Natural Hazards Research Australia

Progress Report

1 July to 31 December 2024

Our Values

Excellence – To pursue the highest-quality research methods and implementation.

Independence – To be open, transparent and independent in all activities.

Integrity and honesty – To be honest and act with the highest levels of integrity.

Respect – To recognise and value the contributions of everyone through embracing diversity of gender, ethnicity and thought.

Supportive leadership – To enable all involved to achieve their best.

Trust and collaboration – To share and work cooperatively in a trusting environment.

Our Mission

To work with partners and the community on research that is useful, actionable and supportive of better decision-making to save lives and protect communities.

Our Vision

That communities will be safe, more resilient and sustainable in the face of natural hazards.

Natural Hazards Research Australia's staff work from Burramattagal, Dharawal, Dharug, Dja Dja Wurrung, Gadigal, Turrbal/Yuggera, Wadawurrung, Wangal and Wurundjeri Countries. We thank and acknowledge the Traditional Custodians of these lands and all the lands where we work, live and walk, and pay our respects to Elders past, present and emerging. We recognise that these lands and waters have always been places of teaching, research and learning, and that sovereignty has not been ceded. We are committed to strengthening reconciliation and building resilience through respectful and empowering relationships with First Nations communities, peoples and partners.

ABN 21 163 137 979

Publisher: Natural Hazards Research Australia

January 2025

Report number 41.2025

Citation: Natural Hazards Research Australia (2025) Progress Report 1 July to 31 December 2024, accessible at naturalhazards.com.au/corporate-documents.

To contact Natural Hazards Research Australia, email office@naturalhazards.com.au

Natural Hazards Research Australia is funded by the Australian Government and Participants

Australian Government

Overview

Tackling complex problems through excellence in end-user driven research and transformative partnerships to save lives and build resilient and sustainable communities.

Natural Hazards Research Australia (the Centre) is Australia's research centre for natural hazards resilience and disaster risk reduction. Established 1 July 2021, the Centre focuses on research that promotes natural hazard resilience and reduces disaster risk. This unique approach supports the needs of end-users including emergency service agencies, all levels of government, industry and communities.

This year marked a milestone in the maturing of Australia's natural hazards research sector, celebrating 21 years since the Bushfire Cooperative Research Centre (CRC) was established. Collaboration is core to the Centre as it maintains and builds on the work of its predecessors to achieve meaningful action to reduce Australia's disaster risk and prepare Australia for future natural hazards.

The Centre's *Be Ahead of Ready* thought leadership initiative continues to spark broader national conversations, exploring its concepts and understanding and identifying future research priorities.

During the reporting period, Centre researchers produced 160 outputs spanning academic and industry-facing journal articles, event presentations and project reports (Table 1). Research projects featured in seven of the Centre's Hazardous Webinars and Centre scholarship recipients presented posters and presentations at AFAC24, the Northern Territory Symposium and the 2024 Queensland Disaster Management Research Forum as a direct result of Centre engagement with these Participants.

Table 1: Commonwealth outputs summary, 1 July 2024 to 31 December 2024

Research outputs according to reporting requirements*	Number of research outputs
New technologies and systems	1
Journal articles	25
Conference presentations[a]	22
Media interviews[b]	81
Other[c]	31
TOTAL	**160**

***** Refer to *Attachment 3: Research outputs* for itemised data on each of the research outputs listed in this table.

(a) Comprises oral, poster and paper conference presentations

(b) Includes combined media interviews by Centre staff and researchers.

(c) Includes industry training courses, workshops, knowledge sharing forums and international exchanges/collaborations and output-targeted meetings, award courses, final project reports, thought leadership reports and briefing notes.

Key achievements

This Progress Report 2024 covers the period 1 July 2024 to 31 December 2024, as the Centre moved into its fourth year of operation, with a focus on the delivery and use of research.

Overall, the Centre continues to track well against its *Strategic Plan 2021–2031* with further expansion of its research program, engagement and utilisation planned throughout 2025.

This report highlights the Centre's achievements in building upon its strategic direction with a growing network of Participants and a targeted national research program.

Working closely with the Australian Government to ensure the growing research program continues to align with this strategic direction, the Centre aims to continue to provide a national natural hazards research capability that addresses the complexities and difficult questions surrounding natural hazards.

Governance, management and partnerships

The Centre's 32 formal Participants are from across all levels of government, industry and community sectors (refer to Figure 1). The depth and diversity of these organisations, sectors and people enriches the research undertaken and delivered by the Centre. The Centre's collaborative approach involves research that is developed, monitored, and supported by Participants and the communities they represent. Participants are involved from the start, when the research question is being designed, through to implementation. This flexible model ensures responsiveness to the changing needs of the environment and Participants, providing research that is useful, useable and used.

Achievements

- Celebrated 21 years of natural hazards research and the maturation of Australia's research sector since the establishment of the Bushfire CRC in 2003.
- Onboarded two new research providers, bringing the total to 51 providers including tertiary institutions, consulting firms and government agencies (state and federal)
- Increased staffing capacity to 24 staff across New South Wales (NSW), Queensland, Victoria and Western Australia (WA) nodes
- Reviewed, developed and implemented eight workplace policies
- Moved Brisbane node to co-locate at the Australian Red Cross Queensland State Office
- Restructured Science and Innovation and Research Services teams to strengthen the development, contracting, implementation and evaluation of research
- Established a new legal counsel role, reinforcing governance and operational capacity to deliver research
- Stakeholder Research and Implementation briefings in Tasmania and Queensland demonstrated agility and responsiveness of research program in meeting emerging needs
- Exchanged knowledge and experience through international collaborations

Research and implementation

The Centre's research program continues to demonstrate agility and responsiveness in meeting emerging needs of Participants.

Achievements

- 77 projects in total including 67 in progress and 10 already completed. Further projects are expected to be completed over the next six months providing further opportunity for research impact.
- Eight new end-user driven project concepts were endorsed in October 2024.
- Examples of research use include:

  - Outputs from the *Principles of best practice strategic crisis management arrangements for catastrophic disasters* project are significantly shaping national crisis management frameworks having been integrated into national policies, plans, and operating models and forums.
  - Connected the emergency management sector with First Nations communities to improve engagement and dialogue and more effective and inclusive emergency management practices
  - PhD project on smoke exposure profiles of bushfire fighters in the south-western ecoregion of Western Australia positively impacted forestry firefighters' safety and health with more than 700 forestry firefighters in Western Australia issued P3 respirator masks.
  - Incorporation by emergency services of research on enhancing emergency management decision making into training for incident management teams.
  - Research informing national doctrine of managing animals during disasters with the research-informed Handbook published by the Australian Institute for Disaster Resilience.
  - Delivered a tool to support Queensland energy networks to mitigate damage, effects and disruption to the energy grid.
  - Established growing library of culturally appropriate resources to ensure researchers engage with First Nations communities sensitively and appropriately.

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

- Supported 68 postgraduate students in total - 41 Postgraduate Research Scholarships, 22 Postgraduate Research Associate Students, and five completions.
- Five Early Career Researcher (ECR) development fellowships awarded to date.
- Deliver learning, networking and mentoring opportunities for the next generation of natural hazards researchers and practitioners by establishing the Early and Mid-Career Academic and Practitioners (EMCAP) Network, with 95 members to date.
- Implementation of First Nations Scholarship program.
- 2024 Disaster Challenge delivered with 18 submissions from across Australia, detailing solutions to build and sustain trust for the collective and coordinated actions fundamental to reducing the risks and impacts of disasters. The winning concept, an AI chatbot delivering postcode-specific disaster information, was developed by postgraduate psychology students from James Cook University.
- Planning well advanced for the Natural Hazards Research Forum 2025 with registrations opening in December 2024.

Research informed advice

The Centre delivers regular events to communicate the outcomes of its research program. Three highly successful Natural Hazards Research Forums have been hosted with the fourth, in Adelaide in June 2025, bringing together a large number of diverse organisations to exchange ideas and knowledge while learning about the latest Centre research.

Achievements

- Facilitated discussions around the *Be Ahead of Ready* thought leadership initiative including co-hosted workshops at the following events:
  - Queensland Fire Department Forum, July 2024
  - Northern Territory Emergency Management Symposium, November 2024
  - NSW SES Workshop, December 2024.
- Held a national roundtable event in partnership with Suncorp with national leaders on the topic of nature positive disaster risk reduction solutions. The event featured a keynote by Senator the Hon Jenny McAllister, Federal Minister for Emergency Management. A subsequent discussion paper launched following the event was covered by the media.
- Research Industry Partner for the AFAC24 annual conference and supporter of numerous sector conferences and events
- Public webinars showcased lessons learnt from national and global catastrophes; resilience of critical infrastructure; awareness, education and communication for compound disasters; community perceptions and understanding of bushfire maps; and enhancing decision making in emergency
- Sponsor of the National Indigenous Disaster Resilience (NIDR) Summit 2024, AFAC24 and ADRC24 conferences
- Continued implementation of the Centre's *Biennial Research Plan 2024–26*

Key upcoming activities in 2025

- Additional research projects with a clear transition path to utilisation
- Investment in new research projects across two funding rounds
- Natural Hazards Research Forum in Adelaide in June 2025
- Continued investment in building future capability via education and training programs
- Evaluation of research impact.

Governance and management

Staff

Twenty four Centre staff are located across the Centre's NSW, Queensland, Victoria and WA node offices. The Centre's new Science and Innovation team and associated new positions commenced to enhance data management, research evaluation and education and training, while an in-house Legal Counsel and two new Research Services Project Officers were appointed. A new Communications Director commenced in November 2025, leading the ongoing communication of research projects and translation of research findings into actionable insights.

Finance and business support continues to be provided through the Australasian Fire and Emergency Service Authorities Council (AFAC).

Board

The Board of eight independent members met twice over the reporting period with a strong focus on maturing the Centre's practices and research portfolio to meet the needs of Participants. The Board held its Annual General Meeting 22 November 2024. At that meeting, Iain MacKenzie, Tim Moltmann and Kate Vinot were reappointed as Board members for further three-year terms. The meeting also approved the Centre's annual accounts.

Research and Implementation Committee

The Research and Implementation Committee provides the Board with strategic advice on the 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 governance and 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 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 once 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. The People and Culture Committee met once 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. The next meeting of the End-User Advisory Panel will be scheduled in 2025.

