

Progress Report

1 July to 31 December 2023



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Overview

Natural Hazards Research Australia (the Centre) is Australia's research centre for natural hazards resilience and disaster risk reduction. The Centre began on 1 July 2021 and is now working closely with the Australian Government and other participating organisations across Australia to deliver a strategic research agenda for the nation and actively promote research utilisation.

The Centre is focused on undertaking research that promotes natural hazard resilience and reduces disaster risk, to support the needs of a variety of critical stakeholders – including emergency service agencies, government, industry and communities – in mitigating impacts of, responding to, and recovering from disasters caused by natural hazards.

It is built on the strong foundations of its predecessor Cooperative Research Centres, the Bushfire CRC and Bushfire and Natural Hazards CRC.

The Centre is both a leader and a catalyst for expansion of natural hazards research in Australia, ensuring that research is informing national and regional policy and capability, and improving public safety, resilience and sustainability.

39 PHD STUDENTS AND 22 ASSOCIATE PHD STUDENTS

4 ECR FELLOWSHIPS AWARDED

NEW WA NODE OFFICE WITH MANAGER FOR WA AND SA

47 RESEARCH PROVIDERS

29 TOTAL PARTICIPANTS

52 PROJECTS IN PROGRESS 3 COMPLETED

Key achievements

The Progress Report 2023 covers the period of 1 July 2023 to 31 December 2023 for the Centre, as it moved into its third year with a focus on delivery and use of the research.

Overall, the Centre is tracking well against its Strategic Plan 2021-2031 with further expansion of the research program, engagement and utilisation planned throughout 2024.

This report presents our achievements in building upon our strategic direction with a growing network of Participants and a targeted national research program. Working closely with the Commonwealth Government to ensure the growing research program continues to align with this strategic direction, the Centre aims to provide a national natural hazards research capability that addresses the complexities and difficult questions surrounding natural hazards.

Governance and Management, Partnerships

As more Participants join the Centre, the resulting research becomes further enriched by the depth and diversity of these organisations, sectors and people. When research is shaped, developed, monitored and supported by Participants and the communities they represent – those who will ultimately use it – the best possible chance of the research being relevant and useful from project report to implementation is ensured. This flexible model is responsive to the changing needs of the environment and the sector, providing research that is useful, useable and used.

Achievements

- Endorsement of four new projects in the November research round
- Two new Participants agreements signed, bringing total Participants to 29
- Four new research providers onboarded, bring the total to 47
- Opening of WA Node office and appointment of a Node Research Manager for Western Australia and South Australia
- Implementation of measuring and evaluation framework ongoing
- Stakeholder briefing events in Sydney and Darwin

Research and Implementation

The Centre's research program continues to demonstrate its agility and responsiveness to meet emerging needs.

Achievements

- 52 projects in progress, three project completions
- Research Data Management Framework and Data Catalogue of Centre's research assets developed
- National SES *Fitness for Role* program, based on Centre research, launched
- ABC Radio produced and continues to broadcast Centre research-based community service announcements broadcast during floods and storms
- Mobile weather stations deployed ahead of Cyclone Jasper under a new process for sharing real-time data



Capability

The Centre continues to build the capability of the future emergency management and disaster resilience workforce, as well as develop and support the current workforce.

Achievements

- 39 PhD students and 22 associate PhD students supported
- Four Early Career Researcher development fellowships awarded
- PhD student wins early career researcher award from CRC Australia
- Principles of Culturally Safe Research Practices released
- Research-backed schools bushfire safety program wins award
- Disaster Challenge 2023 final highlighting youth engagement

Research Informed Advice

The Centre runs regular events to communicate the outcomes of its research program. Two Natural Hazards Research Forums have been an amazing success with the third, in Adelaide in May 2024 again aiming to bring together a large diversity of organisations to exchange ideas and knowledge.

Achievements

- Sector roundtable informing, and discussion paper about assisted relocations produced in partnership with the Suncorp Group distributed widely
- Distinguished Speaker tour in Brisbane, Sydney and Canberra with Prof Gavin Smith of North Carolina State University on assisted relocations sponsored
- Research Industry Partner for AFAC23 annual conference and a supporter of many sector conferences and events
- Public webinars based on our PhD program, community risk, community led recovery, Indigenous-led research
- National Indigenous Disaster Resilience Summit drawing on Centre support and research

Key Upcoming Activities in 2024

- Completion of more research projects with a clear transition path to utilisation
- Hosting of Natural Hazards Research Forum in Adelaide in May
- Funding of new projects
- Completion of the Biennial Research Plan 2024–26
- Commencement of early career researcher network
- Partner role in International Fire Behaviour and Fuels conference
- Stakeholder briefing events in Melbourne and Canberra

Governance and management

Board

The Board of eight independent members met three times over the reporting period, with a strong focus on corporate governance, strategic planning and the Centre's research portfolio.

The Annual General Meeting was held on the 27 November 2023. At the meeting, annual accounts were endorsed and the extension of the term of Director Sandy Whight was approved.

Research and Implementation Committee

The Research and Implementation Committee provides the Centre's Board with strategic advice on overall development of the Centre's research and implementation programs, consistent with the Commonwealth Funding Agreement.

The committee met twice during the reporting period.

Risk, Audit and Compliance Committee

The Risk, Audit and Compliance Committee provides the Centre's Board with assurance that there are adequate processes in place regarding matters of risk, audit and compliance.

The committee met three times during the reporting period.

Education and Training Committee

The Education and Training Committee provides the Centre's Board with advice on the strategic directions that the Centre should take to support and promote training and education to improve resilience to natural hazards.

The committee met twice during the reporting period.

People and Culture Committee

The People and Culture Committee oversees strategies to manage and enhance the Centre's workforce, including attraction, retention, remuneration and conditions; performance management; development and succession-planning of staff; equity and diversity; workplace relations; staff, health, safety and wellbeing and organisational culture.

People and Culture committee met twice during the reporting period.

End-User Advisory Panel

The End-User Advisory Panel provides the Board with strategic advice on the development of the Centre's research, education and utilisation programs, consistent with the Commonwealth Funding Agreement. It is the primary end-user advisory body of the Centre and consists of representatives of Participants.

The End-User Advisory Panel met on the 27 November 2023.

International Science Advisory Panel

The International Science Advisory Panel did not meet during this period.

Centre policies and processes

The Centre holds and manages substantial financial and intellectual resources on behalf of its members. Strong governance and management processes are in place to ensure confidence in the use of these resources.

Throughout the reporting period, the Centre has enhanced its governance and management by reviewing, developing and implementing policies including:

- Annual Leave Policy
- Family and Domestic Violence Leave Policy
- Performance and Development Planning Policy and Procedure
- Public Holiday Substitution Policy
- Information Security Policy
- Acceptable Use of Information Technology Policy

The Centre has also completed the implementation of recommendations following an earlier information security review to enhance the Centre's information security.

The Centre is also progressing review of Work, Health and Safety and Privacy policies.

Measuring performance

The Centre's Board endorsed the evaluation framework in July 2023. Initial implementation of the framework is underway, focused on the collection of research utilisation case studies and amendments to quarterly project reporting requirements to assist in collecting further information on research project promotion, outputs and collaboration activities.

Further implementation in 2024 will consist of review and analysis of research processes and data sources to identify current and potential research engagement and utilisation data. Design of a stakeholder survey is also underway. The Chief Science Officer co-authored an editorial section on research utilisation in *Real impact: Challenges and opportunities in bridging the gap between research and practice – Making a difference in industry, policy, and society* in the International Journal of Information Management, which will be published in early 2024.

Managing Data

A jointly funded and recently completed Centre and Australian Research Data Commons project has formed the basis of the Centre's research data management initiative. Working with a team of experts from FrontierSI, UNSW, RMIT, and NGIS the Centre has developed a trusted, harmonised and user-driven Research Data Management Framework (RDMF) and pilot Data Catalogue (Metadata Exchange) for the Centre's research datasets. These products work to provide a "line of sight" to Centre funded research datasets and a robust, scalable and interoperable platform to manage and share all dataset metadata.

Once scaled to a full production system to catalogue all of Centre funded research datasets, the metadata exchange and associated RDMF will create multiple benefits for Centre stakeholders, including:

- Enhanced data discovery and accessibility for researchers, policy makers, emergency responders and others
- Improved data interoperability and integration
- Strengthened collaboration and knowledge sharing of datasets, methodologies, and findings across the natural hazards research community,
- Adherence to best practices and ethical guidelines
- Empowered decision-making and policy development

The Centre is currently developing an approach to system scaling, with further work is planned for 2024.

Opening of WA node

A Western Australian Node of the Centre was officially opened by Department of Fire and Emergency Services Commissioner Darren Klemm AFSM and Centre CEO Andrew Gissing in December 2023.

At the same time, Dr Brendon McAtee was announced as the first Node Research Manager based in the WA node. Brendon will oversee research operations in both Western Australia and South Australia. The opening of the Perth Node at the Department of Fire and Emergency Services headquarters will assist the Centre to work more closely with its stakeholders to progress research.

Below: Deputy Commissioner Strategy and Emergency Management Melissa Pexton, Commissioner Darren Klemm AFSM, Andrew Gissing, Brendon McAtee



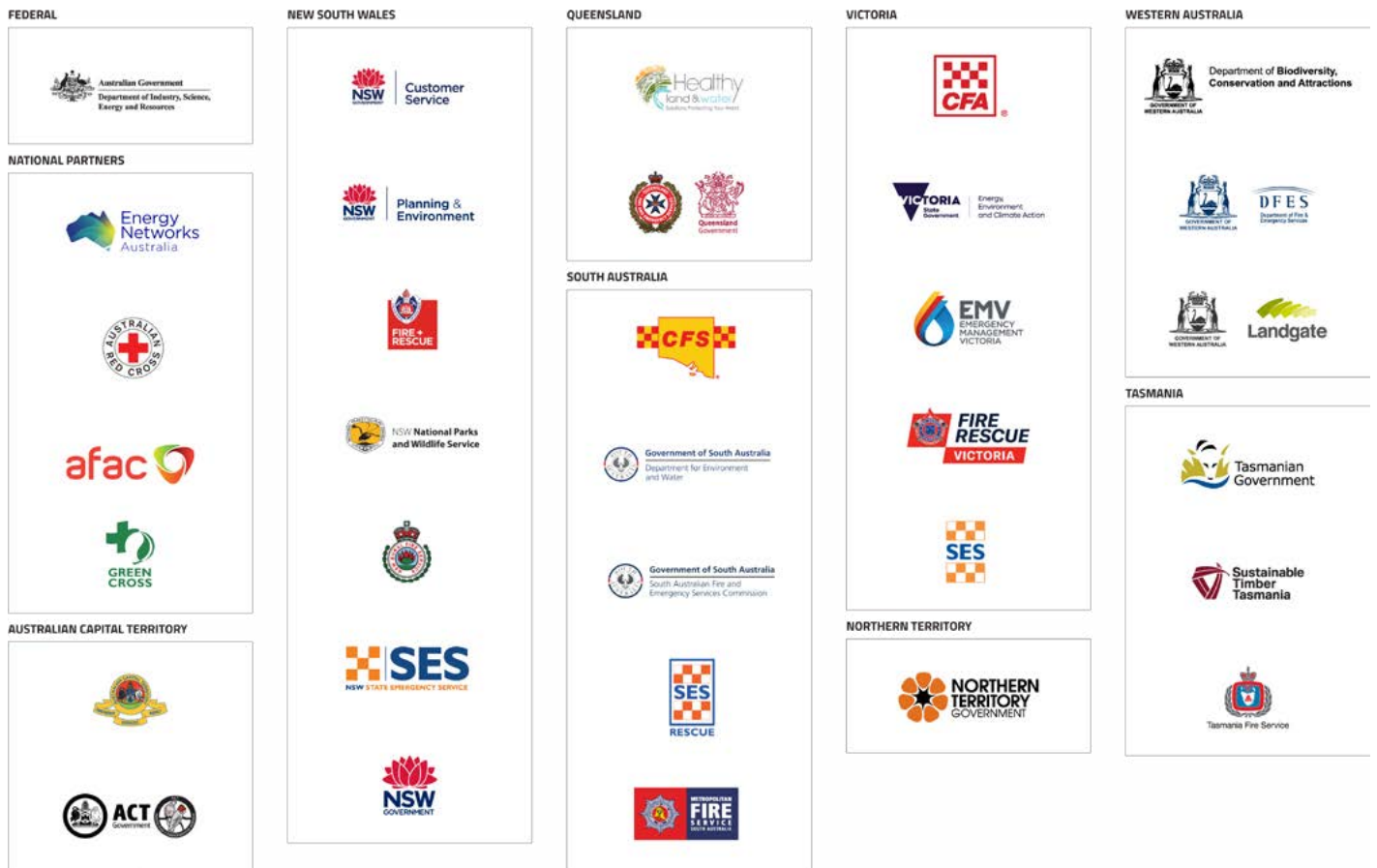
Partnerships

Participants

The Centre is an aggregator and enabler of research capabilities, insights and projects, delivering the maximum value to Participants and additional value to other stakeholders in the Centre's broader knowledge network. As a collaborative research organisation, the focus is on real-world problems and delivery of useable knowledge through products and networks to help address these problems.

