

DRIVING CHANGE WITH BUSHFIRE AND NATURAL HAZARDS CRC RESEARCH

SUMMARY

With the plethora of Bushfire and Natural Hazards CRC research from 2013–21 now available, how can you best make use of the research findings most relevant to your area of interest? The [Driving Change](#) online resource is the place to start, collecting and curating the best and latest research from across the eight years of CRC research. [Driving Change](#) provides the all-important first steps to using the project outputs with overviews and many great examples of current use, all linking back to the underpinning research.

[Driving Change](#) is presented around 10 themes according to how the research is now being used by emergency services, government and the community. [Driving Change](#) showcases online tools, inspiring case studies of research in action, and a selection of the best news, resources and publications, culminating in a collection of all relevant research projects relating to that theme. Explore [Driving Change](#) today on the CRC website, at www.bnhcrc.com.au/driving-change.

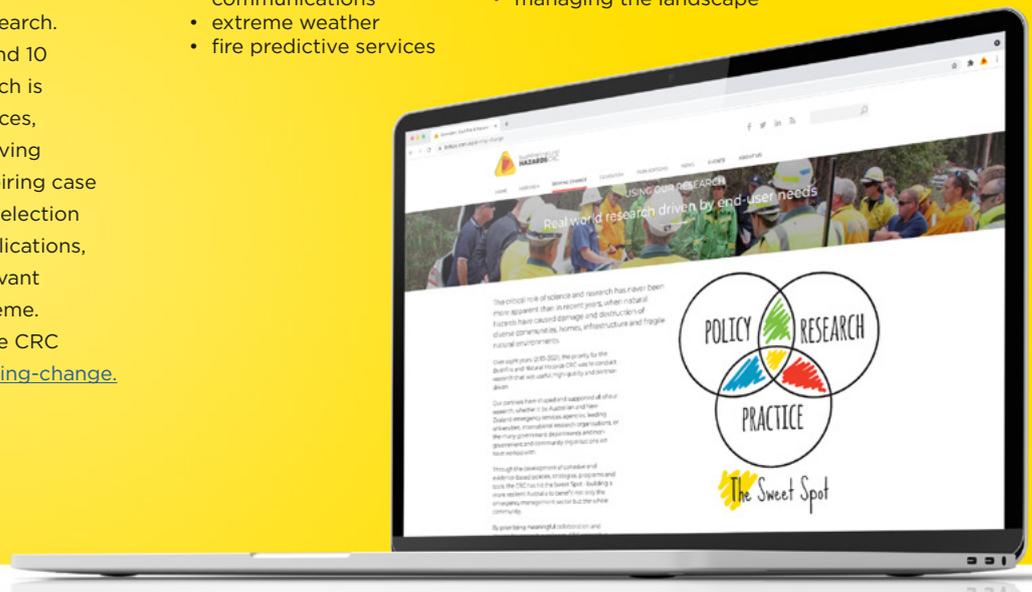
This special edition *Hazard Note* 100 summarises the [Driving Change](#) themes and presents some of the main tools that are ready to use.

DRIVING CHANGE RESEARCH IN USE

[Driving Change](#) curates the best and latest research from the Bushfire and Natural Hazards CRC.

The 10 [Driving Change](#) themes of research in use are:

- disaster resilience
- economics, mitigation and value
- education and communications
- extreme weather
- fire predictive services
- future workforce
- Indigenous initiatives
- infrastructure and impact
- managing the landscape
- policy, political engagement and influence.



BUSHFIRE AND NATURAL HAZARDS CRC RESEARCH

The Bushfire and Natural Hazards CRC built on 10 years of research at the Bushfire CRC, with an expanded all-hazards focus. The natural hazards sector had agreed on a grand vision – to reduce the risks, costs and impacts of natural hazards in Australia and to contribute to the national disaster resilience agenda.