International Research Advisory Panel

The International Research Advisory Panel (the Panel) ensures the quality and scientific rigour of the Centre's research program and research outputs relevant to research utilisation and training activities at a global lens, as well as strengthening the research linkages internationally. The Panel met on 21 November 2024, the second meeting for 2024. Senior Centre researcher Prof David Bowman (ARC Laureate, Pyrogeography and Fire Science at the University of Tasmania) presented on the project *Leading to Impact: bushfire risk at the rural-urban interface*.

Commitment to reconciliation

The Centre's Reflect Reconciliation Action (RAP) plan concluded in December 2023 with 56 of the 63 deliverables complete. The RAP Working Group met to reflect on the considerable achievements over the course of the RAP. The group developed a proposal to form a Pathways Working Group to help inform the development of the Centre's First Nations Strategy. This proposal was prioritised over the development of another RAP as it would help the Centre, which is positioned to make considerable contributions towards reconciliation, better articulate the outcomes it is trying to achieve with First Nations peoples.

The Centre has continued to support its commitments to reconciliation and has concluded many of the outstanding deliverables from the Reflect RAP, supporting appropriate engagement with First Nations rights-holders in natural hazards research and decision-making. Progress during this reporting period includes:

- Signed first contract designed to protect the Indigenous Cultural Intellectual Property (ICIP) of First Nations rights-holders involved with Centre research. This contract will be used for all research to reduce barriers First Nations' inclusion in, and leadership of Centre research.
- Launched and progressed call for Expressions of Interest (EOI) for universities seeking to partner in the Centre's inaugural First Nations Research Scholarship, to support First Nations inclusion in natural hazards research (refer to First Nations Scholarship Program).
- Call for EOIs for First Nation Leaders to join the Pathways Working Group launched in of December 2024 with submissions received from around Australia. The aim is to form the group in the first quarter of 2025 to start co-designing a First Nations Strategy for the Centre.
- Published digital First Nations' engagement resources comprising resources to support appropriate collaboration with First Nations rights-holders, including *Principles and protocols for cultural land management governance and research* and other First Nations-focused research from the Centre and the Bushfire and Natural Hazards CRC (BNHCRC). The collection and select resources were accessed 532 times and downloaded 152 times during the reporting period.
- Webinar co-hosted for NAIDOC week with the Australian Institute for Disaster Resilience (AIDR) and NIDR. Centre Science and Innovation Director Prof Cheryl Desha formed part of the speakers. The rich discussion will inform more respectful inclusion and engagement with First Nations rights-holders by researchers and practitioners.
- Supported the 2024 NIDR Gathering in Lismore funding the attendance of two Indigenous researchers and keynote speaker, Dr Amy Cardinal Christianson from the Indigenous Leadership Initiative in Canada and a member of the Centre's International Research Advisory Panel. The event was well attended by First Nations groups, non-governmental organisations and government agencies. The event went a long way to improve the sector's understanding of First Nations communities' experiences of disaster events and management, as well as the leadership role First Nations and community groups play around resilience. Dr Christianson's keynote demonstrated the similarities between the experience of Indigenous communities in Canada and Australia, as well as what is possible when Indigenous leadership is recognised and supported.
- Hosted *In discussion: Dr Amy Cardinal Christianson & Joe Gilchrist*, facilitated by Board member Oliver Costello at the Queensland node office (refer to events showcase). The event was strongly attended by representatives of Queensland emergency and land management agencies. Key discussions included enhancing the sector's understanding of Indigenous experiences in evacuation and participation in emergency management, as well as exploring how Indigenous knowledge can contribute to building resilience.

The Centre continued to support diverse First Nations-focused research led or co-led by First Nations researchers. Projects currently in progress include:

- *Cultural land management research and governance in south-east Australia*, led by Jagun Alliance and Deakin University
- *Operationalising Aboriginal land and sea management*, led by NSW Department of Climate Change, Energy, the Environment and Water
- Phase 1 of *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 at Deakin University
- *Foundations in Indigenous Disaster Resilience*, led by NIDR at Monash University
- *Colonial load and cultural conflict – understanding the experiences of First Nations staff and volunteers within the Australian emergency, land management and resilience sectors* proposed by AFAC.

Three additional projects were approved in October 2024, including:

- Phase 2 of *Healing Country through Wolgalu/Wiradjuri-led land management,* proposed by NSW DCCEEW
- *First Nations women, cultural fire knowledge, wellbeing and memory* proposed by the Queensland Fire Department
- *Understanding the effectiveness of current communication mediums and messaging used to communicate information on planning, preparing/responding and recovering from an emergency event to remote First Nations communities* proposed by Northern Territory Fire Police and Emergency Services.

Policies and processes

The Centre holds and manages substantial financial and intellectual resources on behalf of Participants, as well as those of its previous iterations. Strong governance and management processes are in place to ensure confidence in the use of these resources.

Throughout the reporting period, the Centre enhanced its governance and management through the review, development and implementation of eight workplace policies:

- Hybrid Working Policy
- Equal Opportunity Policy
- Investment Policy
- Whistleblower Policy
- Leave Policy
- Long Service Leave Policy
- Receipt of Gifts and Benefits Policy
- Financial Delegations and Authority.

Measuring performance

The Centre's Board endorsed an evaluation framework in July 2023. Implementation of the framework continued, focused on the collection of research utilisation case studies and enhancements to the Centre's research management system Turnkey. Further implementation of the framework will be supported by the Centre's new Senior Project Officer Research and Evaluation role.

Managing data

The Centre's Board endorsed the Data Catalogue and Framework Status update in April. Next steps included the recruitment of a staff member to manage and progress the Centre's digital and data processes and initiatives and Data Governance Committee. The new Digital and Data Manager commenced in November, with planning underway for the Data Management Framework and Research Data catalogue. Planning also commenced to establish a Data Governance Committee.

Brisbane node office

In December, the Centre's Brisbane node formalised its new location at the Queensland State Office of the Australian Red Cross. The end-user co-location arrangement is similar to those in NSW and WA. The Brisbane node was previously located at Queensland Police Service and the Centre is thankful for its strong relationships with Queensland-based stakeholders.

Partnerships

Strategic engagement

Demonstrating the significant, wide-ranging impact and value of Centre research to decision makers is key to ensuring the Centre's vision of safer, more resilient and sustainable Australian communities.

In October, Centre Board Chair Iain MacKenzie, Director Oliver Costello and CEO Andrew Gissing briefed Federal Minister for Emergency Management, Senator the Hon Jenny McAllister, on the Centre's activities.

In December, the CEO briefed Ms Janelle Saffin MP, NSW Parliamentary Secretary for Disaster Recovery, on upcoming Centre activities and highlighted key achievements in partnering with agencies in NSW.

Above: Federal Emergency Management Minister, Senator the Hon Jenny McAllister, receiving a briefing from CEO Andrew Gissing, Board Chair Iain MacKenzie and Director Oliver Costello.

Centre Participants

As an end-user driven research organisation, the Centre is focused on finding opportunities for new knowledge, data and insights from its research to be used to create safer, more resilient and sustainable communities confronted with worsening natural hazard risk.

The Centre focuses on delivering maximum value to Participants, organisations with a formal agreement with the Centre. However, it also provides significant value to a broader national and international knowledge network.

The Centre continues to work with Participants to co-design research projects that address knowledge gaps and deliver meaningful outcomes across the breadth of subsectors that constitute the broader emergency management sector.

The Centre's Participants are drawn from all states and territories, federal, state and local governments, key industry bodies, private and not-for-profit sectors and other organisations with a stake in protecting Australian communities.

The Centre's network currently includes 32 formal Participants, with collaborative relationships continuing to be fostered with key partners and stakeholders nationally and internationally, including organisations representing interests in planning, health, insurance and infrastructure. Refer to Figure 1 for a list of Participants.

Figure 1: Centre Participants as of 31 December 2024

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

- City of Hobart
- Conservation Ecology Centre – Cape Otway
- Cooperative Research Australia
- Department of Housing, Local Government, Planning and Public Works (Qld)
- Department of Prime Minister and Cabinet Cyclone Recovery Unit (New Zealand)
- Emergency Media and Public Affairs
- Emergency Recovery Victoria
- Enduring Advantage Consulting
- Fiji National University
- Fire and Emergency New Zealand
- FirEUrisk
- FPInnovations Canada
- Griffith University
- GNS Science
- Inspector-General for Emergency Management Victoria
- International Association of Wildland Fire
- Moreton Bay Regional Council
- Nanyang Technological University
- National Emergency Management Agency (New Zealand)
- Natural Resources Canada
- North Australian Indigenous Land and Sea Management Alliance Ltd
- North Carolina State University
- Northern Forestry Centre (Canada)
- Queensland Chief Scientist
- Queensland Inspector-General for Emergency Management
- Queensland Reconstruction Authority
- Queensland Police
- Resilience Challenge (New Zealand)
- Sentientco
- Suncorp
- Sustainable Built Environment National Research Centre
- The Treasury New Zealand
- United Nations Office for Disaster Risk Reduction
- University of the West of England
- United States Department of Agriculture Forest Service
- United States Department of Homeland Security
- Western Sydney University
- WMA Water
- Yarra Ranges Council.