The Centre is working with Participants to co-design research projects that deliver value and meaningful outcomes for the sectors and stakeholders that they represent.

The Centre now has 29 formal Participants with two new signatories in the reporting period, the Northern Territory Government and Fire and Rescue Victoria. Of note since 31 December 2023 the Centre has also signed a participant agreement with the Western Australian Government. A full list of participants is shown in the figure below.



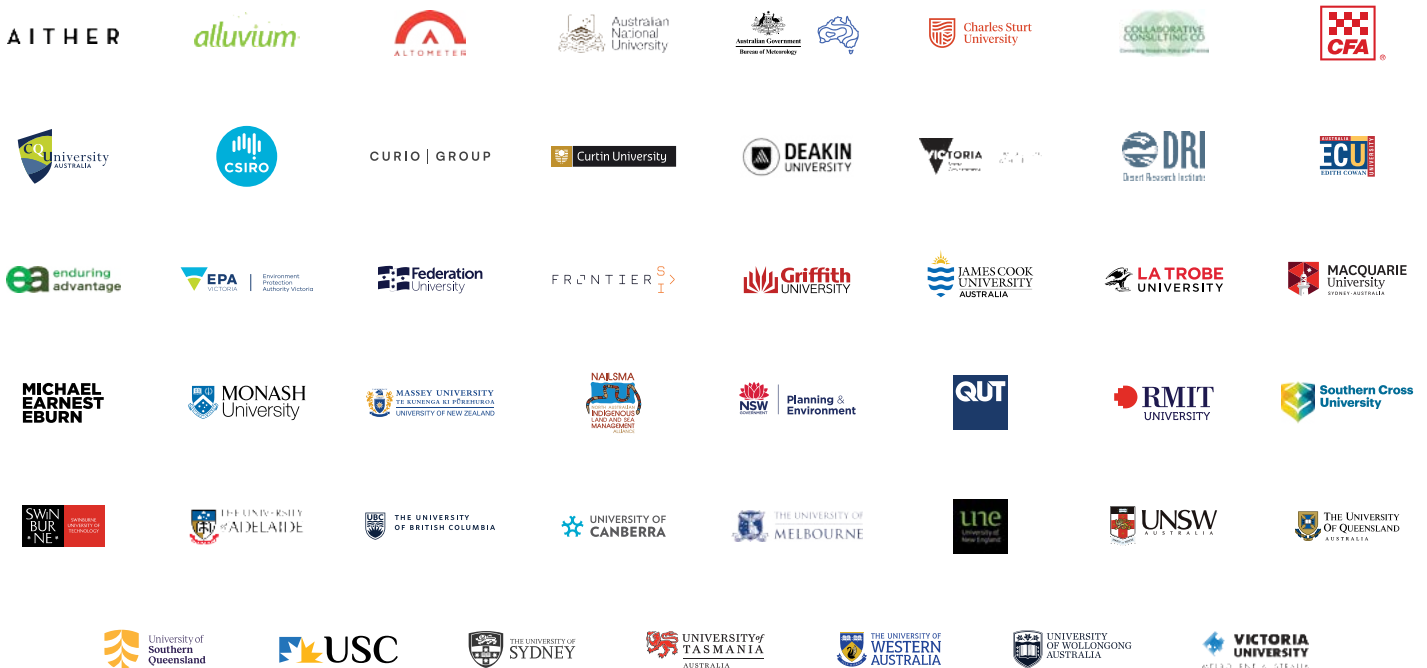
In addition to formal Participants the Centre collaborates with a range of other organisations. Over the reporting period these have included:

- National Emergency Management Agency
- Department of Home Affairs
- Australian Research Data Commons
- Queensland Reconstruction Authority
- Suncorp Group
- Resilient Sydney
- City of Melbourne
- Western Sydney Regional Organisation of Councils
- Department of Health Victoria
- Inspector General for Emergency Management Victoria
- Yarra Ranges Council
- Social Recovery Reference Group (ANZEMC subcommittee)
- Department of Energy and Public Works Qld
- Canadian Interagency Forest Fire Centre
- United States Forest Service

Research providers

The Centre's research providers play a critical role in the delivery of quality research. The Centre has research providers including tertiary institutes and consulting bodies across many jurisdictions, as well as state and federal government agencies.

Over the last two and a half years the Centre's research providers have grown to 47. It is anticipated that the Centre will continue to expand its formal research agreements with other research providers.



International engagement

The Centre continues to grow its international engagement. Key activities over the reporting period have included:

- Meeting with New Zealand National Science Challenges – Resilience to Nature Challenges
- Sponsoring distinguished speaker tour of Prof Gavin Smith of North Carolina State University
- Joint webinar with Canadian researchers on culturally safe research practices
- Participation in FirEUrisk initiative researching wildfire risk in the European Union
- Participation and membership of the International Association of Wildland Fire
- Commemoration of the International Day for Disaster Risk Reduction with the United Nations Office for Disaster Risk Reduction
- Planning discussions to form an international community of practice on assisted relocation
- Centre Chief Science Officer is a current Chief Investigator for the [EU RISE Social Media Analytics network](#) researching domestic and international crisis communications
- Centre Chief Science Officer was General Co-Chair [IFIPWG8.6 Working Conference on Transfer, Diffusion and Adoption of Next-Generation Digital Technologies \(2023\)](#)
- Centre Chief Science Officer is a current Distinguished Editorial Advisor, [International Journal of Information Management](#)
- Centre Chief Science Officer is current Senior Editor, [Information, Technology and People](#)

Research and implementation

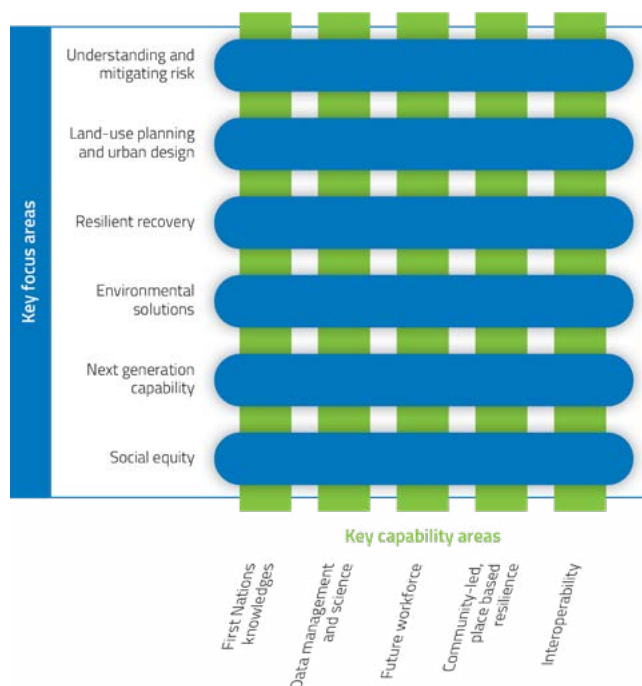
The Centre continues to develop an end-user driven research program to meet its mission. As the Centre’s research matures, a strategic and targeted effort ensures that the outputs are useful, useable and used.

The research themes provide a broad framework for the research program:

- Communities and workforces of the future
- Sustainable, safe and healthy natural landscapes
- Resilient built environment
- Resilient communities
- Situational awareness
- Operational response and innovation
- Evidence-informed policy, strategy and foresight
- Learning from disasters

The Centre maintains a Biennial Research Plan that outlines the Centre’s research activities to deliver outcomes described in the Centre’s 10-Year Research Strategy and Strategic Plan 2021–2031. The current Biennial Research Plan 2023–25 (published June 2023) provides the overarching strategic guide for the Centre’s research activities and describes the Centre’s research focus areas. It provides a two-year outlook and is reviewed annually to ensure that the Centre continues to meet the needs of its Participants and stakeholders, while building on the pre-existing research direction of the Centre. The Plan outlines key focus and capability areas that reflect the shifting drivers and priorities of the sector as it responds to the unfolding and changing risks of natural hazards. These focus areas are illustrated in the diagram below, showing how they interlink with capabilities.

The Plan is currently under review with the 2024–2026 Biennial Research Plan to be endorsed by the Centre’s Board before 30 June, 2024. This process will consider advice on research priorities, Participants’ needs and utilisation from relevant key stakeholders, and subject matter experts.



A portfolio of projects

The Centre's research is managed as a portfolio, developed and managed through strong engagement with Centre Participants, guidance from research organisations and leadership from the Centre. The Centre's Board and Research and Implementation Committee regularly review the research portfolio.

The portfolio of 52 core research projects are listed in Attachment 2. These projects are at various stages in their life cycle including some that have been recently completed and are now commencing utilisation. To date, a total of three projects have been completed and further projects are expected to be completed within the next six months.

To ensure the portfolio remains relevant and capable of investing in research in a timely manner, there are two formal investment rounds each fiscal year, in October and February. The most recent investment closed in September 2023 with 14 concepts submitted by participants. Four concepts were approved by the Board for funding.

Concept	Targeted Outcomes
Conserving and reconnecting floodplains to mitigate flood risk	This project will address key knowledge gaps towards implementing nature-based flood risk mitigation strategies in the Australian context. Nature-based solutions can offer effective and environmentally sensitive flood mitigation alternatives, ensuring meaningful stakeholder involvement and community engagement. Conserving and reconnecting floodplains through nature-based strategies can provide shared benefits, such as increasing biodiversity, and improving water quality and community wellbeing.
Australian temporary and emergency accommodation: learnings to inform future policy, strategy and recovery operations	This project analyses and addresses the increasing challenges in emergency and temporary housing during and after a disaster. The project aims to provide national guidance on the design and implementation of temporary housing from the research and resources developed.
Multi-Hazard Evacuation Modelling for Effective Emergency Management: A Collaborative Workshop Series	This research will develop a national roadmap for evacuation modelling design and development through a series of workshops to identify research gaps and consolidate learnings to improve evacuation decisions and support tools.
Support integration of Recovery Capitals in service plans for communities with different levels of social disruption	This utilisation project will develop research previously undertaken at the Bushfire and Natural Hazards CRC, the Recovery Capitals project, which was used to develop the Community Disaster Content Matrix. This project aims to utilise the frameworks to understand the extent of exposure to disaster-driven social disruptions, and Recovery Capital-related support needs of communities.

The next investment round will open in January 2024 and close in early March 2024.

Commissioned research

In conjunction with the core research program, the Centre also operates an extensive commissioned research program that provides organisations with opportunities to work exclusively with the Centre to develop and produce research or research-informed activities that often fulfil a specific or niche business need for that organisation. In the last six months, the Centre has undertaken commissioned research for Powerlink, the National Emergency Management Agency (NEMA) and the NSW Reconstruction Authority.

In addition to ad hoc commissioned projects, the Centre continues to coordinate two large multimillion-dollar commissioned research portfolios for the Victorian Department of Energy, Environment and Climate Action (DEECA), and for the Victorian Country Fire Authority (CFA). The Centre provides end-to-end support for these programs including establishing research projects, coordination of research activity and delivery of research outputs in partnership with a range of research providers.