The main priority of the CRC was to provide useful, high-quality, needs-based research through partnerships with universities, emergency service agencies,

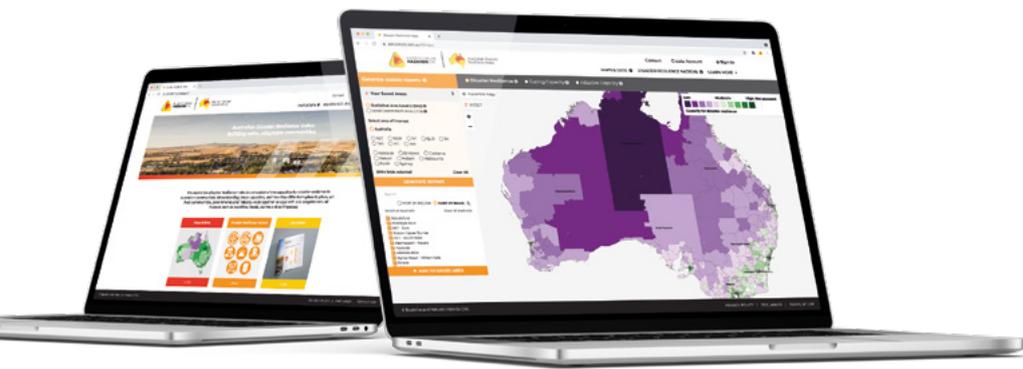
international research organisations, government departments and non-government groups. The aim was to drive changes in the way Australia prepares for, manages and responds to natural hazards.

Through the development of cohesive and evidence-based policies, strategies, programs and tools, the CRC has hit the ‘sweet spot’ – building a more resilient Australia to benefit not only the emergency management sector but the whole community. By prioritising meaningful

collaboration and striving for research excellence, CRC research is driving change.

More than 250 researchers partnered with end-users around Australia and New Zealand to produce a body of knowledge that includes a substantial list of resources, a national capacity of people-skills built up across our partner agencies, and a renewed focus on natural hazards sciences. This includes more than 600 reports, 100 *Hazard Notes*, 200 videos, 20 ready-to-use tools and 400 scientific publications.

HOW IS CRC RESEARCH DRIVING CHANGE?



▲ Above: THE AUSTRALIAN DISASTER RESILIENCE INDEX

DISASTER RESILIENCE

CRC research has changed the way that emergency services, land managers and governments view resilience. This is based on the premise that, to reduce both the risk and cost of natural hazards, an integrated approach is needed that considers multiple hazards and involves a range of mitigation options at the local, state and national level.

Australian Disaster Resilience Index

Developed in partnership with the University of New England, the [Australian Disaster Resilience Index](#) is the first national index of the capacities for disaster resilience in communities. By assessing disaster resilience across Australia, the Index helps communities, government and emergency services take informed and practical steps to improve disaster resilience, through better decision making, planning, development, policy, engagement and risk assessment. Explore maps of disaster resilience across the country, download easy-to-read data reports, and discover the strengths and barriers to disaster resilience and how they differ around Australia.

Use the Australian Disaster Resilience Index for policy or business development, resourcing, recovery planning, community engagement and profiling, strategic planning, research and modelling, risk assessment, monitoring and evaluation, and much more.

ECONOMICS, MITIGATION AND VALUE

Governments and emergency management agencies are being supported by CRC insights as they make decisions today to reduce the impacts of the natural hazards of tomorrow. How disaster risk may change in the future, the impacts of

these changes and assessing mitigation costs to reduce future risk most effectively are all important considerations.

Value Tool for Natural Hazards

The [Value Tool for Natural Hazards](#) is an online database developed with the University of Western Australia, providing peer-reviewed intangible economic values associated with the impacts of natural hazards, such as health, environmental or social values. The values are designed to be incorporated into other economic analyses, such as the Economic Assessment Screening Tool.

Use the Value Tool for Natural Hazards to gather data to measure intangible values for natural hazard mitigation options.

Economic Assessment Screening Tool

A companion to the Value Tool for Natural Hazards, the Economic Assessment Screening Tool allows users to determine the economic benefits of natural hazard risk mitigation options, and to compare the relative benefits of these options. It can estimate the value for money derived from different investments in mitigation, showing cost effective mitigation for a given budget.