Over the reporting period, the Centre continued its focus on engaging with representatives of Australian Government departments and agencies. This included engagement with:

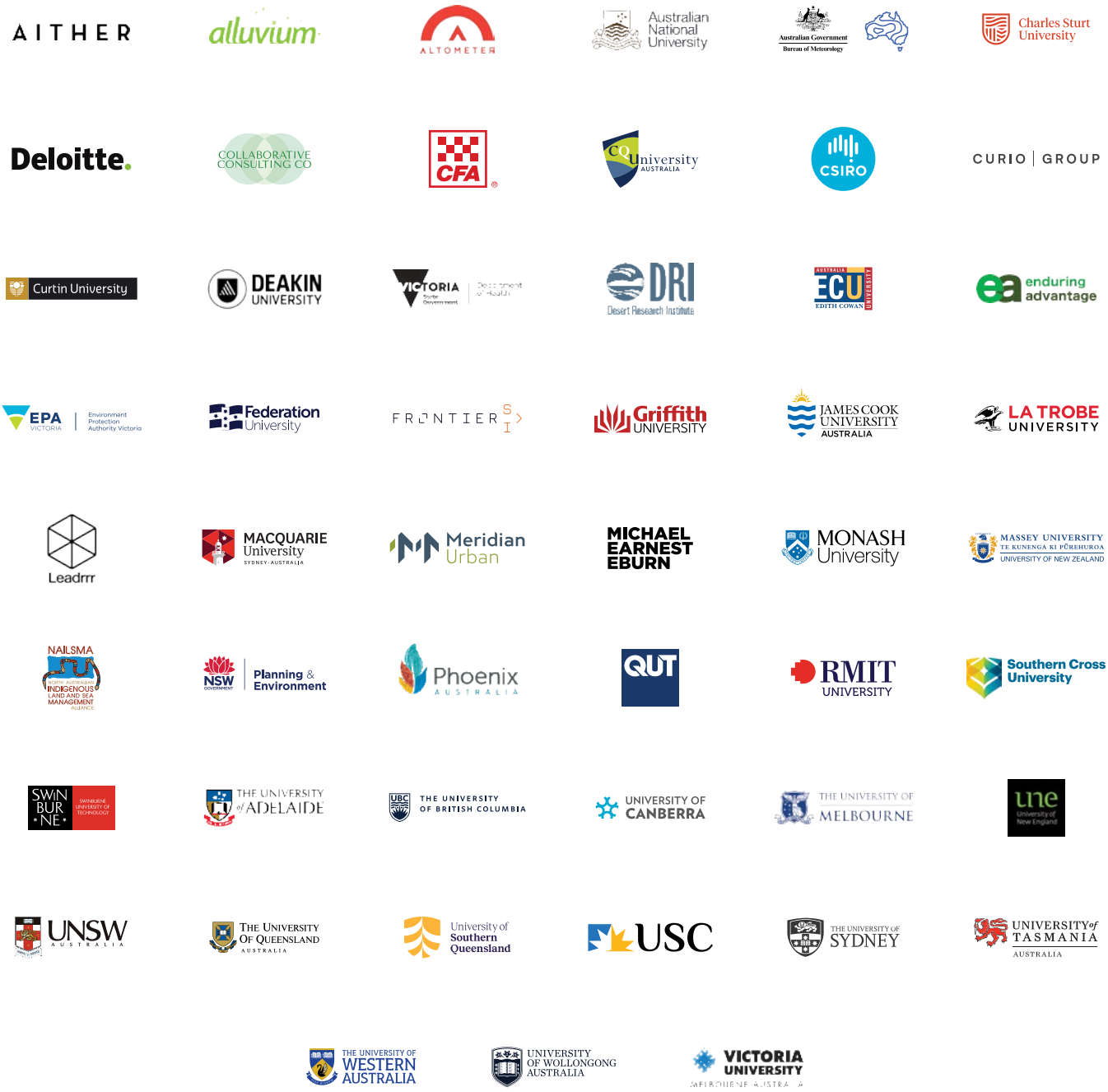
- Australian Government Department of Industry, Science, Energy and Resources
- Australian Research Data Commons
- Bureau of Meteorology (including the Australian Climate Service)
- Geoscience Australia
- National Emergency Management Agency (NEMA)
- Department of Home Affairs.

The Centre continues to regularly engage with representatives from the insurance, local government, policing, philanthropic and other sectors to ascertain their knowledge needs and discuss possible collaboration opportunities. In addition, the Centre's research program delivers tangible outcomes and outputs gaining interest with new sectors, informing the Centre's broader engagement activities focus and participation opportunities.

Research providers

Research providers are essential in the Centre's ability to deliver high-quality research. The Centre's network consists of 51 research providers, including tertiary institutions, consulting firms and government agencies at all levels, all contributing valuable research across states, territories and sectors.

Figure 2: Centre Research Providers as of 31 December 2024



International research collaboration

Project level international collaborations have included the:

- ***Enhancing decision making in emergency management*** project team collaborated with team members in the **United Kingdom (UK) and New Zealand** to build the evidence base for decision-making practices.
- ***Awareness, education and communication for compound natural hazards*** lead researchers from Deakin University and University of Tasmania delivered two presentations at the Media Asia Conference in **Japan,** 15–19 October 2024, titled *Working with disaster-affected communities to build better communication for compound natural hazards* and *Exploring local media ecologies in communicating natural disaster*.
- ***Flash flooding case studies to improve predictions and the communication of uncertainty*** lead researcher from the Bureau of Meteorology presented at the World Meteorological Organisation's HIWeather Conference in **Germany**, 9–13 September 2024, showcasing the cost-effective rapid appraisal case study method used within the project.
- ***Why fly? How do we know that aerial firefighting operations are effective and efficient?*** Project researchers hosted online discussion with Centre's Postgraduate Scholar graduate Dr Heather Simpson from the Canadian Interagency Forest Fire Centre and worked with international colleagues to produce article for the International Association of Wildland Fire's *Wildfire* magazine.

International engagement

In addition to the International Research Advisory Panel, the Centre continues to share knowledge and experience through international collaboration and exchange.

International engagements over the reporting period included:

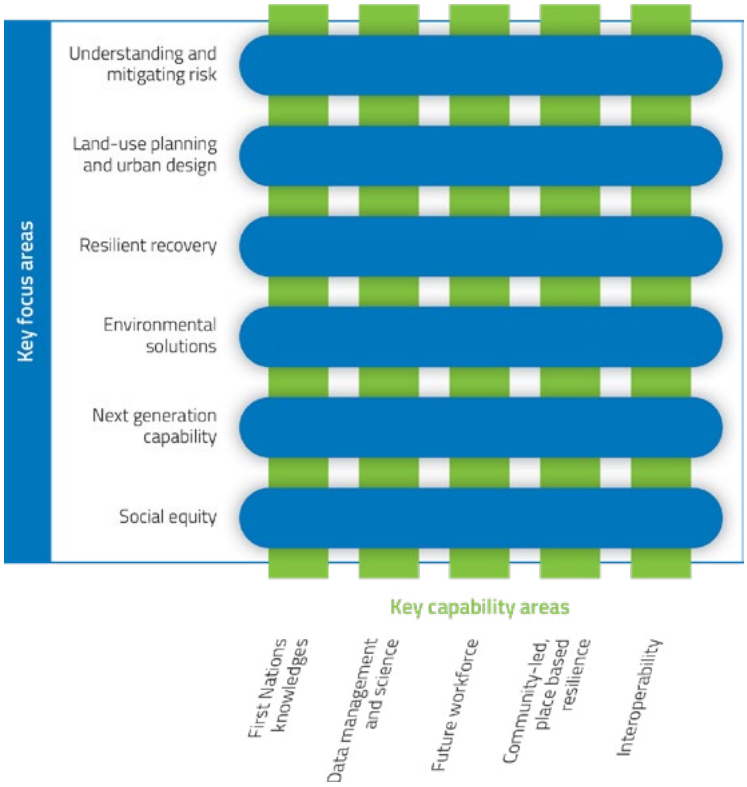
- Partner in FirEUrisk, a European consortium of 38 international partners integrating a multi-perspective strategy to enhance understanding of extreme wildfires.
- Supported Dr Amy Cardinal Christianson's travel from Canada to attend and present at the NIDR Gathering 2024 (24–26 September 2024) in the Northern Rivers, NSW. The Centre also supported travel to attend the event for two Centre researchers working on a First Nations research topic, and two Centre staff involved in the First Nations Pathways activities.
- Hosted Dr Christianson to run a workshop with Canadian Elder Joe Gilchrist for stakeholders in Brisbane following the NIDR Gathering, 3 October 2024. Workshop participants from government and industry reflected on the importance of fire in their landscapes and the effects of fire, or lack of fire, in changing the ecosystem.
- Establishment of Assisted Relocation Community of Practice with inaugural Executive Committee meeting hosted online on 29 October 2024. Foundation members include government and research colleagues from the United States (FEMA, North Carolina State University), New Zealand (NEMA New Zealand, GNS Science) and Australia (NEMA, the Centre) with the first Community of Practice meeting scheduled in early 2025.
- CEO and Science and Innovation Director met with Daniel Cotter and Emily Saulsgiver from the US Department of Homeland Security's Office of Science and Engineering to discuss collaboration opportunities (online, 25 October 2024).
- Participated in an online presentation to the Wildland Fire Canada Conference: Wildfire Community Impact Research Workshop on post-event research, 29 October 2024.
- Hosted webinar about research lessons from recent Canadian wildfire seasons, 14 November 2024. Panel included Dr Amy Cardinal Christianson (Indigenous Leadership Initiative, Canada), Dr Kelsey Winter (FPInnovations Canada), Sandra Whight (AFAC) and Andrew Gissing (the Centre).
- Centre Director Dominique Hogan-Doran SC attended the 2024 United Nations Climate Change Conference of the Parties COP29 in Baku, Azerbaijan (11–22 November 2024).
- CEO and Science and Innovation Director met with key New Zealand natural hazards research stakeholders (8–10 December 2024), coordinated by the Natural Hazards Research Platform and hosted by GNS Science. Organisations involved included National Emergency Management Agency (New Zealand), The Treasury New Zealand, Fire and Emergency New Zealand, Department of Prime Minister and Cabinet Cyclone Recovery Unit (New Zealand) and New Zealand's local disaster managers' Community of Practice. Prof Gavin Smith also attended and presented on Cyclone Helene and North Carolina's recovery challenges to government and industry colleagues.

Research and implementation

The Centre is committed to evolving its research program to align with its vision and mission. As the program matures, strategic and focused efforts are made to ensure that the outputs are practical, applicable and widely utilised.

The Centre's research focus and capabilities provide a comprehensive framework for effective implementation. The Centre continuously engages with Participants to ensure the program remains relevant, valuable and driven by the needs of government, emergency services, industry and the community.

Figure 3: Key focus and key capability areas outlined in the Centre's *Biennial Research Plan 2024-26*



Core research program

The Centre's research portfolio is developed and overseen through strong collaboration with Participants, supported by research organisations and leadership from the Centre. The Centre's Board and Research and Implementation Committee regularly review the research portfolio.

The portfolio includes a total of 77 core research projects, detailed in Attachment 2. These projects are at various stages in their lifecycle, with some recently completed and now entering the translation and utilisation phase. To date, ten projects have been completed, with more expected to conclude within the next six months.

To ensure the portfolio remains relevant and responsive to research needs, two formal investment rounds are held each fiscal year. The most recent round closed October 2024, with 18 concepts submitted by Participants. The Board approved funding for eight of these concepts.