For DEECA, 13 projects are active that cover areas including ecosystem resilience, native wildlife management, smoke exposure and planned burning and climate change impacts. Another four projects were managed to conclusion during this reporting period. For the CFA, six projects were active in this period on the effectiveness of bushfire risk reduction.

Academic publications from Research Projects – July–December 2023

Academic publications	Number
New technologies and systems	4
Journal articles	2
Conference papers (published)	5
Media interviews	145
Other (includes project reports)	46

Case studies of research utilisation

SES Fitness for Role



The national *SES Fitness for Role* program was launched by AFAC and SES agencies at the August AFAC23 conference in Brisbane (above). It provides a single approach to ensure SES staff and volunteers have and maintain the physical fitness to operate safely as first responders.

The program is solely based on Centre research findings and jointly funded by the Australian Council of State Emergency Services and undertaken by Human Performance Science in partnership with SES agencies and AFAC.

Ultimately, the *Fitness for Role* program contributes to the safety, health and wellbeing of SES members across Australia, reduces the risk of injury while performing required tasks, and contributes to building a culture of wellbeing. The Fitness for Role program benefits the safety and wellbeing of individual SES members. It also ensures that when SES members are deployed to support other states and territories during major emergencies, they are safe enough to assist.

Nine activities mimicking the most relevant operational tasks SES members undertake were assessed, as well as the level of effort required to meet these minimum physical fitness levels, and the environments SES members operate in. The program is backed by more than a decade of research measuring the minimum physical fitness SES members require to do their job safely and effectively.

Since the August launch, implementation has started in Victoria, Northern Territory, ACT, Queensland and South Australia, and is planned in New South Wales, Tasmania and Western Australia. The research has been promoted in the *SES Community Matters* magazine and *Asia Pacific Fire* magazine.

Victoria SES CEO and Australian Council of State Emergency Services Chair, Stephen Griffin.

"It's incredibly exciting to see this program come to life, and how it will reduce injuries among our members and improve their overall health. This project is a great example of what can be achieved when like-minded agencies in Australia come together and work collaboratively to tackle shared goals."

ABC flood and storm announcements

ABC Radio is broadcasting new Community Service Announcements (CSAs) for floods and storms, based on research findings from the Centre's previous Flood Risk Communication project, led by A/Prof Mel Taylor at Macquarie University, facilitated and supported by AFAC through the AFAC SES Community Safety Group.

Flood CSAs are used by ABC Radio before, during and after floods and severe storms for radio broadcasts and are typically around 30 seconds in duration. They contain high-level, general advice and support to listeners with the aim of increasing public safety in floods and storms.

They have been broadcast across the ABC Radio network throughout the two La Nina summers of 2021/22 and 2022/23, and again this summer as storms and flooding has hit up and down the east coast.

Comprising 26 different CSAs, these messages are the first-ever nationally agreed set of public flood and storm risk announcements.

The 26 CSAs cover a range of topics, including:

- six related to different risks and contexts associated with driving in floods
- four related to playing in floodwater — the behaviours most associated with flood fatalities
- four related to animal ownership
- four that provide information about the meanings or nature of warnings and alerts
- eight include messages around home preparation, safety considerations when cleaning up after flooding, what to do if trapped by rising floodwater or are considering staying when advised to leave, and flash flooding and the implications of flooding upstream.

Pat Hession, Emergency Broadcast Lead, ABC

"Prior to the develop of these CSAs, the safety messages broadcast differed state by state and were not consistent.

"The value of these CSAs is they are informed by the research and they are nationally consistent – no matter which state or territory you're in, you'll hear the same safety messages."

SWIRLnet

The deployment of mobile towers ahead of Cyclone Jasper in north Queensland in December 2023 allowed for real-time data collection for the project *Streamlining SWIRLnet data acquisition, analysis, storage and dissemination procedures*.

The SWIRLnet (Surface Weather Relay and Logging Network) team used improved data flow and automated analysis to deploy five weather stations in north Queensland communities expected to be impacted by Cyclone Jasper. The project was funded by the Centre and a collaboration between the University of Queensland-Cyclone Testing Station and James Cook University. The real-time, and eventually archived, data feed was available for viewing and downloading during the storm's landfall to streamline data acquisition and dissemination so that data is more accessible.

Tropical cyclones are one of Australia's most costly natural hazards. It is important that accurate measures of their characteristics are recorded to better prepare buildings, infrastructure, communities, and disaster management organisations.

Current procedures are overly manual, so the automation of this process ensures the capture and dissemination of real-time data during tropical cyclone events is more robust, reliable, and timely.

Handbooks

The Centre's research input into the Handbook Collection of the Australian Institute for Disaster Resilience (AIDR) is providing an authoritative and accessible knowledge on disaster resilience principles to Australian disaster and emergency managers.

The collection promotes good practice and a common language in disaster resilience across many jurisdictions in the public, private and community sectors. Centre and CRC research has contributed to the handbooks in the tables below.

Below: AIDR Handbook Collection – CRC/Centre research input, downloads since publication to December 2023

Handbook title	Publication date	Downloads
Evacuation Planning	Jan 2017	3780
Communities responding to disasters: Planning for Spontaneous volunteering	Jan 2018	1721
Community Engagement	Jan 2020	4728
Systemic Disaster Risk	Jan 2020	2158
Flood emergency planning for disaster resilience	Jan 2020	1923
Public Information and Warnings	Jan 2021	1262
Disaster Resilience Education for Young People	Jan 2021	757
Incident Management	May 2023	2019

Australian Exposure Information Platform (AEIP) and NEXIS

The Australian Exposure Information Platform (AEIP), a joint development of the CRC/ the Centre and Geoscience Australia (GA), interrogates national data contained in the National Exposure Information System (NEXIS) to make it available to emergency services, governments and other interested groups to assist in planning and situational awareness of the assets, services, infrastructure, businesses and population exposed to emergencies within any defined region.

AEIP quickly and easily allows users to generate exposure reports needed for decision making before, during and after hazard events anywhere in Australia. The customised reports provide a detailed statistical summary of the number of people, dwellings, other buildings and structures, businesses, agricultural and environmental assets, within a user-defined area.

NEXIS provides comprehensive and nationally consistent exposure information to enable users to understand the elements at risk. Exposure information is produced by sourcing the best publicly available information, including statistics, spatial and survey data, such as demographics, building, business, agriculture, institutions, infrastructure and environmental elements.

Since AEIP launched in September 2018:

- 40,000 reports have been generated via the AEIP website/API
- 9 million reports have been generated as batched report jobs done for private companies (for example – Western Power WA) and other state and commonwealth agencies

The NSW Rural Fire Service (RFS) uses AEIP as an integrated tool for response during active bushfires. The RFS models the direction of a bushfire over the next 24 hours to create and understand the potential bushfire impact boundary. The impact boundary is generated and sent to the AEIP Application Programming Interface (API) to create and send the RFS an exposure report in less than five minutes.

Identifying water bodies

This project identified how existing GA Digital Earth Australia (DEA) satellite-based data products could be tailored to better suit the needs of the National Aerial Firefighting Centre (NAFC). The final report on the research was published in May 2023 and presented to the broader sector in a poster at the AFAC23 conference. NAFC is now developing its internal systems based on these insights. During active fire events, aerial firefighting units dispatched by NAFC use a variety of data sources to identify locations for helicopters and fixed wing aircraft to access water.

For effective decision making, current and accurate information is critical. The project identified additional attributes that would add value to the existing DEA Waterbodies product for users in the emergency management sector. A workshop targeted at emergency management agencies provided insights into how current waterbody datasets are used and what additional waterbody attributes are needed. A localised prototype workflow was developed and implemented to better identify several waterbody properties (the surface area of water in the waterbody and the most recent date that water was observed) that assists in the placement of aircraft for upcoming fire seasons.

Helping people care for their animals during disasters

Managing Animals in Disasters CRC research, led by A/Prof Mel Taylor from Macquarie University, is generating further research utilisation opportunities for the Centre. Work is under development on the Planning for Animals in Disaster Handbook through AIDR, due for publication in mid 2024. The NSW State Emergency Service (SES) hosts resources from this research on its Get Ready Animals | NSW SES website, with resources to help NSW animal owners plan for their animals in emergencies. Hard copies of the resources have also been distributed at community events and pre-bushfire season activities.

Several NSW Government videos generated from this research have also been created that have been supported by NSW SES, Infrastructure NSW, NSW Department of Primary Industries (DPI), Greater Sydney Local Land Services (LLS), Hawkesbury City Council and the Agnes Banks Equine Centre.

Small Companion Animal Incident Management Project – Skills Impact also references the CRC research importance in its Australian Animal Care and Management Industry Sector Annual Update 2021: IRC Skills Forecast and Proposed Schedule of Work, to support the development of a TAFE unit in Companion Animal Emergency Management.

Emergency law online

The Australian Emergency Law blog, supported by the Centre and others, is an online discussion forum on the laws that applies to or affects Australia's emergency services and emergency management. The blog, produced by Dr Michael Eburn, formerly Ass/Prof at Australian National University, arises from his research funded by CRC research. It provides a popular educational tool to discuss legal principles and policy. The blog is distributed to 7,325 subscribers by direct email and through Facebook (5,100 followers), Twitter (122 followers) and Newstex, an international distribution service for professional blogsites and commentary. The blog has consistently ranked second or third in the 30 Best Australian Law Blogs and Websites and is listed in the Global Top 200 Law Blogs.

In the six months from July 2023 to 7 December 2023, Australian Emergency Law had made 76 posts, an average of 12.3 a month. There have been 66,675 individual visitors to the associated website who have read 124,677 pages.

Predictive maps

This project is defining the role of fire predictions in agency communications with the public during an emergency. It is overseen by a Steering Committee comprising representatives from the AFAC Predictive Services Group, the AFAC Warnings Group from all Australian states and territories, and the Bureau. The first research phase focused on understanding current levels of comprehension and use of maps for public information and warnings, is complete. To achieve this, fire-affected residents nationally were surveyed about how they use, comprehend, perceive, and act upon maps, including fire spread prediction maps. 3,007 people took part. In addition, 95 research interviews for more specific details were undertaken in West Gippsland, Victoria; the Huon Valley, Tasmania; the southern ACT; and the Snowy Monaro; New South Wales.

Steering Committee workshops resulted in the development of the Current Practice Atlas that shows the different approaches used by Australian emergency service agencies in the production, design and use of incident warning maps. This provides important context for the project to ensure that fire prediction maps complement the existing map-based products used to communicate with communities during an emergency.

Phase Two is now developing a series of fire prediction maps for testing with communities across Australia to provide evidence-based guidance for the six key decision points around the design and dissemination of the maps identified by the Steering Committee. By involving the project Steering Committee in the development of fire prediction maps, receiving their support in defining the scope of the research studies and interpreting the results, this project has ensured that the results of the research are useful, usable and used. The research will support a nationally consistent and evidence-based approach to the future use of fire prediction maps during an emergency.

Developing the non-technical skills of emergency managers

AFAC's Learning and Development Group is drawing on CRC research for its training guides. The recently published guide, *A Guide to Non-Technical Skills in Emergency Management*, builds on the work of Dr Peter Hayes and Ass/Prof Chris Bearman from CQUniversity. This work highlights the importance of non-technical skill development for emergency management practitioners. It provides guidance, tools and activities to help instructors and organisations better integrate non-technical skills into training and operations. Hayes and Bearman co-authored the guide with contributions from Queensland Fire and Emergency Services (QFES) and NSW National Parks and Wildlife Service who provided their training materials to assist with the development of the industry case studies within the guide. Hayes and Bearman's work on non-technical skills is also being utilised by QFES as an input to the Emergency Management Non-Technical Skills (EMNoTS) checklist for the organisation's Incident Supervision/Crew Leader training program.

Work continues with AFAC on incorporating EMNoTS materials into the Emergency Management Professionalisation Scheme (EMPS) to ensure professional standards, as well as in the interview process to assess candidates for EMPS certification. There has also been discussion around including EMNoTS material in the revision of the Australasian Inter-service Incident Management System (AIIMS) is currently underway.