Use the Economic Assessment Screening Tool to estimate the value for money derived from different investments in mitigation and explore if a full economic assessment is required.

EDUCATION AND COMMUNICATION

Australian lives are being saved by CRC research that prepares and protects communities threatened by natural hazards. This research had the collective focus of saving lives and empowering

communities to act to ensure their safety, and to equip emergency management agencies to improve planning and targeting of resources. It has improved community warning messages, enabled better targeted long-term public safety campaigns, identified best practice approaches to animal emergency management, and placed children at the centre of household and community disaster risk reduction and resilience education campaigns.

Public Information and Warnings Handbook

Published by the Australian Institute for Disaster Resilience, the *Public Information and Warnings Handbook* draws on CRC research from the Queensland University of Technology to support emergency services, media and individuals with developing and disseminating effective public information and warnings in an emergency. This includes changing the structure and language styles for warnings for specific audiences, such as high-risk groups and non-English speaking communities. An updated handbook is now in production, which will ensure that the research findings since 2018 are captured and embedded into future warnings.

Use the *Public Information and Warnings Handbook* if you issue public information and warnings in emergency services, meteorological services, policy and security, health agencies, hazard management organisations, or media organisation.

EXTREME WEATHER

The ability to understand, predict, forecast and monitor extreme weather is fundamental to understanding the threat posed to communities and, in turn, the ability to provide appropriate warnings in the lead up to emergencies. CRC science has improved the scientific understanding of extreme weather in Australia and informed the development of numerical weather prediction systems specifically for severe weather.

Pyrocumulonimbus Firepower Threshold

Fire-generated thunderstorms, or pyroCBs, are dangerous and can lead to unpredictable changes in fire behaviour. Developed with the Bureau of Meteorology, the Pyrocumulonimbus Firepower Threshold is a diagnostic tool which assesses the atmospheric potential to support the development

of a fire sufficiently large and intense to create a fire-generated thunderstorm.

The Pyrocumulonimbus Firepower Threshold is being used by fire behaviour analysts and Bureau forecasters to help predict when dangerous fire-generated thunderstorms might occur, informing warnings to the public and firefighters.

Coastal Erosion Story Map

A partnership with Geoscience Australia, the [Coastal Erosion Story Map](#) sets out the key steps required to understand coastal erosion when clusters of storms are a possible driver. Using two case studies – Old Bar Beach on the NSW mid north coast, and the Adelaide metropolitan beaches – the story map models beach response for current sea level conditions and shows a method for evaluating the impact of coastal erosion on the environment and infrastructure.

Use the Coastal Erosion Story Map if you are a coastal land manager, work in policy development for coastal areas, or live in a coastal area.

FIRE PREDICTIVE SERVICES

CRC fire behaviour research has created a base of solid scientific evidence that builds on a long history of fire danger ratings research in Australia. Collectively, this research is bridging the gap between outdated fire danger prediction systems and a modern system that draws on current research, technology and conditions.

Australian Flammability Monitoring System

The first online mapping tool of its kind in Australia, the [Australian Flammability Monitoring System](#) uses satellite data to provide a clear picture of dryness in the landscape. Developed with the Australian National University, it collects near real-time information on moisture in vegetation and soil, and displays this information on an interactive map to help fire and land managers with prescribed burning efforts and repositioning of resources.

Use the Australian Flammability Monitoring System if you are a fire or land manager to plan prescribed burning and to assess vulnerable fire risk areas in the lead up and during the bushfire season.

Australian Seasonal Bushfire Outlooks

Strategic decisions about resources, prescribed fire management and community warnings have been underpinned by the

CRC's [Australian Seasonal Bushfire Outlooks](#) (including the original development by the Bushfire CRC) since 2006. Governments and fire authorities use the *Outlooks* for planning in the lead-up to their bushfire seasons, including refining their public messages that communicate bushfire risk and highlight areas with the highest potential for fire. The CRC led the preparation of the *Outlooks* in close consultation with the Bureau of Meteorology, AFAC and emergency service agencies.