New projects

Table 2: Approved new research concepts with targeted outcomes

Concept	Targeted outcomes
A national framework and toolkit for multicultural inclusion in emergencies	Identify the challenges and needs of multicultural communities to strengthen resilience and improve outcomes for multicultural communities during disasters.
Managing the risk of heat stress for first responders: understanding the role of diverse heat sources and environment	Enhance understanding of heat stress experienced by first responders and empower stakeholders to reduce the risk of heat stress through comprehensive knowledge and actions.
Remote sensing of grass condition	Develop a national satellite-derived model that detects changes in grass fuel conditions in crops and pastures, and how they relate to improve agencies' fire danger ratings and warning messaging.
Multi-hazard resilient buildings	Investigate current multi-hazard building standards and guidance to identify gaps and create best practice building outcomes, elements and testing.
First Nations women, cultural fire knowledge, wellbeing and memory	Understand how gathering and sharing cultural burning knowledge impacts First Nations women and explore its culturally protective factors in building disaster resilience.
Unlocking risk: Enhancing hazard risk assessment through historical archival reanalysis	Improve how historical hazards are characterised, incorporating First Nations knowledge to enhance the archives of these historical events, making data more accessible for researchers, emergency managers and the public.
Understanding the effectiveness of current communication mediums and messaging used to communicate information on planning, preparing/ responding and recovering from an emergency event to remote First Nations communities	Provide evidence-based data to inform fit-for-purpose future communication strategies and messaging in a remote First Nations community to enhance safety and resilience.
Quantifying and predicting bushfire risk following large-scale, drought-induced vegetation die-off	Quantify the fuel characteristics of a range of vegetation types affected by vegetation die-off across south-western Australia to calculate potential fire behaviour.

Overview of active research

The Centre continues to make good progress against its *Strategic Plan 2021–2031*. As its research projects expand into programs of work, it is crucial to ensure projects are grounded in the Centre's strategic research themes and contextualised to address natural hazards. This program-based approach ensures the Centre continues to invest in research that meets the needs of all Participants, states and territories and communities regardless of location and natural hazard.

Translation and Implementation Panels

During the reporting period, substantial work took place to map and establish Translation and Implementation Panels (TIPs) to monitor and support the translation of Centre research into practice. This process involved extensive collaboration with key stakeholders to identify thematic areas of focus and ensure TIPs effectively support national priorities, promote impactful research translation and foster collaboration across sectors. The TIPs will meet biannually, with their objective being to monitor and support research translation while providing advice on research design at the thematic program level and maximise outcomes and benefits for end-users.

Why fly? How do we know that aerial firefighting operations are effective and efficient?

This project, undertaken by A/Prof Owen Price, Dr Michael Storey and Dr Michael Bedward at the University of Wollongong and Dr Matt Plucinski at CSIRO, aims to understand how to better use aircraft for firefighting in Australia under a range of conditions. The research offers a thorough understanding of aircraft usage, including when and why different aircraft are deployed, along with an in-depth analysis of their effectiveness. Participants are highly engaged in quarterly steering committee meetings with senior executive staff and a working group has been established including aviation managers and specialists from most fire agencies land managers. A literature review of aerial suppression effectiveness and case study survey are ready for release.

Peter McKechnie AFSM, Deputy Commissioner Field Operations, NSW Rural Fire Service

"The Why Fly *project is an important piece of work for fire agencies across Australia, the outcomes are expected to better inform our decisions relating to the use of these valuable resources to better protect our communities. I've been part of the steering committee guiding this project. We have received a literature review on aerial suppression effectiveness and are looking forward to the outcomes of the case studies to increase our knowledge and understanding on how effective and efficient aerial firefighting operations are for fire management."*

Predictions in public: understanding the design, communication and dissemination of predictive maps to the public

Highly collaborative and practitioner-led, this project is developing an evidence base and approach for nationally consistent design, dissemination and communication of public-facing fire spread prediction maps during future emergencies.

Coordinated by representatives from the Country Fire Authority Victoria (Dr Chloe Begg) and Department of Education Victoria (Angela Gardner), the research is undertaken by a multidisciplinary team from RMIT University (Dr Erica Kuligowski, Dr Amy Griffin), Queensland University of Technology (A/Prof Paula Dootson), Deakin University (Dr Timothy Neale) and Swinburne University (Dr Graham Dwyer). made up of AFAC Predictive Services and Warnings Group representatives from all Australian states and territories.

The project completed its first phase, examining current map design and dissemination and is currently testing predictive map concepts to develop a standardised fire spread prediction map that can be used across Australia. In 2025–26, the project will focus on operationalising the research outcomes with agencies.

Through close engagement with the PSC, this research is already enhancing agencies knowledge and practice regarding the way the public understand and use predictive bushfire and incident maps. The project was shortlisted for the Resilient Australia Research Impact Award in 2024.

Deanna Pullela, Team Leader Public Information, Department of Fire and Emergency Services

> *"The* Predictions in Public *project and the regular fortnightly meetings of the project's Steering Committee have allowed us as jurisdictions to contribute to solving the challenge of developing a set of design principles for fire spread prediction maps that is workable for all jurisdictions to achieve a nationally consistent approach. The opportunity to provide input into the design of the maps and the studies testing their effectiveness has meant that different jurisdictions can gain insights that are relevant to their own operational contexts."*

Evaluation of Resilient Homes Fund

Co-funded by the Centre and the Queensland Reconstruction Authority (QRA), the Queensland-based component of this project evaluates the success and lessons that can be learned from Queensland's Resilient Homes Fund (RHF). The research team at the University of Queensland (Prof Paula Jarzabkowski, Dr Tyler Riordan, Dr Matthew Mason, Dr Katie Meissner, Prof Alicia Rambaldi, Dr Laurel Johnson and Stephanie Wyeth) and the University of Melbourne (Prof Benjamin Avanzi) evaluated the RHF's buy-back, retrofit and house-raising programs by measuring how they addressed the physical, financial, social and emotional dimensions of resilience.

The project recently extended to evaluate the NSW Resilient Homes Program (RHP) in the Northern Rivers Region, as well as the RHP component of the Central West Recovery and Resilience Package. Overall, this research aims to improve the responsiveness and efficacy of recovery activities to ultimately build the resilience of communities.

Vina Varsani, General Manager, Queensland Reconstruction Authority

"This (Queensland phase of the) project is an in-depth review of the Resilient Homes Fund, enabling QRA to work with the research team to consider what we need to both monitor and evaluate the effectiveness of the program, and shape future programs of its kind. We are committed to ensuring that the investment is making a difference where it counts – reducing risk and building resilience in our communities."

Utilisation of transformative scenarios in a climate-challenged world

A joint project with the AFAC Climate Change Group, this project further develops the translation, utilisation and application of the *Transformative Scenarios in a Climate Challenged World* resources that address stakeholder needs. The AFAC Climate Change Group provided significant support, particularly in the development of scenarios and case studies. The group also play a crucial advisory role in guiding the project's direction. The resulting modules are intended to challenge agency leaders to stress test their agency's preparedness and strategies across four future scenarios.

Katelyn Samson, Deputy Director, Resilience and Risk Reduction, AFAC

"The team are doing an incredible job interpreting the original transformative scenarios materials for user-friendly, real-world application by the emergency management sector and beyond. The collaborative approach to the project has been effective and piloting the online modules with SAFECOM has really helped refine the modules and the scenario process."

Awareness, education and communications for compound natural hazards

In an Australian first, researchers from the University of Tasmania (Dr Gabi Morcatta) and Deakin University (Dr Erin Hawley, Prof Kristy Hess, A/Prof Joshua Newton and A/Prof Timothy Neale) are combining international best-practice approaches and local lived experience to develop a framework for communication, education and awareness about compound natural hazards. The framework for agencies and other organisations to guide community communication is co-designed with communities and stakeholders to ensure it is fit-for-purpose and immediately useful in empowering emergency preparedness, response and resilience within Australian communities.

Shellie Smythe, Manager Community Risk, NSW Rural Fire Service

"We all need to improve in the space of public information and warnings. This research is helping me develop tools to tailor our communications and ask better questions to refine our strategies. Being part of this project allowed me to embed new knowledge into our public information approaches, enhancing how we connect with communities for disaster preparedness and response.

"As natural hazards become more frequent and complex, communication strategies must adapt to address these challenges. Our goal is to improve preparedness and reduce risk through better, more inclusive communication. By applying best practices and research-based principles, we can ensure our strategies are effective and aligned with community needs."

Bushfire risk at the rural-urban interface

Rural-urban interfaces are at high-risk of exposure to fire. This project explores the changing characteristics of the plants in the rural-urban interface and focuses on improving our understanding of extreme fire behaviours in fragmented fuels such as patch and corridor. The research team at the University of Tasmania (Prof David Bowman, Dr Stefania Ondei, Dr Grant Williamson and Dr Anna Gjedrem) and the University of Wollongong (A/Prof Owen Price) have published three journal articles and are in the process of submitting another two manuscripts. The research team won the 2024 Resilient Australia National Collaboration and Partnership Award with their University of Tasmania project *Fire Centre: building community resilience to bushfires through science translation.*

Melissa O'Halloran, Manager Bush Fire Risk Planning, NSW Rural Fire Service

> "Bushfire risk at the rural–urban interface *is a much-needed project to continue our understanding of the mechanisms of house loss from bushfires in Australia. The recent publication of* Garden design can reduce wildfire risk and drive more sustainable co-existence with wildfire *provides an excellent contemporary synthesis of global research in this space. As an end-user this is a highly valuable resource to support our public facing communication on household preparedness but also for us to acknowledge that there are still gaps in our evidence base and where future research effort could be applied. The multi-faceted design of this project is so important, and I keenly await further results from the ember modelling and biophysical components of the project which have the potential to significantly improve bush fire risk and planning policy across Australia."*

Enhancing flood prediction and warning capability:

Developing an integrated predictive capability for extreme rainfall and inundation project
This research with the Bureau of Meteorology (Dr Paul Fox-Hughes, Dr Carlos Velasco-Forero, Dr Wendy Sharples, Dr Carla Mooney, Jayaram Pudashine, Dr David Wilke, Dr Dragana Zovko-Rajak, Barry Hanstrum, Dr Christopher Pickett-Heaps and Dr Jiawei Hou) will develop a prototype with predictive capability to improve forecasts of extreme rainfall and inundation and the communication of risk to emergency management. Designed in collaboration with stakeholders and supported by social scientists, this project has successfully facilitated greater linkages across a range of initiatives developing and exploring heavy rainfall forecast tools and approaches within the Bureau of Meteorology.