Self-leadership skills

Positive Mental Health in Young Adult Emergency Services Personnel CRC project developed a framework and resources to minimise the short- and long-term impacts of exposure to potentially traumatising events. For use at an individual, local or organisation-wide level, the resources also promote general mental health and wellbeing among young people in the emergency services.

The consultancy Obvious Choice used the resources to create a suite of eLearning modules for Emergency Management Victoria (EMV) to develop leadership capability for disaster risk in members of Australia's emergency management community. The modules are intended for use across the country to advance leadership skills in planning, preparedness, response, and recovery to disasters. Early utilisation included the provision of resources to first responder psychology students in Indonesia in November 2023, and a presentation for Life Saving Victoria club presidents in October on the mental health of young life saving volunteers.

Community experiences of the 2022 eastern Australian floods

The Centre's 2023 National Research Forum launched major research report into the 2022 eastern Australia floods, followed by a workshop to unpack the impacts of the findings. In the last six months, aspects of the report have been published twice in the *Australian Journal of Emergency Management*. The project is part of the Centre's capability to undertake research following significant natural hazard events and was commissioned alongside QFES and NSW SES to explore community experiences of Australia's most damaging floods, as measured by insurance losses.

The research undertaken by Macquarie University, the University of Southern Queensland and the Queensland University of Technology, led by lead researcher A/Prof Mel Taylor, Macquarie University provided vital insights on preparedness, response and the early stages of recovery to help reduce future flood risk. A total of 192 flood-impacted residents were interviewed using an approach that invited residents to share their flood story, while a further 430 residents participated in an online survey ensuring personal experiences of people impacted by these floods was captured.

The research provides vital context to assist emergency management organisations, government departments, local government, community organisations and community members to better understand the complexities of community experiences before, during and after severe weather. The results are already informing strategies to improve flood safety and policy across Australia, including informing an external review of the 2022 flood response commissioned by the Insurance Council of Australia.

This work continues to be extensively translated and communicated across stakeholders including briefings and presentations to Central Coast Council; NSW State Emergency Management Committee; NSW DPI; Resilience NSW; Australian National University Institute for Climate; Energy and Disaster Solutions; Transport NSW; NSW SES; QFES; Queensland Reconstruction Authority; Insurance Council of Australia; Floodplain Management Australia Conference; AFAC National Warnings Group; Emergency Management Public Affairs Conference; and the International Sociological Association World Congress. Further briefings are planned in the coming months.

Further research is underway exploring community experiences of flooding during 2022 in Tasmania, Victoria and South Australia with a new set of stakeholders.

Community-led recovery

Research conducted with the University of Melbourne's Recovery Capitals (ReCap) project contributed to new partnerships with climate change researchers, including through Prof Lisa Gibbs and PhD researcher Phoebe Quinn's involvement with [Melbourne Climate Futures](#) and the [Climate CATCH Lab](#). In the Climate CATCH Lab, Prof Gibbs is focussing on the Disaster Resilience theme, while Phoebe is working on the Intergenerational Justice theme, building on the Climate Superpowers adaptation of the Recovery Capitals approach. Both are also investigators on the new National Indigenous Disaster Resilience Program led by Monash University researcher Bhiemie Williamson.

ReCap resources were used for training courses including:

- University of Melbourne – Foundations of Disaster Recovery at the Disaster, Climate and Adversity Unit.
- Australian Red Cross – Senior Executive Leaders in Disaster Recovery and Resilience. Brisbane and Melbourne.

Recovery Capitals underpins important new frameworks, conceptualisations and programs including:

- *A Five-Year Framework for Mental Health and Wellbeing Disaster Recovery and Resilience in Victoria*, commissioned by Victorian Department of Health, July.
- Young People's *Climate Superpowers* (www.climatesuperpowers.org.au), a website co-designed with young people based on the Recovery Capitals Framework is currently being trialled in school and universities.
- *Resilient Villages* pilot project being run by Mountains Community Resource Network in the Blue Mountains, incorporates training using Recovery Capitals resources.

Capability

The Centre's education program provides four main types of support – postgraduate scholarships, associate scholarships, Early Career Researcher development, and industry fellowships and internships.

- The postgraduate scholarship program provides access to full and top-up scholarships over three and a half years, as well as access to industry expertise and support. The Centre currently supports 39 postgraduate students.
- The associate student program is specifically designed for students conducting research in relevant areas of significant interest to Participants, who are not already directly involved with the Centre. There are currently 22 associate students.
- Fellowships support the career development of late-stage PhD students, Early Career Researchers and researchers employed within industry. The Early Career Researcher Fellowship has had one completion and three current fellows.
- Industry internships are in the final stages of development, with the first internship scheduled to begin with NSW Parks and Wildlife Service in the first half of 2024.

Below: Centre postgraduate students meet at the Natural Hazards Research Forum 2023



Postgraduate students

Name	Institution	Project Title
Cameron Atkinson	University of Tasmania	Creating resilient and sustainable critical infrastructure using evidence informed policy
Louise Buckley	Deakin University	Cross-cultural relationships in natural resource management: Understanding the nature and experiences of partnership and collaboration
Louise Mitchell	University of Sydney	Multi-agency collaboration in disaster recovery after bushfire
Phoebe Quinn	University of Melbourne	Exploring the role of civic technologies in community decision making in the face of climate change and disasters
Fadia Isaac	Federation University	A multi-component CBT for the treatment of insomnia and nightmares in survivors of bushfires presenting with PTSD
Hafiz Suliman Munawar	University of New South Wales	Machine learning for humanitarian disaster relief efforts through employing rule-based verification on drone's aerial imagery
Sarah Cooley	University of Melbourne	Response, resilience and recovery of Tasmania's endangered Pencil Pine using a multi-archive palaeoenvironmental record
Christy Hung	University of Sydney	Determining changes in Eucalyptus litter during decomposition
Mohamed Sharaf	Victoria University	Parametric study of the transition from a surface fire to a crown fire through physics-based modelling
Rebecca Ryan	University of Wollongong	Developing novel geochemical and spectroscopic techniques to extend existing bushfire records
Kiam Padamsey	Edith Cowan University	Smoke exposure profiles of bushfire fighters in the southwest ecoregion of Western Australia
Jady Smith	University of the Sunshine Coast	Mitigating fire through water management in the Wildland Urban Interface
Jiyu Liu	University of New South Wales	Assessing post-fire forested ecosystem by using Spaceborne LiDAR over south-eastern Australian
Catherine Ryland	University of Wollongong	Planning for Bush Fire Protection: maintenance of protection measures
Heather Simpson	University of Wollongong	Productivity and effectiveness of suppression resources and tactics on large fires
Kate Simmonds	University of Melbourne	Impact of fires on temperate rainforests in northern New South Wales
Matthew Kyng	Victoria University	Parameterisation for a simplified short-range firebrand model from physics-based modelling
Saimum Kabir	University of Melbourne	Flood risk reduction in a dynamic urban context exploring the urban-water-resilience nexus
Shauntelle Benjamin	University of New England	Why do people decide to drive through floodwater? Utilizing virtual reality to assess motivations and behaviour associated with driving through floodwater.
Simeon Telfer	RMIT University	Remote sensing of fuel to improve fire behaviour predictions in Mallee and Heathy shrublands
Wavne Ridders	University of Western Australia	Fighting the fires within: breaking down the barriers to mental help-seeking amongst first responders with post-traumatic stress disorder (PTSD) and high psychological distress

Name	Institution	Project Title
Zoe D’Arcy	RMIT University	Towards fire-adaptive communities in the Australian landscape: A framework to address rapid and slow onset fire emergencies into an uncertain future
Anna Durkin	RMIT University	Landscape architecture design and development of natural systems wastewater treatment and landscape design
Suki Jaiswal	University of New South Wales	Impact of bushfire smoke on eye surface
Nina Rogers	University of Tasmania	Exploring leadership for municipal climate change adaptation planning and implementation
Brigit Maguire	University of Sydney	Strengthening the experiences of people who are deaf or hard of hearing during extreme weather events and other disasters
Ahmad Hassan	Victoria University	Physics-based modelling of field-scale junction fire
Michael Meadows	RMIT University	Correcting vertical errors in a global Digital Elevation Model, to derive a “bare earth” terrain surface for improved flood modelling in data-scarce regions
Audrey Cetois	University of Queensland	Focusing on the intersection of community resilience and energy resilience
Alex Tanfield	University of Canberra	The effect of disrupted social connection on wellbeing during prolonged disasters
Thanirosan Krishnakumar	Queensland University of Technology	Bushfire risk assessment of buildings using advanced technologies
Sarah Jayne	Charles Darwin University	Emergency and disaster practice across the spectrum of mobility
Belinda Davis	Monash University	Building social and transformative resilience through school education: A case study on bushfire learning
Gabrielle Miller	University of Melbourne	Exploring settler perspectives and engagements with cultural land management initiatives and its implications for working together on bushfire management
Susan Atkinson	University of Canberra	Understanding people’s communication needs and behaviours and how community communication ecologies spontaneously form in a natural disaster crisis
Oscar Metcalfe	Charles Darwin University	Developing ecosystem services based economic opportunities for Indigenous communities in northern Australia
Anthony Power	University of the Sunshine Coast	The potential contribution of wildfire behaviour modelling for urban and regional planning in Australia
Elena Skoko	Queensland University of Technology	Maternity Care in disasters. New frameworks for immediate action.
Syed Adeel Aktar	University of Tasmania	The role of trust-building for effective collaboration: using evidence-based strategies to strengthen disaster response



Associate students

Associate students do not receive direct funding, however their research directly aligns with the Centre's research themes and they are invited to attend Centre events, including the Natural Hazard Research Forum, dedicated student engagement sessions and more. Associate students are able to apply for additional support from the Centre, such as travel grants to present their research and build networks at important industry events. The table below provides a summary of the associate students, their institutions and projects.

Table: Associate students

Name	Institution	Project Title
Ahmed Qasim	Griffith University	Using digital technology to share and trade local food, and improve community food resilience
Anna Kennedy-Borissow	University of Melbourne	Creative, recovery, and resilience: How the arts strengthen resilience in communities affected by disasters
Anna Williams	Australian National University	Exploring community resilience to cascading disasters in Australia
Annal Dhungana	Massey University	Effective communication of uncertainty around modelling in hazard and risk models
Atul Rai	University of Wollongong	Quantifying runoff in arid zone basins of central Australia
Danielle O'Hara	University of Queensland	Conflict in disaster recovery: Why does it happen? What can we do about it?"
Douglas Radford	University of Adelaide	An integrated modelling approach for the planning of collaborative and adaptive wildfire risk-reduction activities
Eleanor Williams	University of Queensland	The effectiveness of rapid evidence in fast-paced policy contexts
Harikesh	University of Sunshine Coast	An empirical & dynamic tool for Prediction Forest Fire Spread Using Remote Sensing and Machine Learning Technique
Haydn McComas	Griffith University	Working together or working apart? Interoperability and organisational culture across RESLEM agencies and organisations during major disaster responses.
Heba Mohtady Ali	Griffith University	How can hospitals improve their resilience and ensure business continuity during disasters
Jane Toner	Griffith University	Enhancing community ecoliteracy for regenerative design: Inspired by nature
Michael Johnson	Monash University	Exploring the Australian practices of disaster resilience, with a focus on community-led approaches
Russell Dippy	Charles Sturt University	The human capacity demands of an Emergency Manager in Australia
Ryan Smith	University of Sunshine Coast	Developing bioclimatic urban planning and design policy for the public realm
Sarah Dickinson-Hoyle	University of British Columbia	Restor(y)ing fire-adapted territories: wildfire recovery, Indigenous leadership and restoration in Secwepemcul'ecw
Sheriden Keegan	Griffith University	Enabling governance for sustainable and resilient regional food system development in Australia
Sumayyah Ahmad	Curtin University	An investigation of spontaneous volunteers' social media engagement in emergency disaster management
Tony Jarrett	Central Queensland University	Agency experts supporting bushfire disaster resilience education for primary school students: a case study in NSW

Name	Institution	Project Title
Victoria Heinrich	University of Tasmania	Use of weather and climate information: Risk perception and decision-making in Antarctica, the sub-Antarctic and Australia
Yunjin Wang	Griffith University	Urban green space is a critical component for children living in urban areas to enrich their mental and physical development
Zakria Qadir	Western Sydney University	UAV trajectory optimization for pre- and post-bushfire disaster assessment using artificial intelligence

Fellowships

The Centre's two fellowship opportunities target academia and industry, respectively. Each fellowship type recognises the value of supporting Early Career Researchers and practitioners to expand their networks, create strong local and international collaborations and have the opportunity to compare the challenges facing natural hazards research in different geographic, societal, cultural and climatic settings.