Savanna Monitoring and Evaluation Reporting Framework

By assessing nearly 20 years of data, the [Savanna Monitoring and Evaluation Reporting Framework](#) website evaluates the effects of fire where burnt area mapping is available across northern Australia. Developed with Charles Darwin University, the website shows where bushfires have burnt, at what time of year (early or late dry season) and when an area was last burnt, providing crucial intelligence for the planning of prescribed burning across northern Australia and for assessing greenhouse gas emissions calculations.

Use the Savanna Monitoring and Evaluation Reporting Framework if you are a land manager, prescribed burn planner or landholder in northern Australia.

FUTURE WORKFORCE

The emergency services workforce of tomorrow needs to be highly adaptable to meet the challenges and opportunities presented by a future where natural hazards are more extreme, longer lasting, and a greater drain on resources, both human and economic. CRC research has influenced workforce and volunteer management strategies, including issues of recruitment and retention, leadership and decision making, mental health, capability and planning, and diversity and inclusion.

Teamwork Tools

A [suite of six tools](#) that enhance teamwork and decision making in high stakes emergency management situations have been developed with CQUniversity, the University of Tasmania and the South Australia Country Fire Service. Teams and leaders can use these tools before, during and after emergencies to ensure the team is running as smoothly as possible under stress, including the enhancement of communication, leadership, coordination and strategic decision-making skills.

Use the teamwork tools if you work in Incident Management Teams, strike teams, at regional and state operations centres, or make strategic decisions for emergency management.

Care4Guide

The [first suite of resources](#) designed specifically with and for fire and emergency service volunteers aged 16 to 25 has been developed to focus on the mental health needs of this key demographic. The *Care4Guide*, along with associated resources, provides practical and usable evidence-based tools that promote positive mental health and wellbeing in young adult volunteers. It was produced in collaboration with the University of Adelaide, Flinders University, the University of Western Australia, the University of British Columbia in Canada, the Hospital Research Foundation, AFAC and Military and Emergency Services Health Australia. A digital toolkit is now under development.

Use the *Care4Guide* if you work in volunteer management, are a young fire and emergency service volunteer, or know a young volunteer.

INDIGENOUS INITIATIVES

CRC research has investigated Indigenous-driven interests and initiatives in building community resilience as a foundation for more effective relationships between communities and emergency management agencies. This research provides a basis for emergency service agencies to work with communities on respectful resilience measures in the face of fires, floods, cyclones and other hazards.

Northern Australian Remote Bushfire and Natural Hazards Training

[Ten training units](#) developed with Charles Darwin University provide practical support and reinforcement of capabilities in remote northern communities. Designed for delivery on Country, with family and at a flexible pace at the Vocational Education and Training Certificate II level, the units interweave a set of philosophical and practical understandings of the management of landscapes for natural hazards in a changing climate, as well as the integration of Indigenous knowledge with non-Indigenous approaches.

Use the training units if you work in emergency service and land management training and development in northern Australia. The units are subject to national accreditation.

INFRASTRUCTURE AND IMPACT

The scale of the impacts of storms, cyclones, earthquakes and floods upon houses, buildings, roads, bridges and other infrastructure is directly related to earlier mitigation decisions. CRC research has improved the way that vulnerability of buildings and key infrastructure is factored into planning decisions for communities at risk across a range of hazards.

Australian Exposure Information Platform

The [Australian Exposure Information Platform](#) is a website that quickly and easily allows users to generate exposure reports of what is in the path of a hazard, with the ability to be integrated into emergency service agency software systems. Developed with Geoscience Australia, it can be used for decision making before, during and after hazards, with the reports providing detailed statistical summaries of the number of people, dwellings, structures, businesses, and agricultural and environmental assets in any specified area across Australia.