Flash flooding case studies to improve predictions and the communication of uncertainty
In partnership with the Bureau of Meteorology (Dr Carla Mooney, Dr Paul Fox-Hughes, Victoria Heinrich, Dr David Wilke, Dr Dragana Zovko-Rajak, Karen Hudson, Dr Carlos Velasco-Forero and Dr Wendy Sharples), this project identifies how best to prepare systems, people and public messaging to reduce the impact of flash flooding, enhancing community resilience. Through case study analysis, the project focuses on the communication of probabilistic forecast and warning information through all steps within the warning value chain to emergency management agencies and communities. Research findings will provide preliminary guidance on effective communication of uncertainty for forecasting terminology, as well as a foundation for a prototype predictive service for extreme rainfall and flash flood inundation.

Long-range flood outlook for strategic preparedness project
This project with the Bureau of Meteorology (Dr Wendy Sharples, Dr Navid Ghajarnia, Dr Jiawei Hou, Dr Christopher Pickett-Heaps and Dr David Wilke) will build a national suite of probabilistic long-range flood outlook and inundation products as a proof-of-concept for evaluation and testing by the Bureau of Meteorology. In doing so, the project will address a known gap in the service by considering extended (beyond seven-day) lead times with products tailored specifically to convey flood risk.

Steve Muncaster, Principal Advisor, Emergency Management Reform, Victoria SES

"These three projects have been working closely with stakeholders to ensure research outcomes not only improve forecast and warning capability from the Bureau but are also being applied by the sector in tailoring preparedness and readiness for a range of time horizons and approaches to communicating and understanding uncertainty for public facing messages and operational decision making."

Natural hazards resilience in complex urban systems

Urban environments are exposed to multiple, compounding and cascading natural hazard risks. This is further complicated by the changing climate. This project, undertaken by RMIT University (Prof Jago Dodson, Prof John Fien, Dr Annette Kroen, Dr Solmaz Hosseinioon, Dr Leonardo Nogueira de Moraes, Prof Esther Charlesworth, Dr Mittul Vahanvati, Dr Leila Irajifar, Dr Erica Kuligowski and Dr Anthony Kent) and Nature Based Resilience (Dr Amanda Lamont), supports agencies and communities to prepare urban environments for compounding natural hazards and support and empower residents to build resilience against compounding natural hazards.

The project uses document analysis, interviews and focus groups to understand multi-dimensional, compounding and cascading disasters, with practice reviews to understand future disaster impacts in major urban areas, conceptualise and map vulnerabilities and resilience in urban systems and processes for prioritising resilience investments.

Project findings include co-designed practical guidance, including:

- Assess and map vulnerabilities and resilience within urban systems at local scales
- Operationalise, monitor and evaluate urban resilience strategies, plans and investments
- Prioritise and influence urban resilience investments by applying process principles and standards.

John Richardson, Executive Director (Interim), Australian Institute for Disaster Resilience

"This is an exciting and important project. To date we have seen how the researchers have grappled with and made sense of the complexity of urban systems and thinking through how this will help decision makers, from local through to federal make evidence informed decisions to help build urban resilience. This is critical as it is often forgotten that 80 per cent of Australians live in urban areas, and the more highly connected nature of our systems on which we are reliant for everyday living are more at risk from a changing climate and other local through to global shocks and stresses. It means simply more people are at risk of the impacts of disasters. These tools will help reduce that risk."

Commissioned research program

In conjunction with its core research program, the Centre operates a commissioned research program providing organisations with the opportunity to work with the Centre to develop and produce research or research-informed activities that fulfil a bespoke or niche business need. In the past six months, the Centre finalised commissioned research for Powerlink Queensland to better quantify the consequences of major bushfires to and from its Queensland energy network, as well as commenced work with NSW Reconstruction Authority to support the development of its community preparedness evidence-base.

Australian Disaster Resilience Index 2

Launched in 2020, the Australian Disaster Resilience Index (ADRI) was the first nationally standardised assessment of disaster resilience in Australia. Scientifically rigorous and peer-reviewed, the index was developed through a research project funded by the Centre's previous iteration and completed by the University of New England, in consultation with stakeholders from multiple emergency service agencies. ADRI visualises disaster resilience across coping and adaptive capacities using data generated from public sources, using datasets compiled between 2014 and 2017 as well as 2011 census data and is reaching the end of its currency. To ensure usability and applicability for users, NEMA requested the Centre to refresh the Index with recent datasets to develop ADRI 2 which was completed in partnership with the University of New England. The revised ADRI 2 was delivered to NEMA in August 2024.

Commissioned research portfolios

The Centre continues to coordinate commissioned research portfolios for the Victorian Department of Energy, Environment and Climate Action (DEECA) and CFA. For these portfolios the Centre provides end-to-end support, including research development, coordination and delivery of outputs in partnership with a range of research providers.

There were 14 active projects undertaken for DEECA during this period with a further two in development. These covered ecosystem resilience across Victoria ecological fire groups, including a quantitative review of the program designed to support ecosystem resilience, best practice monitoring and evaluation approaches for bushfire management, native wildlife management, smoke exposure modelling, climate change and planned burn outcomes tracking.

Eight active projects were undertaken for CFA during this period, focusing on bushfire risk reduction effectiveness, roadside burning, upper atmosphere influence on fire behaviours, tanker design, understanding fuel moisture lag in bushfire models and simulators and community engagement in vegetation management.

Other program support

The Centre continues to provide in-kind network engagement and mentor support for research projects that are submitted to other funding sources including the Australian Research Council (ARC) and the National Health and Medical Research Council (NHMRC), where they contribute to building safer, more resilient and sustainable communities. In this reporting period, the Centre:

- Participated in a collaborator meeting for Dr Hamish Clarke's ARC Mid-Career Industry Fellowship (IM240100046, University of Melbourne), awarded earlier in 2024. This four-year fellowship focuses on decision support for climate-adapted bushfire risk mitigation and commences June 2025. The Centre will provide in-kind support for network-related mentoring and logistical support.
- Supported a Centre of Excellence for Future Fires Expression of Interest submission in October 2024, led by University of Melbourne, seeking to transform the way Australians understand, manage and live with fires. The Centre of Excellence aims to bring together and develop Indigenous and non-Indigenous fire knowledge towards improved resilience of communities and ecosystems, with in-kind contributions from the Centre including networking, research connection and communication activities. The result of the EOI process will be announced in 2025.
- Committed to in-kind mentoring and networking for Dr Margaret Cook's Australian Research Centre Mid-Career Industry Fellowship application in October 2024 (IE250100114, Griffith University). The proposed research draws on Dr Cook's librarian and community context expertise in building disaster resilient communities.

Case studies of research utilisation

Utilisation of the Centre's research is at the heart of its mission to work with partners and the community on research that is useful, actionable and supportive of better decision-making to save lives and protect communities.

The Centre defines research utilisation as the process of synthesising, disseminating and using research-generated knowledge to impact or change existing practice. This involves ensuring that findings are understood, accepted, adopted and applied by end-users through a range of different mechanisms.

Research utilisation is complex and occurs on a continuum. It may take many years of effort for research to be successfully implemented and used. The following case studies highlight some of the pathways and instances of utilisation.

BNHCRC and the Centre fostering disaster resilience knowledge – AIDR Handbook Collection

Along with its predecessor BNHCRC, the Centre contributed technical expertise to AIDR's Handbook Collection outlining national principles and practices for disaster resilience. Handbook development identifies knowledge gaps within the sector followed by input from a network of experts. This information is reviewed and updated every five years. Below is a list of handbooks for which the Centre provided research input, along with the number of downloads over the past six months.

Table 3: AIDR Handbook Collection – BNHCRC and Centre research input, July to December 2024

Handbook title	Publication date	Downloads (Jul-Dec 2024)
Evacuation planning	2023	586
Planning for animals	2024	198
Communities responding to disasters: planning for spontaneous volunteering	2018	138
Community engagement	2021	486
Systemic disaster risk	2021	263
Flood emergency planning	2020	253
Public information and warnings	2021	381
Disaster resilience education for young people	2021	121
Incident management	2023	710

Source: Data provided by AIDR, December 2024.

Margaret Moreton, former Executive Director, AIDR

"The handbooks are a definitive source of knowledge and experience and guide various aspects of disaster risk reduction and resilience practice and effort. They represent the latest thinking across the sector and are developed through collaboration and review between subject matter specialists. The Centre is a highly valued source of emerging research. Findings and issues that emerge from the Centre's work, inform AIDR's planning for future handbooks and AIDR's review of existing handbooks."

Fostering disaster resilience knowledge – Handbook on Planning for Animals

This handbook, developed from the BNHCRC project *Managing Animals in Disasters* by Dr Mel Taylor, is a strategic guide to planning for animals before and during emergency using a principles-based approach. The handbook outlines the recommended minimum number of practices required for including and integrating animals in all stages of the emergency management cycle (prevention, preparedness, response and recovery). This Centre research-informed handbook serves as a collection of best practices for policymaking, planning and decision making for animals in emergency management. While it is not prescriptive or operational, specific considerations and actions may vary according to different species, organisations and jurisdictions.

Erica Honey, on behalf of the Australian Veterinary Association

> *"Bushfires are increasing in severity and frequency in urban and rural areas, impacting people, animals and the environment. Veterinary practices are essential during these crises, caring for their teams, treating animals, and assisting clients and the wider community. Created by animal and emergency stakeholders, the newly released AIDR Planning for Animals Handbook offers invaluable guidance for animal and emergency stakeholders. The information from the handbook assists in developing a robust practice plan that veterinary professionals will find helpful in developing their practice's emergency plan, alongside key stakeholders such as other veterinary practices, local government, emergency services, and their clients, including vulnerable communities."*

From Australian Veterinary Association News, 29 November 2024.

Bianca Nogrady, Science Writer, The Saturday Paper

> *"A new disaster management guide finally recognises the need for animals to be factored into emergency planning, for the safety not only of pets and wildlife but humans too."*

From The Saturday Paper, 7 December 2024

Enhancing decision-making in emergency management

This research enhances the understanding of the crucial aspects of effective decision making under stress, focusing on building the capacity and skills of emergency management teams during strategic operations. Led by A/Prof Chris Bearman at CQUniversity, the research team also comprises Dr Peter Hayes (CQUniversity), Dr Greg Penney (Charles Sturt University), Prof Rhonda Flin (Robert Gordon University, Scotland), Phil Butler (Cardiff University, Wales) and Adj Prof Jim McLennan. Through a human-centred design approach, the project improves emergency management decision making training through prototype training and learning products. These products were co-designed in close collaboration with end-users to identify challenges and opportunities. A skills acquisition framework, informed by a current practice and future needs analysis, will also help organisations, teams and individuals better understand and train in effective decision making.