Fellowships are open to Early Career Researchers up to five years post-PhD, excluding periods of parental leave, other family caring duties or ill health. The following table contains a summary of the Centre's Early Career Researchers to date.

Name	Institute	Project title
Dr Phillipa McCormack	University of Adelaide	Bushfire mitigation and hazard reduction in Australian law 2023
Dr Kate Brady	University of Melbourne	Fostering international collaborations and improving science communication for disaster recovery
Dr Amelie Jeanneau	University of Adelaide	Interdisciplinary collaborative platform for reducing future bushfire risk and increasing community resilience
Dr Nick McCarthy	Country Fire Authority	Enhancing Resilience and Safety in Bush and Grass Firefighting: Adapting Interdisciplinary and International Frameworks for Australian Contexts.



Disaster Challenge



Above: Lydia Wardale (right) accepts the Disaster Challenge winner's trophy from Natural Hazards Research Australia CEO Andrew Gissing.

The Disaster Challenge is a national research innovation challenge for disaster management that encourages new ideas, new thinking and new research. It invites early career researchers, postgraduate and undergraduate students in Australia to take their research training and academic studies and apply them to solving a real-world problem faced by disaster management agencies.

2023 marked the second successful Disaster Challenge, hosted by the Centre and guided by a Victorian-based working group with representatives from AFAC, the Australian Red Cross, CFA, DEECA, EMV, Fire Rescue Victoria, Inspector-General for Emergency Management Victoria, Monash University, RMIT University, University of Melbourne, Victoria SES and Yarra Ranges Council. Working group members were actively engaged in proposing the wicked problem, promoting the Disaster Challenge within their sector, considering all proposals, mentoring finalists and selecting the winners, who received a cash prize and other support.

The 2023 Disaster Challenge launched in early 2023 and asked entrants to develop a solution to the following wicked problem: *In the midst of disruption, chaos and calamity, how can resources from across society be accessed and connected in new and innovative ways to improve disaster response and link those who have the resources and supports with those that are most in need?*

Three finalists were selected and linked with academic and sector mentors to develop their solutions, after which they pitched to a judging panel at a public event in Melbourne to mark International Day for Disaster Risk Reduction in October. The judges were representatives from AIDR, RMIT University and Victoria SES.

A concept to empower young people aged 13-18 to take a leading role in disaster resilience in their local area, called Youth Guardians, took out the 2023 Disaster Challenge.

"My solution to the wicked problem empowers teenagers to use their knowledge and experience," said Lydia Wardale, who is a recent Masters graduate in development economics and public policy economics from the University of Queensland.

Joint runners up were a team of undergraduate students from the University of Technology Sydney (UTS), and a team of early career researchers and postgraduate students from the Queensland University of Technology (QUT), Monash University, Oregon State University, the University of Tasmania and the University of Queensland.

Feedback from finalists and other participants is overwhelmingly positive, with engaging with mentors a highlight for finalists and mentors alike.

Lydia Wardale, Disaster Challenge 2023 winner

“Professionally, I gained experience within disaster resilience. Personally, I gained confidence in what I can bring to the table as a young person in the disaster risk reduction field.”

With support from the Centre and a mentor from the University of Sydney, Lydia is preparing to pilot her youth-led community resilience program in a Queensland high school in 2024.

For the Centre, working group members, mentors, finalists and judges, the 2023 Disaster Challenge fostered enabled new connections with innovative thinkers and programs in universities and the sector to be fostered. Highlighting this was the integration of the 2023 Disaster Challenge into Central Queensland University’s Emergency Services and Disaster Management postgraduate program. Additionally, the UTS undergraduate team developed its submission through an innovative course codesigned with the Australian Red Cross in UTS’s Transdisciplinary School, while the QUT-based team initially developed its idea initially for a Brisbane Flood Hackathon held in the QUT Centre for Data Science. The Disaster Challenge provides a bridge between innovative programs like these, the Centre, and the disaster management sector.

Progress towards a First Nations Scholarship

In 2023, the Centre designed a First Nations Research Scholarship to support an outstanding First Nations research candidate to undertake academic project work.

To inform the design of the scholarship and a wider roadmap to underpin our relationship with and support of First Nations scholars, the Centre held a workshop with First Nations representatives and members of the Education and Training Committee in July, with a First Nations Research Scholarship principles and structure document discussed by the Education and Training Committee in December. The scholarship will be launched in the first half of 2024.

This scholarship is ambitious as it not only aims to support First Nations scholarship and research training objectives, but also identify, develop and provide opportunities and support for future First Nations research leaders.

Research-informed strategic advice

The Centre provides trusted research-based advice and insights to inform the efficient planning and decision making of government, communities, emergency services and the business sector.

This goes to the very heart of the Centre's Mission to support better decision-making by working closely with partners and the community on research that saves lives and protects communities. This ultimate outcome aligns with the Centre's Vision: an Australian community that is safer, more resilient and sustainable in the face of natural hazards.

Thought Leadership

Assisted relocations



The Centre hosted a visit by Prof Gavin Smith from North Carolina State University (above) to talk about international experiences of assisted relocations.

The *Assisted relocations: a community-centred approach* discussion paper was developed from a roundtable held in Canberra in September with more than 40 senior executives and experts from government, research, community and corporate sectors and hosted by Suncorp and the Centre. The roundtable included keynote speeches from Commonwealth Minister for Emergency Management, Senator the Hon Murray Watt, and an international expert from North Carolina State University, Prof Gavin Smith.

The discussion paper was distributed directly to all Centre Participants, promoted digitally for public access, and sparked a wider conversation in the national media.

Prof Smith also shared his expertise and experience in Sydney with NSW Reconstruction Authority staff and local councils and in Brisbane with the Queensland Reconstruction Authority, Department of Public Works and Energy and the Office of the Inspector General of Emergency Management.

Letter to the Editor The Age 5 December 2023.

“Climate impacts are here now. Communities need to be made aware of the risks through hazard risks mapping of areas exposed to climate disasters as suggested by Natural Hazards Research Australia and Suncorp. Every step we take to help communities prepare for now unavoidable climate impacts secures a safer future and builds resilience, protecting people and country.”

Roundtable participant

“The event was excellent. You expertly brought together diverse views and experiences to enrich the thinking. I particularly enjoyed the format of encouraging comments from pre-selected participants rather than a traditional panel. That format meant that it was easier afterwards to engage directly with speakers. The paper itself has been useful input for our National Plan.”



Be Ahead of Ready

Work to tackle Australia's emerging emergency management, hazard and resilience challenges continued through the Centre's *Be Ahead of Ready* project. *Be Ahead of Ready* aims to inspire bold ideas from sector bodies, researchers and Participants to enhance future safety, resilience and sustainability through a series of validation workshops. A thought leadership piece is currently in draft to be launched in the first half of 2024.

Strategic Advice

During the reporting period, stakeholders sought strategic evidenced-informed advice from key staff at the Centre, including:

- Membership of Independent Peer Review Panel for Flood Hazard Mitigation Methodology for the NSW Reconstruction Authority
- Publication of opinion article in the Canberra Times on Heatwave Resilience
- Participation in NSW Treasury project to develop cost-benefit analysis tools for natural hazard mitigation arising from the NSW Flood Inquiry
- Submission to the Independent Review of Commonwealth Disaster Funding and subsequent workshop
- Submission to the Department of Home Affairs Alternative Commonwealth Capabilities for Crisis Response Discussion Paper and subsequent workshop.
- Submission to the Australian Climate Service Review and meeting with the Independent Panel.
- The Chair and CEO met with Robert Glasser and Gill Savage in relation to the Independent Review of National Natural Disaster Governance Arrangements
- Provision of regular briefings to AFAC Board, AFAC Council and AFAC collaboration groups
- Participation in the Australian Fire Danger Rating System Program Board.
- Participation on the Project Control Group to update the climate change considerations in Australian Rainfall and Runoff
- Presentation to the Board of the Royal Automobile Club of Tasmania
- Participation in Higher Risk Weather Season Summit hosted by the National Emergency Management Agency
- Participation in the National and South Australian Climate Change Risk Assessments
- Participation at the Insurance Council of Australia and Building Council of Australia Land Use Planning Roundtable
- Participation in NEMA consultation on Disaster Ready Fund
- Participation in the Independent Voice of Strata Owners – Disaster Resilience Workshop
- Participation on the Steering Committee for the NSW Bushfire and Natural Hazards Research Centre
- Participation in Northern Australia Fire Management Forum
- Participation in organising committee of 7th International Fire Behaviour and Fuels Conference
- Advice to SA SES on flash flood warning proposal
- Advice to NSW Reconstruction Authority on State Risk Assessment

- Chief Science Officer nomination and confirmation as Deputy Chair of the Australian Academy of Science National Committee on Information and Communication Science (NCICS).
- Chief Science Officer participation in the Australian Academy of Science, National Committees for Science (annual meeting of committee chairs)
- Member of the Resilient Futures Investment Roundtable
- Participation in the program committee for AFAC Lessons Management Forum
- Membership of the Australian Journal of Emergency Management Editorial Advisory Board

NSW Treasury, on the Centre's cost-benefit analysis tools

“Thank you for your engagement throughout the development of the Disaster Cost-Benefit Framework.”

“The Framework addresses Recommendation 16 of the 2022 NSW Flood Inquiry report to adopt and utilise a disaster cost-benefit framework to enable a more systematic prioritisation of investments before, during and immediately following a natural disaster event. The Framework supplements the NSW Government Guide to Cost-Benefit Analysis (TPG23-08). It will make it easier to complete cost-benefit analysis for disaster resilience initiatives, and improve the consistency of analysis across different proposals.”



In addition, research findings, outcomes and research-informed advice were presented at the following conferences, workshops and meetings:

- International Keynote to International Dam Breach Life Loss Assessment Workshop in the United States
- Keynote at AFAC 2023 Conference
- Plenary session presentations at AFAC 2023 Conference
- Keynote at EMSINA workshop
- University of Western Sydney Environmental Health course
- Northern Territory Emergency Management Committee
- Asia Pacific Coroners Conference
- Science-industry workshop on severe convective storms
- EMPA webinar on the NSW/QLD post flood research
- Queensland Disaster Research Forum
- Hunter, Central Coast, Mid Coast Councils Floodplain Management Roundtable
- Chair and Research Presenter, Disaster & Emergency Management Conference 2023
- AFAC Annual Senior Leaders Cohort 2023
- Department of Foreign Affairs and Trade (DFAT) Australia Awards Fellowship Conference (UTS) – fellows visiting from India, Malaysia, Nepal, Philippines, and Thailand
- Presentation to Disaster Relief Australia conference
- Presentation to Emergency Services Foundation Emergency Management conference
- National Indigenous Disaster Resilience Summit
- Victorian Rural Youth Sector Conference
- DRANZSEN National Forum
- Australian Disaster Resilience Conference

The Centre was also represented at the following:

- AdaptNSW forum
- Insurance Council of Australia Annual Conference
- Investor Group in Climate Change Summit
- National Press Club – Insurance Council of Australia CEO address
- Resilient Australia Awards (National and Victorian finals)

Communications

Communications activities are shaped by the Centre's key result areas as endorsed in the *Strategic Plan 2021-2031*, to: undertake leading research; create knowledge networks; build partnerships; create a national research capability; provide a trusted and independent voice; and translate research into action.

This reporting period focused on demonstrating research in progress and its potential impact by building awareness and engagement through:

- key Centre publications, including a monthly online newsletter and research briefing papers
- media engagement strategy based on expertise and credibility
- social media strategy focused on educational engagement
- hosting and participation in targeted events, initiatives and collaborations.

Media

The Centre is frequently sought for comment by a range of regional, national and international media outlets. The CEO and subject matter experts across many disciplines position the Centre as a trusted, knowledgeable source to provide media comment that supports agency partners.

