues arising from Black Summer. In addition, the CRC and partner agencies allocated funds for more specific research projects.

Black Summer research program

Building on existing knowledge and expertise, the Bushfire and Natural Hazards CRC developed the Black Summer research program – a suite of research projects to gather insight, data and knowledge to provide a basis for further study into what happened

Below: North Black Range, NSW, December 2019. Photo: Ned Dawson/NSW Rural Fire Service.

Access the report:

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that season and how that information could be used to reduce future disaster risk.

The program was developed to complement the findings of the various post-fire inquiries or reviews and provide insights that can be applied to all Australian communities managing the threat of severe bushfires. Some projects focused on what could be learned at a national level, while others analysed specific fire behaviour or technology in Queensland, New South Wales, Victoria, South Australia and Western Australia. However, the lessons and knowledge derived from each project, as detailed in *Understanding the Black Summer bushfires through research* report, can (in most cases) be applied across the country, not just within the state or territory that they were conducted. Some results can also be applied across multiple natural hazards, such as results of cultural land management and community-centred disaster risk reduction projects.

Based on the long history of anticipated summer fire risk in Australia, some of the fundamental principles that drove the development of the Black Summer research program were:

1. Why was this season worse than previous years with similar bushfire risk in affected areas?
2. Are there new capabilities that can be demonstrated by applying the outcomes of recent research to reduce bushfire risk and improve operational outcomes?
3. How can we better learn from the disasters of 2019–20?

The projects summarised in the new *Understanding the Black Summer bushfires through research* report were shaped around these fundamental principles and serve to shed light on each of them.

Black Summer research projects

Understanding the Black Summer bushfires through research focuses on four main themes of research in response to Black Summer, summarising key findings from 23 projects in total:

FIRE PREDICTIVE SERVICES: to boost situational awareness before and during bushfires, and to enhance the sharing of risk information and warnings with communities.
→ *Modelling fire weather interactions*
→ *Understanding moisture in the landscape*

→ *Established and emerging uses of predictive services in Victoria*
→ *Identifying water sources using satellite imagery*
→ *Mapping surface fine fuel moisture content*

CULTURAL LAND MANAGEMENT: to learn from Traditional Owners on how to reduce landscape risk through better integrated cultural land management knowledge and practices.
→ *Cultural land management in southeast Australia*
→ *Indigenous fire and land management in northern Australia*

COMMUNITY-CENTRED DISASTER RISK REDUCTION: to understand and assist communities and governments in enabling effective and efficient community participation and leadership in disaster preparation, relief and recovery.
→ *Community attitudes and experiences of the 2019-20 NSW bushfire season*
→ *Community-led recovery*
→ *Understanding experiences and recovery capabilities of diverse communities in Gippsland*

BUSHFIRE DATA AND RECONSTRUCTION: to analyse data and reconstructions of specific fires for intelligence on how best to better understand how to manage fires and to reduce the risk of fires in future.

Queensland:
→ *Wind speed reduction factors*

New South Wales:
→ *Effects of prescribed burning in NSW*
→ *Suitability of aviation tracking data for use in bushfire suppression*
→ *Extreme fire development on NSW south coast*
→ *Property damage and resilience on NSW south coast in January 2020*
→ *Informing post-fire recovery planning of northern NSW rainforests*

Victoria:
→ *Spread and behaviour of the eastern Victorian fires*

South Australia:
→ *Mitigating risk using prescribed burning in Kangaroo Island and Mount Lofty Ranges*
→ *Kangaroo Island Black Summer fire reconstruction*
→ *Fire risk modelling for Kangaroo Island*

Western Australia:
→ *Yanchep bushfire analysis*
→ *Validating fuel moisture estimates in Yanchep*
→ *Fuel moisture and fire history of south-west WA from Sentinel-2 satellite imagery*

Priorities moving forward

Each project in the Black Summer research program has delivered crucial research insights that address the national priorities on disaster risk reduction, and show how collaboration between researchers, governments and the emergency management sector supports the needs of communities across Australia. The findings of the research were used to inform the national *Research Priorities*, published by the Centre to guide nation-wide research into disaster risk reduction and natural hazard resilience.

Several of these projects and outcomes have since been expanded by the Centre. These extensions are marked on project pages throughout the *Understanding the Black Summer bushfires through research* report.

Most importantly, the findings summarised in the report and in final project outputs can now be used by governments, emergency management agencies, industry and other partners to influence decisions and create safer communities and landscapes in the face of future bushfires.

Australian Government