Daniel Austin, Deputy Commissioner, Executive Director, RTO CEO, NSW SES

"Building the skills of incident control teams is key to operational capability. NSW SES, in partnership with Centre researchers, conducted a professional development workshop for incident management personnel focused on non-technical skills essential for leadership. The researcher's knowledge and expertise were vital to the workshop's success and the initiative demonstrated the benefit of long-term relationships influencing practice. NSW SES looks forward to using the outputs of the research further for the benefit of the broader community."

Informing bushfire-resilient electricity networks

In partnership with Powerlink Queensland, the Centre undertook a comprehensive model to quantify the real costs of catastrophic bushfires on Powerlink infrastructure. Using fire risk modelling methods developed by Project IGNIS during the BNHCRC, the FLARE Wildfire Research Group at the University of Melbourne measured the full impact of bushfires to and from Powerlink's electricity network. The research team of Dr Kate Parkin, Paul Bentley, Brett Cirulis, Prof Trent Penman and Dr Veronique Florec used spatial information to identify areas at high-risk areas from bushfire ignition, across the network enabling Powerlink to demonstrate its ongoing commitment and investment in bushfire risk mitigation to internal stakeholders and regulatory bodies.

The application of the Project IGNIS fire risk model to Queensland's unique profile adds to the national bushfire risk picture, as well as enhances the understanding of bushfire mitigation effectiveness across Australia. A Hazard Note outlining the project and findings was published in December 2024 to capture the knowledge derived from this applied research.

Stephen Martin, Senior Strategist Land Assets,
Research and Development, Powerlink Queensland

"Powerlink Queensland highly regards the results of this research, and it will be applied directly to multiple use cases immediately across the business. Management of risks and assets are integrally linked to risks associated with bushfires, including investment, maintenance and operational decisions across the business. Our internal Bushfire Mitigation Working Group will review and coordinate the implementation of this research across the business. This will include consideration of integration with strategic partners like Queensland Fire Department and the Queensland Fire and Biodiversity Consortium. There are enhancements and additional questions that would add further value and we will explore further with Natural Hazards Research Australia and its research partners."

Principles of best practice strategic crisis management arrangements for catastrophic disasters

Outlining ten key principles of best practice strategic crisis management arrangements for catastrophic disasters for practitioners and policymakers, this literature review and Practice Note challenge government and emergency management to consider and implement principles for managing systems, resources and governance when unforeseen disasters surpass the capacities of the regular emergency management sector. Building on previous research by the BNHCRC, the principles address planning and capability requirements for catastrophic disasters.

Commissioned by NEMA, this project by Dr Michael Eburn and Andrew Gissing identifies the best practice for governments, non-governmental organisations and businesses to best prepare for and manage their responses to catastrophic disasters that exceed current plannings, thinking and experience, as defined by the Australian Disaster Preparedness Framework. This information acknowledges the interdependence of systems and the complexity of disaster crises, promoting proactive policy planning and coordinated crisis management arrangements.

Joe Buffone PSM, Deputy Coordinator General,
Emergency Management and Response Group, NEMA

"NEMA partnered with Natural Hazards Research Australia to develop evidenced based crisis management principles to support national coordination arrangements for catastrophic disasters. The outputs of the project are already being used by NEMA in the design of national crisis management policies, plans and operating models. They are also being shared broadly at national forums such as the AFAC24 Conference, National Space Weather Exercise and Higher Risk Weather Season Summit with strong interest from stakeholders. NEMA looks forward to launching the principles alongside Natural Hazards Research Australia and raising awareness of the research to further enable its utilisation. These principles represent global best practice and are drawn from research that is either contemporary or has stood the test of time. These principles and supporting evidence are invaluable as we tackle more frequent more intense disasters and crisis, and in particular, for Australian context as we continue to build our national crisis management arrangements to deal with consecutive, concurrent and compounding natural and human induced disasters that could result in catastrophic consequences."

Connecting Indigenous people and the emergency management sector

In collaboration with the North Australian Indigenous Land and Sea Management Alliance Ltd (NAILSMA) and local Indigenous consultants, the Centre facilitated a series of discussions between Indigenous community leaders and emergency services personnel in different parts of northern Australia. This initiative builds on the significant work done by the BNHCRC, addressing the issues, opportunities, and challenges faced by remote Indigenous communities in the face of natural hazards.

The *Indigenous Emergency Management Forum* hosted by the Carpentaria Land Council Aboriginal Corporation (CLCAC) and the Gangalidda and Garawa people in Moungibi/Burketown, Queensland, in September 2023 was the culmination of extensive consultation. The forum brought together Indigenous community leaders from the Kimberley, Northern Territory and northern Queensland and senior emergency management and other agency personnel to gather, discuss and develop a way forward in a participatory and inclusive model. The resulting discussions highlighted the challenges and gaps in the longstanding partnership between government agencies (e.g., Queensland Fire Department) and First Nations organisations (e.g., CLCAC), as well as opportunities to build mutual trust. Trust is the foundation of successful partnerships and the steps to building it was formalised in the *Statement of Mutual Understanding and Intent*. This document reflects the group's agreed ways to engage with each other and their moral obligations and practical needs. The statement serves as a reminder to return to basics, emphasising that without agreement on and commitment to these fundamental principles, long-term partnership cannot succeed.

This participatory action research, by Ricky Archer, Barry Hunter, Apryl Ford, Melina Pearse (NAILSMA), Murrandoo Yanner Senior, Murrandoo Yanner Junior, Rachel Amini-Yanner, Kevin Anderson (CLCAC) and Glenn James, puts Indigenous researchers and their communities at the forefront of the research. It also helps strengthen relationships between emergency management agencies and Indigenous communities through direct, face-to-face interactions, promoting real-time problem-solving and immediate, actionable changes.

The research supports the national goal of improving partnerships with Indigenous land managers and helps guide the Centre's future research priorities, creating a collaborative space for Indigenous leaders and emergency management staff to share experiences. This initiative boosts engagement and dialogue through community-hosted workshops across different regions, leading to more effective and inclusive emergency management practices.

The CLCAC played a crucial role in disaster response efforts in the Southern Gulf region. The Southern Gulf's vast, remote geography makes it particularly vulnerable to natural disasters, with limited infrastructure and resources necessitating strong local response efforts. In March 2023, a significant flood hit the Burke Shire local government area and Burketown. CLCAC staff, including rangers and administrative personnel, partnered with Queensland Fire Department – Rural Fire Service to support disaster response and recovery.

Despite not having a formal role in the Local Disaster Management Group, CLCAC demonstrated the essential role of Indigenous organisations in disaster management. Their submission to the *Senate Select Committee on Australia's Disaster Resilience* underscores the vital contribution of non-profit organisations in disaster preparedness and recovery. Given their involvement, CLCAC advocates for formal membership in the LDMG to enhance disaster response coordination and ensure Indigenous communities have direct voice in emergency planning.

Shane Klunder, District Officer Emergency Management and Remote Aboriginal Communities, Department of Fire Department-Kimberley Regional Office

"Learning about opportunities and trying to understand the combined challenge across the remote parts of Australia. I think we all have similar issues and sharing them will help us all. People need to understand the relationship with Traditional Owners is vital and how we provide that continuity and connection with others. It's always challenging, but others would have good ideas or processes that would assist us all. Projects and funding sources don't really understand that side of the coin, which cannot be measured or reported on, as in KPIs and outcomes reached."

Joanne Greenfield, then A/Deputy Commissioner, Queensland Fire and Emergency Services

"Working together, recognising and empowering community leadership is better for everyone… we need to do more in more communities."

Barry Hunter, CEO, NAILSMA

"Another successful forum, hosted by countrymen. This has been a really important opportunity to talk with CLCAC mob and QFES about what they've created between them and how. We have delegates from south-west Western Australia here who've been blown away by what they've seen. And now they have contacts they can just get on the phone to. A very important sharing experience."

Enabling Indigenous-led cultural land management

Improving collaboration between Indigenous land and fire managers and others with similar responsibilities, including government land and fire agencies, this project's findings support greater recognition and inclusion of First Nations' rights and perspectives in government structures.

The project provides insight into ways to develop collaborative land management principles and practices that respect Indigenous communities and their rights to Country. Government agencies at all levels are supported to implement improved, effective and sustainable collaborative land and fire management approaches to build Indigenous self-determination and relationships of trust and respect. As these relationships are increasingly framed as partnerships, replacing outdated stakeholder models that pay little attention to Indigenous communities' unique rights and interests. The wider community benefits from increased awareness and understanding of the importance of Indigenous cultural land management, the necessity of collaboration between Indigenous and non-Indigenous organisations and the systemic challenges faced by Indigenous land and fire managers in asserting their rights to care for Country.

Ultimately, this project demonstrated that strengthening relationships between Indigenous and non-Indigenous communities improves natural hazards management and fosters reconciliation and social cohesion.

A guideline and how to use companion were published to ensure researchers protocols and processes are culturally respectful and appropriate, supporting agencies and research partners to create more ethical and collaborative approaches to cultural land management. The guiding principles cover starting meaningful and culturally safe conversations to benefit Country and First Nations communities. This resource is part of the Centre's ongoing commitment to its RAP, playing a crucial role in guiding researchers' engagement practices.

The Principles and Protocols and guide to using them were developed by the project team and steering group, including project team members: A/Prof Timothy Neale (Deakin University), Oliver Costello (Jagun Alliance Aboriginal Corporation), Bhiamie Eckford-Williamson (National Indigenous Disaster Resilience), Andrea Rawluk (University of Melbourne), Michael-Shawn Fletcher (University of Melbourne), Shaun Hooper (Department of Climate Change, Energy, the Environment and Water NSW) and Tasmin-Lara Dilworth (University of Wollongong); and project steering group: Matthew Shanks (Taungurung Land and Waters Council), Vikki Parsley (Bush Heritage Australia), Daniel and Gabrielle Miller (Gunaikurnai Land and Waters Aborignal Corporation), Jack Pascoe (University of Melbourne) and Teagan Goolmeer (University of Melbourne).

Principles and protocols for cultural land management governance and research has resulted in more than 600 website views and 266 downloads. Its companion how to guide *Using cultural land management principles and protocols*, supports individuals and organisations in implementing the collaborative principles as a starting point for local and in-depth conversations and has been downloaded 116 times.