Through the Australian Science Media Centre, the Centre is a key supporter of the promotion of Australian science. This places the Centre's and natural hazard research in prominent view of science journalists around Australia and internationally. International media reach out for expert opinion, emphasising the Centre's position as an authority on natural hazards research.

In December a CEO opinion piece about heatwave risk, impacts, research and ways forward was published in the *Canberra Times*. The piece was syndicated throughout the Australian Community Media mastheads, including the *Illawarra Mercury* (NSW), *Newcastle Herald* (NSW), the *Central Western Daily* (Orange, NSW), the *Daily Liberal* (Dubbo, NSW), the *Daily Advertiser* (Wagga Wagga, NSW), the *Northern Daily Leader* (Tamworth, NSW), *The Courier* (Ballarat, Vic), *The Advertiser* (Bendigo, Vic), *The Standard* (Warrnambool, Vic), the *Border Mail* (Albury/Wodonga, NSW/Vic), the *Examiner* (Launceston, Tas), *The Port News* (Port Macquarie, NSW).



In addition, prominent coverage appeared in major metropolitan daily newspapers such as *The Sydney Morning Herald* and *The Age*. The Centre featured many times on ABC Radio, including ABC Melbourne, ABC Canberra, ABC Newcastle, ABC Illawarra, ABC Radio North Coast NSW, ABC Regional Queensland, ABC New England, ABC Gold Coast, ABC Southern Queensland, ABC Radio Far North Queensland and ABC Regional South Australia. The Debunks podcast, produced by *Cosmos*, ran a special bushfire series which featured Centre research and researchers. International coverage included the BBC World Service.

In total, the Centre or individual Centre researchers appeared in the media 145 times.

Industry-focused publications

A range of communications products are regularly developed to suit the needs of Centre partners and the public. These include publications, reports, briefing papers, videos, webinars, case studies and tools for operational people in partner organisations.

The Centre distributes a monthly online newsletter, which was read 6,162 times in the reporting period (on average 1,027 times per edition).

Hazard Notes continue a tradition that began in the Bushfire CRC as a research briefing paper, publicly available online and distributed through an extensive email database including staff in Participant organisations, all levels of government, small to medium enterprise, small rural fire brigades and State Emergency Service units, and regional councils. They are also widely shared and engaged with via social media. Three *Hazard Notes* were published in this period and were read 3,524 times (on average 1,175 times per edition).

Centre staff sit on the Editorial Advisory Board and the Editorial Committee of the *Australian Journal of Emergency Management*, published by AIDA, regularly contributing content based on Centre research.

The Centre also regularly contributes research-based content to many well-known external publications and widely circulated external newsletters, including:

- Fire Australia magazine
- Australian Emergency Services Magazine
- Asia Pacific Fire magazine
- Brigade magazine (Country Fire Authority)
- Bush Fire Bulletin (NSW Rural Fire Service)
- Phoenix magazine (Victoria State Emergency Service)
- AFAC newsletter
- AIDR newsletter
- Collaborative Research Australia newsletter
- Wildfire magazine
- Australian-French Association for Research and Innovation newsletter

Website

The Centre's website contains all information about its vast research portfolio and related activities, including publications, news and events.

All public communication is directed to the website as the Centre's key communications tool. As the Centre has grown its research portfolio throughout 2022–23, in addition to hosting many events supplemented with online resources, traffic to the website increased considerably.

	Page views July – December	Website users July – December
Centre website	87,204	46,639

Social media

Coverage in traditional media is amplified through the social media channels of the Centre and its partners. Social media provides an important channel to reach individuals and groups in addition to the regular Centre networks, including the broader public, regional communities, volunteer brigades and units, local government, politicians and international researchers.

The Centre has an engaged audience of 8,373 followers across Facebook, Twitter, LinkedIn and YouTube. Throughout the reporting period, these platforms saw 251,839 impressions and 11,961 engagements.

Videos

Short, timely online videos were produced to promote the outcomes of Centre events, such as conferences and webinars, and included the overview summaries of the Natural Hazards Research Forum, the National Indigenous Resilience Summit and the Disaster Challenge. Research outputs were also highlighted in video including major reports on SES *Fit for Task* and the Black Summer Bushfire projects. All were posted to YouTube, the Centre's website and social media platforms. 32 videos produced over the period, compared to 34 for the previous 12-month period, with 4,086 views and a watch time of 287 hours.



Events

The Centre’s annual calendar of engagement activities fosters greater collaboration between researcher, government and the emergency management sector and to support the needs of communities across Australia.

Below: The Centre’s exhibition booth at the AFAC23 conference in Brisbane was visited by the Federal Minister for Emergency Management, the Senator the Hon Murray Watt.



This includes events that are hosted by the Centre, as well as participation in and contribution to many reputable events hosted externally throughout the emergency management and disaster risk reduction sector.

The Centre was the Research Industry Partner for the AFAC23 annual conference in Brisbane, and a supporter of the Queensland Disaster and Emergency Management Conference, Victorian Emergency Management Conference, Collaborate Innovate 2023, and the National Indigenous Disaster Resilience Summit.

The following table includes the Centre’s own Natural Hazards Forum and other sector related conferences. Knowledge-sharing forums include the free public monthly Hazardous Webinars on projects and relevant issues. Industry training courses include project related research and utilisation sessions for industry personnel. Workshops include one-off gatherings on sector and project related issues. In addition, individual projects held meetings between researchers and end-users, online and in person.

Table: Centre-hosted and supported events, training opportunities

	Number of events
Conferences	7
Knowledge-sharing forums	13
Industry training courses	10
Workshops	14

Indigenous-led research

The inaugural National Indigenous Disaster Resilience Summit held in August in Brisbane brought together Indigenous experts, emergency management practitioners, community leaders, organisations, non-government representatives and researchers from across Australia and New Zealand.

The Summit was organised by Monash University's Fire to Flourish program and supported by the Centre, along with AIDR, Bigibilla Indigenous Consultants and Jagun Alliance.

The Centre sponsored several Indigenous researchers to attend, while several Centre staff also attended to make connections, learn from Indigenous peoples and document the event.

A key focus of the presentations was Indigenous inclusivity in disaster management and how this inclusion benefits the whole community and the land, not just Indigenous peoples.

Attendees also heard from Indigenous community leaders about what can be learned from their communities' unique experiences before, during and after natural hazard emergencies.

Burketown project forum

A group of Indigenous community leaders, emergency services and researchers gathered in remote northern Queensland in September for a forum on Centre research to strengthen local partnerships with emergency management.

Approximately 40 people attended the forum in Burketown, in the Gulf Region of Queensland, co-hosted by the Carpentaria Aboriginal Land Council Aboriginal Corporation and Gunggalida Garawa Traditional Owners. More than 20 Indigenous representatives from communities spanning the Kimberley, south-east Western Australia, Northern Territory and north Queensland, senior emergency management from Queensland Fire and Emergency Services, Northern Territory (Bushfires NT and PFES), Western Australia DFES, local government and other agency representatives were involved.

The research contingent was represented by the Galiwin'ku Research Group, the North Australian Indigenous Land and Sea Management Alliance (NAILSMA), ANU, and the Centre.

Centre Node Managers Nicola Moore and George Goddard participated in discussions around the Centre project: Connecting Indigenous People and the emergency management sector – effective partnerships. A joint statement of intent was drafted to outline how to work together for emergency management in respectful and complementary ways, as well as exploring a case study on the key role the local Indigenous Ranger Groups played in supporting their community during the March 2023 floods.

Below: Centre Node Manager Nicola Moore (third from right) with forum participants at Burketown



Commitment to reconciliation

The Centre is committed to promoting reconciliation within the organisation and throughout the natural hazards research community where possible. Through the development of a Reconciliation Working Group and *Reconciliation Action Plan*, the Centre is implementing reconciliation in its processes, programs and partnerships.

Reconciliation Working Group

This management-level group met twice during the reporting period.

The group's chair was the Centre's Senior Communications Officer Bethany Patch until 13 October when Node Research Manager George Goddard assumed the role. Current Working Group members include CEO Andrew Gissing; Chief Science Officer Prof Deborah Bunker; Board members Oliver Costello (First Nations) and Sandra Whight; staff representative Friedo Ligthart; and First Nations member Bhiemie Williamson (Research Fellow, Monash University).

Reconciliation Action Plan

The Centre's *Reflect Reconciliation Plan (RAP)* was published in September 2022 and launched in October 2022. It outlines the Centre's plan for embedding First Nations recognition within partnerships, programs and processes

The RAP was extended for six months to December 2023 and concluded with 56 of the 63 deliverables completed and another seven partially completed. The Centre is currently reflecting and reporting on the *Reflect RAP* with a view to developing an *Innovate RAP* mid 2024.

Deliverables achieved during this reporting period include:

- The Centre committed \$2,055,250 to First Nations-related research projects in addition more than \$32,000 of procurement from First Nations suppliers since the RAP started. These projects included:
- *Connecting Indigenous people and the emergency management sector – effective partnerships* (led by North Australian Indigenous Land and Sea Management Alliance)
- *Cultural land management research and governance in south-east Australia* (led by Jagun Alliance and Deakin University)
- *Scoping operationalization for Aboriginal land management* (led by NSW Department of Planning and Environment)

- *Healing Country through Wolgalu/Wiradjuri-led land management* (led by Brungle-Tumut Cultural Natural Resource Managers and the University of Wollongong)
- *Cross-cultural relationships in natural resource management: understanding the nature and experiences of partnership and collaboration* (postgraduate research led by Deakin University)
- A number of others are approved and are in establishment phase:
- *Effect of cultural burning on soil health* (proposed by South Australia's Department of Environment and Water)
- *Disaster resilience in Indigenous communities* (proposed by the Australian Institute for Disaster Resilience)
- *Lived experiences of First Nations emergency and land management and resilience personnel* (proposed by AFAC)
- The Centre hosted a [webinar](#) to celebrate NAIDOC week, showcasing First Nations researchers on 6 July 2023.
- The Centre hosted a second webinar on Principles of culturally safe research practices to launch the *Principles and protocols for cultural land management governance and research*. This featured contributions from Indigenous researchers from Australia and Canada and has been developed into an online resource to support researchers in undertaking culturally safe collaborations with First Nations stakeholders.
- The Centre ran a workshop with several First Nations and non-Indigenous stakeholders to establish principles for a scholarship supporting First Nations students to pursue a career in natural hazards research. The principles were drafted, circulated for review and submitted to the Centre's board for approval.
- All staff attended an on-Country training day at Coranderrk in October (below), with a report on cultural safety training impacts and future needs developed.



School bushfire safety

A Centre research-based primary school bushfire initiative was recognised nationally by taking out the 2023 Resilient Australia National School Award.

Harkaway Primary School backed up their state level win at the 2023 Victorian Resilient Australia Awards with the national prize, presented at a ceremony in Perth on 22 November.

The school was recognised for a range of activities, including the establishment of a student-led bushfire safety committee and the development of a 'Bushfire Safety Manifesto' – both outcomes of a Bushfire and Natural Hazards CRC research project led by Dr Briony Towers (Leadrrr) and the late Prof Kevin Ronan (CQUniversity).

The Award also recognised Harkaway Primary School's contribution to *Schools in Fire Country*, a Centre project in collaboration with Safer Together. Led by Neil Munro (CFA) and Dr Towers, *Schools in Fire Country* enabled agencies, experts and educators to collaborate on the development and implementation of a new research-informed bushfire education program.

Centre research was also a finalist in the overall national award, for the *Community-led recovery: evidence, dimensions and supports for Community Recovery Committees* project.

The research team of Prof Lisa Gibbs, Dr Colin Gallagher, Dr Kate Brady and Hannah Morrice from the University of Melbourne addressed the knowledge gap around Community Recovery Committees to develop practical tools and resources to better support Community Recovery Committees.

Sleep and mental health



Fadia Isaac (pictured centre), clinical psychologist at Federation University and Postgraduate Research Scholar with the Centre won Cooperative Research Australia’s Early Career Researcher Competition.