Use the Australian Exposure Information Platform if you are an emergency service agency or individual issuing warnings during emergencies, or are involved in decision making about asset protection before, during or after hazards.

Weather the Storm

The [Weather the Storm](#) website, a collaboration with James Cook University, provides practical and economic options for upgrading existing houses to withstand cyclones and storms, based on the latest research.

Use the Weather the Storm website if you are homeowner or builder to find information about how to improve an existing home's key structural connections against extreme winds.

MANAGING THE LANDSCAPE

Landscape management uses prescribed burning and a range of other measures to mitigate fire risk. Research through the CRC has built a firm basis for understanding and comparing the effectiveness of these measures, showing that there is no one size-fits-all solution to prescribed burning. Factors such as a regions unique risk profile, local fire regimes, climate, infrastructure and land use patterns must all be taken into account.

Prescribed Burning Atlas

Tailor prescribed burning strategies with the [Prescribed Burning Atlas](#). A partnership with the University of Wollongong, University of Melbourne and Western Sydney University, the Atlas compares the level of risk reduction achieved from different combinations of prescribed burning techniques within available budgets. It covers 13 different landscape types across NSW, the ACT, Victoria, Tasmania, South Australia and Queensland, comprising different types of landscapes such as temperate forests, grasslands, savannas, deserts, woodlands and scrub.

Use the Prescribed Burning Atlas if you are a fire or land manager, or policy developer, with responsibility for planning or undertaking prescribed burning.

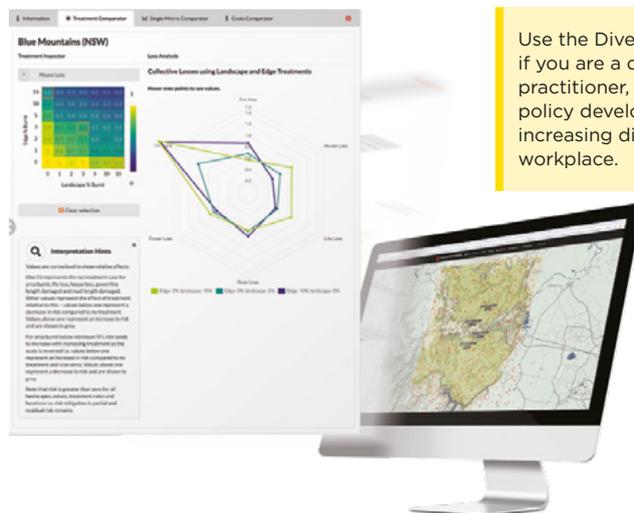
POLICY, POLITICAL ENGAGEMENT AND INFLUENCE

Research that makes policy recommendations or provides data for decision makers is one way to influence policy. While CRC research has produced tangible items where impact and uptake are more straightforward, the use of research in this area can be difficult to measure. Many researchers and emergency managers may agree on priorities and outputs of research, but the decision to use this research is made by governments, ministers or commissioners who create policy. Policy affecting emergency management is made across a broad range of portfolios, from planning and land use, to building standards, infrastructure, transport, communications, justice and more. Research findings, although important, are only one consideration.

Diversity and Inclusion Framework for Emergency Management Policy and Practice

The [Diversity and Inclusion Framework for Emergency Management Policy and Practice](#), a partnership with Victoria University, was designed to help develop a greater understanding of the role of inclusion in the emergency management sector, including the benefits and implementation. It helps to identify structures and practices that support the implementation of diverse and inclusive policies.

Use the Diversity and Inclusion Framework if you are a diversity and inclusion practitioner, are involved in workforce policy development, or are interested in increasing diversity and inclusion in your workplace.



◀ **Left:** THE PRESCRIBED BURNING ATLAS, SHOWING A TREATMENT COMPARISON FOR THE BLUE MOUNTAINS REGION IN NSW.

The Bushfire and Natural Hazards CRC is a national research centre funded by the Australian Government Cooperative Research Centre Program. It was formed in 2013 for an eight-year program to undertake end-user focused research for Australia and New Zealand.

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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