Dr Kat Haynes, Principal Project Officer, Applied Bushfire Science Program, Department of Climate Change, Energy, the Environment and Water, NSW

"It has been a pleasure to engage and guide the Cultural Land Management Research and Governance *project. When the preceding project began, with the then Bushfire and Natural Hazards Cooperative Research Centre, in 2020, I was at University of Wollongong and part of the research team, I then moved to Natural Hazards Research Australia and participated as a research manager and am now at Department of Climate Change, Energy, the Environment and Water (DCCEEW) as an agency stakeholder. These musical chairs have enabled me to see the project evolve and to understand the research – the research needs, project outcomes and their impacts, from multiple perspectives.*

"The project's insights into the forms of relationships and kinds of values that underpin collaborative natural hazard management are useful to a wide range of audiences. These forms of collaboration are growing quickly, across Australia, and many agencies and staff operating in the space are seeking guidance about how best to proceed, balancing legal requirements, government policies, practical realities, and individuals' personal connections and ethical commitments. In particular, the project's principles and protocols for collaboration have great potential to impact agency practice, as is demonstrated by the fact that they are already being utilised in multiple contexts. In my work environment at Science and Insights, NSW DCCEEW, the project provides evidence and justification for greater focus on building and maintaining enduring relationships with Indigenous partners through community led cultural science".

Capability development – practitioner pathways

Research must be driven by innovative thinking and effective knowledge translation. In this reporting period, the Senior Project Officer Education and Training role began within the new Science and Innovation Team to support end-user research engagement, knowledge creation and translation, as well as capability development for research utilisation.

Alongside the established Early Career Researcher (ECR) program, the Centre created the Early and Mid-Career Academic and Practitioner (EMCAP) Network to build a strong, collegiate peer network of the next generation of natural hazards and disaster resilience leaders and began a consolidated professional development program. The pilot of the Centre's Industry Internship program was completed, placing natural hazard and/or disaster resilience research students in industry placements, with and is now conducting three more pilot internships underway ahead of the planned national rollout to Centre Participants in 2025.

Early Career Researcher Fellowships

The Centre's Early Career Researcher Development and Industry Fellowship opportunities target postgraduate students in recognition of the value in supporting ECRs to expand their networks, to create strong local and international collaborations and to compare the challenges facing natural hazards research in different geographic, societal, cultural and climatic settings.

The two fellowship categories that exist are:

- *Development Fellowships* for students who have completed two years of full-time study (or equivalent), and PhD-qualified researchers employed in research positions in research institutions or universities within Australia, for up to five years after their PhD graduation during the final year of their PhD studies; and
- *Industry Fellowships,* for PhD-qualified researchers employed in industry (where their employer is a Participant of the Centre), for up to five years after their PhD graduation.

New ECR Fellows

In this reporting period, there were 12 applications for the ECR Fellowships, from which two ECRs were chosen for fellowships and are currently being awarded.

Active ECR Fellows

Two current ECR Fellows are shown in Table 4.

Table 4: Fellows participating in the Centre's Early Career Researcher fellowship program

ECR fellow	Type	Study topic
Dr Danielle Heinrichs Henry	Development Fellow	Resilience Building through Collaborative Adaptation of Heatwave Messaging
Dr Nick McCarthy	Industry Fellow	Enhancing Resilience and Safety in Bush and Grass Firefighting: Adapting Interdisciplinary and International Frameworks for Australian Contexts

In this reporting period, ECR Industry Fellow, Dr Nick McCarthy completed Part 1 of his fellowship. Dr McCarthy was granted an extension following operational deployment with the US Forest Service to Canada as a Fire Behaviour Analyst. He will complete Part 2 of his Fellowship in March 2025. Dr Danielle Heinrichs Henry was awarded an ECR Development Fellowship. Dr Heinrichs Henry will complete her fellowship in the first quarter of 2025.

Early and Mid-Career Academic and Practitioner Network

The Centre established and hosts the EMCAP Network to support and foster excellence in the science and management of natural hazards. The Network also contributes to the long-term development of the Centre and its missions, ensuring collaboration with Participants and communities to deliver research that is useful, useable and used for a safer, more resilient and sustainable Australia.

Membership is free with applications accepted at any time through the Centre's website (95 members to date). A LinkedIn Group and email are used to communicate with the network. The Executive Committee plans, oversees and delivers professional development activities, facilitates stakeholder connections and strengthens ties between research and practice. The Centre provides funding of $10,000 per annum to support expenses associated with Executive Committee attendance at the Centre's annual forum, planning and professional development days and other strategic events. The inaugural EMCAP Executive Committee was established in June 2024, with members listed in Table 5.

Table 5: EMCAP Network inaugural Executive Committee

Committee member	Affiliation	Representation
Dr Hamish Clarke (Chair)	The University of Melbourne	Victoria
Ruby Campbell	Stantec	Victoria (National)
Dr Thomas Cooper-Johnson	The University of Newcastle	New South Wales
Suki Jaiswal	The University of New South Wales	New South Wales
Dr Adriana Keating	Monash University	Victoria
Dr Kirstin Kreyscher	Deakin University	Victoria
Dr Petter Nyman	Alluvium	Victoria (National)
Dr Deb Parkin	Inspector-General for Emergency Management, Victoria	Victoria
Dr Kamarah Pooley	Fire & Rescue NSW	New South Wales

The Network's Executive Committee conducts monthly online meetings and met twice in-person during this reporting period. A survey of members' needs was conducted from September to November 2024, with results informing a planned afternoon workshop prior to the Natural Hazards Research Forum in June 2025. This session aims to provide professional development and networking opportunities for members.

Professional development knowledge modules

Centre research projects with professional development knowledge outputs enable researchers to support broader research knowledge uptake and translation. As projects reach their final milestones, the Science and Innovation team work with Centre Participants to ensure projects' outputs are accessible and useable by end-users. This can include hosting knowledge modules within lead Participant organisations, clear materials and messaging about findings, their lifespan and when future content may be available to support ongoing utilisation.

In this reporting period, two project modules were finalised, each undergoing external experiential reviews. These are planned for release in early 2025:

Modelling fire weather interactions using the ACCESS-Fire model

Lead Participant: AFAC
Three Extreme Fire Behaviour Modules were developed to translate findings from the Black Summer research project for Fire Behaviour Analysists and Fire Meteorologists. These knowledge modules support interdisciplinary collaboration to determine key antecedent conditions with the potential to lead to the risk of extreme fire behaviour. These modules will be hosted on AFAC's established learning platform.

Utilisation of transformative scenarios in a climate-challenged world

Lead Participant: AFAC (Climate Change Group)
The project's modules are intended as professionally delivered workshops for agency leaders where their strategies and planning for four plausible future scenarios can be stress tested. The seven modules will be hosted by the Centre and provide the opportunity for the development of an integrated learning platform for all Centre research and knowledge translation activities.

Industry internships

Industry internships aim to create opportunities that combine education and industry placement. The Centre's first internship pilot took place in the NSW National Parks and Wildlife Service (NPWS) and is now complete. Shabnam Varzeshi's (RMIT University) six-month internship focused on a *Review of NPWS Research Utilisation Practices*.

Internship case study: NPWS and RMIT

Review of NPWS research utilisation practices, Shabnam Varzeshi, RMIT University

This internship addressed NSW NPWS's critical need to improve its understanding of the barriers and enablers of bushfire research integration into operational practices. Shabnam's project aimed to improve the agency's response to fire-related challenges and advance conservation efforts by optimising the use of bushfire research. Shabnam's internship explored the interplay between organisational structures, individual roles and operational strategies in integrating bushfire research within the NSW NPWS through semi-structured interviews and focus groups, chosen for their flexibility and depth in exploring complex topics.

Four key themes were identified when the qualitative data was analysed:

- Organisational structure and role impact
- Research integration and operational strategy
- Collaboration and communication in research
- Research challenges and support.

These themes highlight the complex landscape of bushfire research utilisation, offering a structured approach to understanding the operational realities and strategic needs of optimised bushfire research utilisation strategies. In addition to supporting NSW NPWS's conservation and heritage preservation goals, this exploration also underscored the need for enhanced evidence-based bushfire management capabilities.

The internship found that the application of scientific research in fire management requires continuous efforts to strengthen the connection between research and practice, improve the relevance and accessibility of research and establish effective knowledge-sharing mechanisms.

Shabnam Varzeshi, Intern Program Participant, RMIT University

"Through the Centre's internship, I gained valuable experience in qualitative data collection and analysis and stakeholder engagement within a complex organisational structure, such as that of the NSW National Parks and Wildlife Service. Navigating the challenges of integrating academic research into practical fire management strategies has provided invaluable insights into the complexities of research translation in a real-world context. As I faced challenges in handling diverse viewpoints and synthesising them into actionable recommendations, I improved my ability to balance arguments, test these for validity, and then synthesise and communicate them effectively. In this way, I learnt to adapt research methods to suit different requirements and to communicate complex information."

Andy McQuie, Senior Project Officer – Operational Improvement and Intern Supervisor, NSW NPWS

"This internship has introduced us to fresh faces with new ideas and new thinking, which helps the agency grow. It puts us in a better position to understand the challenges and impacts of the chosen topic, and in this case, the research implementation pathways."

Capability development – researcher pathways

The Centre is committed to contracting the best research teams and scope of works to ensure safer, more resilient and sustainable Australian communities. This includes growing the national disaster research workforce capacity through researcher career development and researcher communities of practice.

To deliver research that engages effectively with end-users, is of high quality and delivers useful and usable outputs, the Senior Project Officer Education and Training position was created. The position helps researchers understand the Centre's expectations for disaster research design and delivery, as well as facilitates networking with other researchers to develop and improve capabilities, capacity and intersectional ties.

The Centre continues to deliver the Postgraduate Research Scholarship Program, the Postgraduate Research Associate Student Program, and the Disaster Challenge. Alongside the establishment of the EMCAP Network (refer to Capability Development – Practitioner Pathways), the Centre's new First Nations Scholarship Program is currently assessing expressions of interest from potential host universities.

As of December 2024, the Centre has supported 68 students in their postgraduate studies. Adjusting for completions, there are 63 postgraduate students who are active in Centre programs, including 41 Postgraduate Scholars and 22 Associate Students. To date there have been five doctoral completions (three Postgraduate Scholars, two Associate Students). One Postgraduate Scholar withdrew from studies during this period (former BNHCRC student), due to personal circumstances.