Four finalists presented at the Innovate Collaborate 2023 conference, held in Adelaide in July, each giving a five-minute presentation on the practical application of their research, with Fadia’s presentation of her *Online cognitive-behavioural intervention for treatment of insomnia and nightmares in bushfire survivors* project taking out the winning spot and a \$5000 prize.

Fadia’s study is an online, self-paced sleep intervention trial called Sleep Best-i, developed for treatment of sleep disturbances such as insomnia, nightmares or sleep trauma in bushfire survivors.

“The hope is that Sleep Best-i will give individuals increasing self-governance when it comes to their mental health and sleep patterns,” said Fadia.

Floods support

Centre researchers were recognised for their work in bringing community insights from major floods to better support emergency services.

Lead by A/Prof Fiona Miller and A/Prof Mel Taylor, researchers Dr Harriet Narwal, Madeleine Miller and Helga Simon won the Macquarie University Faculty of Arts 2023 Research Engagement Highly Commended Award. The team was recognised for its work on the *Community experiences of the 2022 Australian floods*, a collaborative project that brings together researchers from a wide range of disciplines.

The project has a community-focused approach to form findings that can assist emergency management organisations, government departments, local councils, community organisations and community members to better understand the complexities of floods.

Project expenditure

a. What is the eligible expenditure you have incurred in this reporting period?

\$3,715,352

b. What is the estimated eligible expenditure for the next reporting period?

\$9,253,994

c. What is the estimated eligible expenditure for remaining reporting periods in current financial year (if applicable)?

N/A

d. What is the estimated total eligible expenditure for future financial years?

\$62,598,276

e. What is the estimated total eligible expenditure for the project?

\$85,000,000

f. Briefly explain the reason for any changes between the forecast and actual expenditure for the current reporting period, and any significant changes to the forecast budget for the remainder of the project.

Other eligible expenditure is below the year-to-date agreed project cost due to the research contracting delays.

There will also be a lag in invoicing and payment of research expenditure owing to the Centre paying in arrears on delivery of milestones. It is not expected to materially impact the research program deliverables.

Labour on-costs are slightly above the year-to-date agreed project cost with actual costs related to annual leave and sick leave being higher than anticipated.

Total eligible expenditure for the project remains unchanged.

g. Is the project expenditure broadly in line with the activity budget in the grant agreement?

Yes

Project funding

Provide details of all contributions to your project other than the grant. This includes your own contributions as well as any contributions from government (except this grant), project partners or others.

Other Income

- \$3,014,620 received from Participants as part of annual contribution.
- \$1,211,918 received as contract research from various contracts.
- \$11,423 received miscellaneous income.

Head of expenditure	Breakdown of expenditure	Agreed project cost	Actual YTD
Project expenditure	Labour	\$2,107,500	\$949,652
Project expenditure	Labour on-costs (30% of labour costs)	\$416,900	\$233,011
Project expenditure	Other eligible expenditure	\$6,200,000	\$2,399,864
Project expenditure	Plant and equipment	\$0	\$0
Project expenditure	Travel and overseas	\$252,400	\$132,825
Financial year total		\$8,976,800	\$3,715,352



Attachment 1

Progress against Biennial Research Plan 2023–24 milestones

Milestone	Agreed end date	Actual / anticipated end date	Current % complete	Progress comments – work undertaken and impact of any delay
Biennial Research Plan 2024–26 drafted and endorsed by Centre Board	30 June 2024	30 June 2024	10%	Initial consultation with stakeholders was undertaken at the November End-User Advisory Panel meeting
All funded research complying with Centre’s research data framework. Online data catalogue is available, populated and utilised	30 June 2024	30 June 2024	60%	Proof of concept completed.
Outcomes, findings and insights from post-disaster research projects shared in a timely manner	30 June 2024	Ongoing	100%	Program completed to communicate finding of community experiences of 2022 flooding. Further post-flooding research is underway in VIC, SA and TAS.
The Centre engages with relevant national and international research initiatives	30 June 2024	Ongoing	100%	Activities have included: → Exchange with NZ National Science Challenge → International webinar on culturally appropriate research practices including Canadian researchers → Centre has maintained dialogue with the Queensland Disaster Research Alliance and the NSW Bushfire and Natural Hazards Research Centre → Commencement of arrangements to initiate an international community of practice on assisted relocation → Partner in the FirEurisk project
October 2023 research project investment round complete and approved by the Centre’s Board	31 December 2023	31 December 2023	100%	Investment round completed with four new projects approved.
Research projects approved for development before 30 June 2023 awarded by 31 December 2023	31 December 2023	31 Mar 2023	90%	
Research projects to be mapped into programs of work with a clear narrative. Programs governed by Translation and Implementation Panels and supported by research networks where practicable	31 January 2024	31 January 2024	90%	Workshop held to map NHRA projects into programs.
Research projects approved for development before 31 December 2023 awarded by 30 June 2024	30 June 2024	30 June 2024	N/A	To be reported at June 30 2024
April 2024 research project investment round complete and approved by the Centre’s Board	30 June 2024	30 June 2024	10%	Investment round opens January 2024
Monitoring and evaluation framework implemented to provide systematic demonstration of the Centre’s impact	31 January 2024	Ongoing	80%	Evaluation framework approved by the Board in July 2023. Initial implementation has occurred to collect research impact evidence for progress reporting. Implementation is ongoing.

Milestone	Agreed end date	Actual / anticipated end date	Current % complete	Progress comments – work undertaken and impact of any delay
Scholarship and work placement programs integrated into end-user driven core research program and contribute to research impact	30 June 2024	30 June 2024	10%	
Award of at least one scholarship to a First Nations recipient	30 June 2024	30 June 2024	60%	Scholarship design to be presented to the February 2024 Board meeting after consultation with First Nations representatives
Early Career Research Fellowships awarded	30 June 2024	30 June 2024	100%	1 Fellowship awarded
Disaster Challenge Held	30 June 2024	30 June 2024	100%	A successful Disaster Challenge was completed in October 2023
Research network established	30 June 2024	30 June 2024	50%	Terms of reference for early career research network agreed.
Opportunities to utilise research through education and training programs in consultation with participants and stakeholders are identified.	30 June 2024	30 June 2024	50%	Initial opportunities have been identified
Annual Natural Hazards Research Forum delivered	30 June 2024	30 June 2024	25%	Natural Hazards Research Forum scheduled for 14-16 May in Adelaide.
Regular series of research translation and engagement events delivered with high participation and positive feedback for example workshops and webinars	30 June 2024	30 June 2024	100%	<p>The following events have been undertaken:</p> <ul style="list-style-type: none"> → Joint event with Resilient Sydney on resilience featuring keynote address by Prof. Gavin Smith → Joint event with Suncorp involving Minister Watt, Senator Sheldon, key Commonwealth Public Service and industry representatives. → Workshop with the NSW Reconstruction Authority on flood resilience featuring Prof Gavin Smith → Workshop with the Queensland Reconstruction Authority and the Inspector General Emergency Management on flood resilience featuring Prof Gavin Smith → Workshop with the Queensland Department of Energy and Public Works on flood resilience featuring Prof Gavin Smith. → Workshop with Commonwealth Government officers on flood resilience featuring Prof Gavin Smith → Workshop with First Nations representatives to design approach to education and training programs → Webinar on supporting community led – recovery – 104 attendees → Webinar on improving community-based risk assessment – 211 attendees → Webinar on PhD related research projects – 53 attendees → Webinar on First Nations Research Practices – 72 → Two stakeholder engagement workshops (Darwin and Sydney) → Be Ahead of Ready validation workshops → Further events are planned for Quarters 3 and 4

Attachment 2

Current research projects

Project	Summarised targeted outcomes
T1-A1 Translation of observed and modelled extreme bushfire behaviours to improve fire prediction and fireground safety	<ul style="list-style-type: none"> → Provision of the new modules as post PUA training professional development options. → Increased situational awareness and fire ground safety – interoperable language and concepts/ shared understanding. → Improved risk communication.
T1-A2 Understanding the design, communication and dissemination of predictive maps to the public	<ul style="list-style-type: none"> → Gain an overview of the existing public information and warnings products across jurisdictions. → Develop a preliminary set of evidence-based guidelines for predictive/e map design.
T1-A3 Cultural land management (Northern): Connecting Indigenous people and the EM Sector – Effective partnerships	<ul style="list-style-type: none"> → Strengthen the collective Indigenous understanding and position on engagement in emergency management in Northern Australia, providing a stronger and better-informed foundation for future work practice and partnerships.
T1-A4 Cultural land management (Southern): Cultural Land Stewardship Research in Southeast Australia	<ul style="list-style-type: none"> → Strengthen collaborative governance and research involving Indigenous land and fire managers and state, territory, and local government agencies.
T1-A5 Community-led recovery: Evidence, dimensions, and supports for Community Recovery Committees	<ul style="list-style-type: none"> → Develop a shared understanding of the roles of Community Recovery Committees (CRCs). → Test and validate the self-assessment tool built for CRCs that was developed in Phase 1. → Measure representativeness of community recovery committees' membership using a social network approach, to help inform future recovery policy.
T1-A6 Identifying water sources for aerial firefighting	<ul style="list-style-type: none"> → Explore the suitability of Sentinel 2-based waterbody insights.
T1-E1 Bushfire information database– scoping study	<ul style="list-style-type: none"> → Provide an evidence base and recommendations that can be used to support the development of a National Bushfire Information Database.
T1-E2 Understanding the resilience of lifelines for regional and remote communities	<ul style="list-style-type: none"> → Increase knowledge about Australia's lifeline characteristics, interconnections, vulnerabilities, strengths, needs and opportunities for improving resilience, of relevance to practitioners and researchers. → Understand the primary research needs and opportunities around lifeline resilience in Australia to strategically inform future work at the Centre and other organisations.
T1-P1 Research data management	<ul style="list-style-type: none"> → Establish a research data management initiative for sharing research data as the outcome of bushfire research undertaken through Centre projects, and where practical, from previous CRC research projects.
T2-A1 Awareness, education and warning programs for concurrent and cascading events	<ul style="list-style-type: none"> → Improve shared understanding of the threats posed by compound disasters. → Inform community engagement programs and agency capacity to ensure the public understand compound disasters, associated risks and how to prepare for them. → Demonstrate the need to provide integrated community engagement and warning systems to develop awareness of the risks associated with compound disasters. → Enhance communications planning in the context of disaster recovery.
T2-A2 Improved predictions and warnings for flash flooding	<ul style="list-style-type: none"> → Improve end-users' understanding of how to prepare systems, people, and public messaging and warnings to reduce impact from flash flood and enhance community resilience.
T2-A3 Bushfire adaptive homes	<ul style="list-style-type: none"> → Provide a better understanding of the causes of the failure rates of homes. → Develop measures that best reduce failure rates. → Understand social levers that could be better utilised to influence and support communities to better protect homes from bushfires.

Project	Summarised targeted outcomes
T2-A4 Decision making in emergency management	<ul style="list-style-type: none"> → High capacity for effective and appropriate crisis decision making in the Australian and New Zealand emergency management sectors across all levels. → Decision-making capacity to be supported by well designed and implemented training and learning products that build on existing programs and tools. → A common, national approach to decision making across services and multi-agency training to support cross agency decision making.
T2-A5 Rural-urban interface fires	<ul style="list-style-type: none"> → Improve understanding of how community led / centred action can be engendered and supported within communities living at the RUI to reduce risks in and around the APZ. → Identify key site and vegetation characteristics that affect bushfire behaviour within the RUI, including garden plant flammability and garden arrangement / landscaping. → Develop informed fire behaviour modelling that captures interface and garden fuels, fire spread and ember production in RUI zones. → Identify and evaluate potential mitigation measures for stopping and reducing the spread of fire into the RUI.
T2-A6 Enhancing severe weather impact prediction	<ul style="list-style-type: none"> → TBC – project being rescoped as a smaller scoping study with a larger concept to be possibly submitted for a future round.
T2-A7 Modelling Impacts of Sequential Cascading Natural Hazards on the Built Environment	<ul style="list-style-type: none"> → Improve ability to estimate direct costs of infrastructure damage and to assess the financial benefits of infrastructure betterment in the context of current and future climates. → Develop capability to estimate infrastructure restoration timeframes to inform emergency management planning and risk assessment.
T2-A9 Mitigating natural hazard impacts in urban environments	<ul style="list-style-type: none"> → Improve greater understanding of the multidimensional disaster impacts arising from natural hazard events for communities located in major urban areas in Australia, and the ways in which these impacts may change over time under the influence of climate change and rapid urbanisation.
T3-A1 What makes a good fire simulator	<ul style="list-style-type: none"> → The AFAC Predictive Services Group will use this research to help define the development of Spark and ensure that it meets the needs of its users. Existing simulator users will also use it to evaluate current practice and use, justify changes to simulators, guide the development of new versions of simulators, justify new simulation methods of work and aid in interpreting predictions and outputs.
T3-A2 Storing and sharing qualitative data	<ul style="list-style-type: none"> → The key outcome of this project is a strong foundation and clear pathways for the Centre and its researchers to implement the effective collection, use, curation and sharing (where feasible) of qualitative social research data.
(T1-A2) Predictions in public: Phase 2 and 3	<ul style="list-style-type: none"> → Inform the scope, content, and methods used in research conducted in phase 1 and refining the outcomes of the project (particularly phases 2 and 3).
T3-A3 State-wide community risk assessment project	<ul style="list-style-type: none"> → Improve understanding of value in a systematic approach to community-based risk that takes advantage of the latest computational and risk modelling advances.
T3-A4 Case studies	<ul style="list-style-type: none"> → Build on the Bureau's reputation for preparing high-value case studies by developing a defined methodology.
T4-A1 Identifying and defining landscape dryness thresholds for fires	<ul style="list-style-type: none"> → Review and describe the range of landscape dryness products that have been developed, are in use or may potentially be applied in Australia. → Compile and characterise operational uses for land dryness indices in Australia including the AFDRS. → Evaluate landscape dryness products (weather and satellite derived) and describe their sensitivity and specificity in identifying when and where mission critical events may or may not occur. → For dryness products that have potential for supporting decision making, identify thresholds for mission critical events and make recommendations on their strengths and limitations. → Develop approaches for mapping landscape dryness to deliver operational intelligence. This may entail developing a new dryness index or calibrating or restructuring indices to account for vegetation productivity or drying rates.

Project	Summarised targeted outcomes
T4-A2 Capturing uncertainty in bushfire spread predictions using Bayesian modelling and real bushfire observations	<ul style="list-style-type: none"> → Develop a Bayesian ROS model for forest (and grass a second priority), giving FBANs an additional, powerful tool to understand expected ROS probabilistically (which currently does not exist). → ROS database that could be regularly updated and shared with fire agencies and researchers. → Fast access to the history of ROS available to FBANs to understand how a particular fire sits in the context of previous fires.
T4-A3 Long-range flood outlook for strategic preparedness	<ul style="list-style-type: none"> → Build a suite of national probabilistic long-range flood outlook and inundation products as a proof-of-concept for evaluation and testing. The products will be generated using computationally efficient flood inundation mapping, cutting edge statistical methods and state of the art climate, hydrology and earth observation data.
T4-A4 (a) Healing Country Through Wolgalu/Wiradjuri led Land Management and	<ul style="list-style-type: none"> → Run on-Country activities to revitalise and share cultural knowledge and to develop resources that tell Wolgalu/Wiradjuri histories and knowledge of Country. The project will better understand what Wolgalu/Wiradjuri Caring for Country looks like today
T4-A4 (b) Scoping the operationalisation of Aboriginal Land Management at a landscape wide scale	<ul style="list-style-type: none"> → Provide foundational understanding necessary for implementing landscape ALM. With that foundational understanding, government support for implementation can be provided, and an accompanying research program to document learning and problem solving, along the lines of a living lab model, can be developed.
T4-A5 Why fly? How do we know that aerial operations are effective and efficient?	<ul style="list-style-type: none"> → Understand and build the existing user profile of Australia's aviation fleet across different landscapes. → Understand the profile of the purposes for which the fleet is deployed and how effective that purpose has been. → Apply a statistical and geospatial analysis over the data contained within the Arena database, where over 10 years of data can be analysed.
T4-A6 Evaluating the resilient homes fund	<ul style="list-style-type: none"> → Examine the extent to which resilient reconstruction incentivisation programs can reduce flood risk to homes and increase their insurability, by addressing the following two questions: <ul style="list-style-type: none"> – How does a resilient reconstruction program enhance the physical and financial resilience of homeowners and communities? – What are the key components of successful implementation of a resilient reconstruction program?
T4-A7 Developing an integrated predictive capability for extreme rainfall and inundation	<ul style="list-style-type: none"> → Enhance use of ensemble numerical weather prediction. → Estimate quantitative rainfall from STEPS radar nowcast application. → Develop of a prototype probabilistic inundation model. → Case study analysis building on a related NHRA flash flood project. → Investigate potential improvements to current forecast approaches using combinations of the above forecast applications. → Assess the value in integrating the applications in a single predictive service model.
T4-A8 Safety of Alternative and Renewable Energy Technologies (SARET) Research Program –Fire propagation in alternative energy storage systems	<ul style="list-style-type: none"> → Investigate the risks related to fire propagation within and between stationary energy storage systems (from household to commercial scale) due to external factors related to bushfire, heatwaves, storms, and floods (such as fire impingement, temperature extremes, impact/shock, and water ingress) that are not considered in current best practice standards.
T4-A9 National Volunteer Blueprint for Emergency Management	<ul style="list-style-type: none"> → Explore opportunities and collaboratively develop a sustainable volunteer system to better support EM volunteers (the people), volunteering (the activities) and volunteerism (the culture). The project will leverage the volunteering research undertaken under the previous CRC.
T5-A1 The lived experiences of First Nations staff and volunteers in the emergency management and resilience sector	<ul style="list-style-type: none"> → Identify systemic and behavioural drivers of cultural load and cultural conflict for First Nations staff and volunteers, and develop recommendations for interventions based on identified gaps to improve participation of First Nations people.

Project	Summarised targeted outcomes
T5-A2 National Indigenous Disaster Resilience Project	<p>The National Indigenous Disaster Resilience Project will achieve the following outcomes that lay foundations for resilient Indigenous communities:</p> <ul style="list-style-type: none"> → An evidence-based policy framework for guiding Indigenous disaster resilience policy and practice across Australia, → Building trusting relationships between Indigenous communities and peak organisations → An Indigenous disaster resilience community of practice → New evidence and authoritative guidance as a knowledge base regarding Indigenous peoples and disaster resilience → Recognition of the critical roles Indigenous community organisations play in disaster resilience, and → Increased confidence in Indigenous communities to respond to disasters.
T5-A3 Heatwave resilience: exploring steps for adaptation	<ul style="list-style-type: none"> → Improve population heat adaptation. → Reduce mortality. → Reduce health burden from these events. → Improve communication of heatwave risk to agencies, the public and the media. → Increase understanding of the health impacts of extreme heat and poor air quality will directly inform heat health planning and enable jurisdictions to better prepare for these events when they occur. → Improve understanding of the full costs and impacts of heat events will enable agencies and health departments to better plan, prepare and respond to heat events. Only once the full costs are known can we properly invest to reduce risks. → understanding of the barriers and opportunities of including the consideration of extreme heat into the national construction codes will begin an important process and conversation of how we can best adapt to heat within Australia.
T5-A4 – Tracking of exposure to potentially traumatic events (PTEs) – Environmental Scan of best practice and current systems	<ul style="list-style-type: none"> → Understand current national and international risk management systems and practices that support psychological wellbeing and safety. → Gap analysis of what is required in this space to better monitor long term mental health impacts within the Australian emergency services and resilience sector. → Understand how climate change, compounding and cascading disasters are adding to the mental health load of emergency service and resilience sector workers. → Assess whether it is favourable and feasible for the Australian emergency services sector to collectively share the development of a new psychological wellbeing and safety risk management system.
T5-A5 Flood Research Program → Understanding the full cost and impact of floods → Communicating flood risk to communities → Identifying the effectiveness of land use planning flooding controls on buildings impacted by the 2020/2021/2022 flooding in NSW	<p>This flood research program aims to:</p> <ul style="list-style-type: none"> → Understand the full cost and impact of floods, → Understand the challenges with communicating flood risk to communities and → Identify the effectiveness of land use planning flooding controls on buildings impacted by floods.
T5-A6 Translation and utilisation of transformative scenarios in a climate-challenged world	<ul style="list-style-type: none"> → Develop the translation and utilisation of the Transformative scenarios in a climate challenged world resources with the development of professional development modules, and user-friendly train the trainer applications. It will be a joint project with the NHRA and the AFAC Climate Change Group, which brings together key individuals from jurisdictional emergency management agencies, the Bureau of Meteorology and thought leaders in the climate and disaster field. This group will play an important advisory and testing role throughout the project process
T5-A7 Assessing the effect of cultural burning on soil health	<ul style="list-style-type: none"> → Provide a quantitative assessment of how soil physical and chemical properties respond to cultural burning and hazard reduction burns. → Provide similar quantitative assessments across a range of Australia environments. → Inform policy development for environmental management and contribute to Indigenous knowledge as an active determinant of Australian governance.

Project	Summarised targeted outcomes
T5-A8 Evaluation Framework Research Program → Evaluating the effect of Wi-Fi captive portal videos on tourist and tourism worker disaster preparedness → Fight fire fascination	→ Inform monitoring and evaluation of community education programs in the emergency services sector. Identified strategies successes and challenges will bring structure and rigour to evaluation of education programs across the sector, significantly contributing to the evolution of best practice via both learnings and formalised documentation.
T6-A1 Conserving and reconnecting floodplains to mitigate flood risk	→ Address key knowledge gaps towards implementing nature-based flood risk mitigation strategies in the Australian context. Nature-based solutions can offer effective and environmentally sensitive flood mitigation alternatives, ensuring meaningful stakeholder involvement and community engagement. Conserving and reconnecting floodplains through nature-based strategies can provide shared benefits, such as increasing biodiversity, and improving water quality and community wellbeing.
T6-A2 Australian temporary and emergency accommodation: learnings to inform future policy, strategy and recovery operations	→ Analyse and address increasing challenges in emergency and temporary housing during and after a disaster. → Provide national guidance on the design and implementation of temporary housing from the research and resources developed.
T6-A3 Multi-Hazard Evacuation Modelling for Effective Emergency Management: A Collaborative Workshop Series	→ Develop a national roadmap for evacuation modelling design and development through a series of workshops to identify research gaps and consolidate learnings to improve evacuation decisions and support tools.
T6-A4 Support integration of Recovery Capitals in service plans for communities with different levels of social disruption	→ Utilise Community Disaster Content Matrix frameworks to understand the extent of exposure to disaster-driven social disruptions, and Recovery Capital-related support needs of communities.
Mobile radar research and workshop	→ Provide an overview of proposed support by the Centre towards a multi-agency collaboration on the exploratory use of a mobile radar during prescribed burns and possibly wildfires in WA. → Test the capability of mobile radar to detect fire plumes during prescribed burns and possibly wildfires in WA. → Develop an unrestricted data set to be managed in the NHRA's data catalogue. → Facilitate the strengthening of researcher and practitioner networks through cross-agency and cross-jurisdiction collaboration.
Maintenance of the Australian Flammability Monitoring System (AFMS)	→ Maintain the AFMS until it is fully operational and implemented by GA.
Australian Emergency Law Blog	→ Supporting Australian Emergency Law communications
SWIRLnet Data Acquisition, Analysis, Storage and Dissemination Procedures	→ The objective of this project is to streamline the data acquisition and dissemination procedures currently enacted during SWIRLnet deployments and to make the data more accessible.
NSW, Qld and Tas Post Floods	→ Provide an in-depth understanding of the community lived experience before, during and following the February and March 2022 flood events to assist future planning and engagement
Victorian and SA Post Floods	→ Provide an in-depth understanding of the community lived experience before, during and following the recent flood events to assist future planning and engagement
Understanding floodwater contamination risks	→ Understand floodwater contamination risks to inform community engagement programs. The project will consist of testing of floodwater and sediment samples across sections of Victoria that have experienced flooding in late 2022 for a range of contaminants.