Outputs from postgraduate research programs

Full citation details are provided in **Attachment 3**, with the following highlights:

- Eight Postgraduate Scholar articles were published in well-regarded industry-focused publications, including *Fire* (two articles), *International Journal of Wildland Fire* (two articles), *International Journal of Environmental Research and Public Health, Environmental Science and Policy, Environmental Policy and Governance* and *Plants.*
- Eight Associate Student articles were published in well-regarded industry-focused publications, including *International Journal of Disaster Risk Reduction (two), Research in Drama Education: The Journal of Applied Theatre and Performance (one), Democracy as Creative Practice (one), Journal of Environmental Management (one), International Journal of Wildland Wire (one), Journal of Forestry Research (one); The Historic Environment: Policy & Practice (one).*

Postgraduate Research Scholarship Program

The Postgraduate Research 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. Postgraduate Scholars are funded to attend the annual Natural Hazards Research Forum, which includes a dedicated postgraduate symposium.

The Centre currently funds 33 Postgraduate Scholars conducting research projects (four full and 29 top-up scholarships), as shown in Table 6. In the reporting period eight students submitted for assessment (Table 7) and one student was awarded their full doctorate, bringing the total number of Postgraduate Scholar completions to three (Table 8). In this reporting period, 19 students applied for a scholarship, from which five offers were made, and four students were awarded top-up scholarships.

Table 6: Ongoing students in the Postgraduate Research Scholarship Program

Student name	Type	Institution	Project title	Round
Full scholarships				
Natasa Adamovic	Full	Charles Darwin University	Death in disaster: sociocultural perspectives and challenges in disaster victim identification	11
Ahmad Hassan	Full	Victoria University	Physics-based modelling of field-scale junction fire	6
Christy Hung	Full	University of Sydney	Determining changes in Eucalyptus litter during decomposition	4
Mohamed Sharaf	Full	Victoria University	Parametric study of the transition from a surface fire to a crown fire through physics-based modelling	4
Top-up scholarships				
Evelyn Adade	Top-up	Monash University	Water experimentation towards more sustainable urban water management in rural/regional townships: a journey of processes and places	11
Syed Aktar	Top-up	University of Tasmania	The role of trust-building for effective collaboration: using evidence-based strategies to strengthen disaster response	10
Cameron Atkinson	Top-up	University of Tasmania	Creating resilient and sustainable critical infrastructure using evidence informed policy	1
Susan Atkinson	Top-up	University of Canberra	Working title: Understanding people's communication needs and behaviours and how community communication ecologies spontaneously form in a natural disaster crisis.	9
Louise Buckley	Top-up	Deakin University	Cross-cultural relationships in natural resource management: Understanding the nature and experiences of partnership and collaboration	1
Audrey Cetois	Top-up	University of Queensland	Focusing on the intersection of community resilience and energy resilience	6
Sarah Cooley	Top-up	University of Melbourne	Response, resilience and recovery of Tasmania's endangered Pencil Pine using a multi-archive palaeoenvironmental record	4
Belinda Davis	Top-up	Monash	Building social and transformative resilience through school education: a case study on bushfire learning	8
Anna Durkin	Top-up	RMIT University	Landscape architecture design and development of natural systems wastewater treatment and landscape design	5
Benedict Fleming	Top-up	Deakin University	Scientific understanding of coastal cohesive (soft) cliff failure	11
Natale Froia	Top-up	University of Melbourne	Community experiences of floodplain management in the context of post-disaster reconstruction in regional Australia.	11
Nima Janfeshanaraghi	Top-up	RMIT University	Evacuation behaviour during bushfires	12
Sarah Jayne Griffiths	Top-up	Charles Darwin University	Emergency and disaster practice across the spectrum of mobility	8

Student name	Type	Institution	Project title	Round
Tinula Kariyawasam	Top-up	RMIT University	Statistical analysis of local climate records	13
Thanirosan Krishnakumar	Top-up	Queensland University of Technology	Bushfire risk assessment of buildings using advanced technologies	7
Carolyn Lambert	Top-up	Queensland University of Technology	A justice-based approach to climate-related planned relocation	13
Brigit Maguire	Top-up	University of Sydney	Strengthening the experiences of people who are deaf or hard of hearing during extreme weather events and other disasters	6
Michael Meadows	Top-up	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	6
Oscar Metcalfe	Top-up	Charles Darwin University	Developing ecosystem services based economic opportunities for Indigenous communities in northern Australia	10
Gabrielle Miller	Top-up	University of Melbourne	Exploring settler perspectives and engagements with cultural land management initiatives and its implications for working together on bushfire management.	9
Louise Mitchell	Top-up	University of Sydney	Multi-agency collaboration in disaster recovery after bushfire	1
Phoebe Quinn	Top-up	University of Melbourne	Exploring the role of civic technologies in community decision making in the face of climate change and disasters	1
Catherine Ryland	Top-up	University of Wollongong	Planning for bush fire protection: maintenance of protection measures	BNHCRC
Kate Simmonds	Top-up	University of Melbourne	Impact of fires on temperate rainforests in northern New South Wales	BNHCRC
Elena Skoko	Top-up	Queensland University of Technology	Maternity care in disasters. New frameworks for immediate action.	10
Jady Smith	Top-up	University of the Sunshine Coast	Mitigating fire through water management in the wildland urban interface	3
Alex Tanfield	Top-up	University of Canberra	The effect of disrupted social connection on wellbeing during prolonged disasters	6
Simeon Telfer	Top-up	RMIT University	Remote sensing of fuel to improve fire behaviour predictions in mallee and heathy shrublands	BNHCRC
Nur Fajar Trihantoro	Top-up	RMIT	A novel satellite-based fire detection algorithm using data fusion	13

As of December 2024, eight Postgraduate Scholars submitted their theses for assessment, as shown in Table 7.

Table 7: Centre-funded Postgraduate Scholars who have submitted for assessment

Name	Type	Institution	Project title	Round
Full scholarships				
Fadia Isaac	Full	Federation University	A multi-component CBT for the treatment of insomnia and nightmares in survivors of bushfires presenting with PTSD	1
Jiyu Liu	Full	University of NSW	Assessing post-fire forested ecosystem by using spaceborne lidar over south-eastern Australian	3
Kiam Padamsey	Full	Edith Cowan University	Smoke exposure profiles of bushfire fighters in the southwest ecoregion of Western Australia	3
Top-up scholarships				
Sukanya Jaiswal	Top-up	University of NSW	Impact of bushfire smoke on eye surface	6
Matthew Kyng	Top-up	Victoria University	Parameterisation for a simplified short-range firebrand model from physics-based modelling	BNHCRC
Hafiz Suliman Munawar	Top-up	University of NSW	Machine learning for humanitarian disaster relief efforts through employing rule-based verification on drone's aerial imagery	2
Nina Rogers	Top-up	University of Tasmania	Exploring leadership for municipal climate change adaptation planning and implementation	6
Rebecca Ryan	Top-up	University of Wollongong	Developing novel geochemical and spectroscopic techniques to extend existing bushfire records	4

As of December 2024, three Centre-funded Postgraduate Scholars were conferred a doctorate, as shown in Table 8.

Table 8: Centre-funded Postgraduate Scholars who have completed their studies

Name	Type	Institution	Project title
Dr Saimum Kabir	Top-up	University of Melbourne	Flood risk reduction in a dynamic urban context exploring the urban-water-resilience nexus
Dr Wavne Rikkers	Top-up	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
Dr Heather Simpson	Top-up	University of Wollongong	Productivity and effectiveness of suppression resources and tactics on large fires

In this report, several postgraduate study examples are included to show the breadth and innovative nature of studies supported by the Centre.

Postgraduate Scholar case study: Cross-cultural relationships in natural resource management

Louise Buckley, Deakin University
Supervisors: A/Prof Timothy Neale, Dr Will Smith, Prof Euan Ritchie

This interdisciplinary project provides new insights into the way inter-cultural partnerships and collaborations are experienced and managed, particularly among First Nations communities, state agencies, and conservation organisations in the context of land and natural resource management. The ultimate goal is to support communities and organisations within the environmental sector, with the research write-up currently in progress.

The project examines relationships among First Nations groups, government agencies and non-governmental organisations engaged in natural resource management and conservation to generate data that deepens understanding of collaboration between First Nations communities, state agencies and conservation organisations, and inform policy, improve operational practices and foster equitable partnerships in the environmental sector.

"As a PhD candidate at Deakin University, my research explores how partnerships between First Nations communities and state agencies function in the field of land management. I am particularly interested in understanding how these relationships are formed, how they operate, and what makes them successful. My research delves into how conservation not-for-profit organisations build partnerships with First Nations communities, engage in co-management and capacity-building programs, and contribute to land reparation initiatives.

"By bringing together these insights, my goal is to shape policies and practices that support ethical and equitable relationships. I hope this work will contribute to creating stronger, more inclusive partnerships in the environmental sector, centring First Nations communities in decision-making and governance."

Louise Buckley, Centre PhD student

Postgraduate Scholar case study: Creating resilient and sustainable critical infrastructure using evidence informed policy

Cameron Atkinson, University of Tasmania
Supervisors: A/Prof Maryam Khalid, Dr Brian Ballsun-Stanton

This research contributes new knowledge to the Centre's research priority themes of evidence-informed policy and resilient built environments. It seeks to investigate governance settings and automate the systematic literature reviews (SLR), which will enable state policymakers to confidently integrate the knowledge derived from the process into policy formulation. This SLR provides robust evidence base for increasing resilience and sustainability in critical infrastructures, particularly in the energy sector. This research initiative has resulted in four related publications with a total of 74 citations to date.

> *"This study has published research protocols and papers on a series of hard-coded tools designed to automate various stages of the literature review process. Future plans include developing a user-friendly interface tool that will be accessible to a wide range of researchers, including social scientists and academics. The researcher expressed deep gratitude for the networking opportunities provided by the Centre, which boosted confidence in showcasing the research tool to a broader audience. The exposure given by the Centre attracted industry interest and potential collaboration from state disaster recovery agencies."*

Cameron Atkinson, Centre PhD student

Postgraduate Scholar case study: Application of emotional intelligence in emergency management for improved trust building and decision making

Syed Adeel Akhtar, University of Tasmania
Supervisors: A/Prof Steven Cunin, A/Prof Benjamin Brooks

This project investigates the way disaster assistance response teams in high stakes situations can navigate and regulate their emotional landscape while making critical decisions. A systematic review and observational studies were conducted with the urban search and rescue teams of Fire and Rescue New South Wales, the Queensland Fire Department, and Fire and Emergency New Zealand, focusing on the team's ability to influence and collaborate when making decisions for tactical disaster response. There is a significant interest from the international humanitarian community, particularly Singapore, US, UK, the Netherlands, Germany and Malaysia. The learnings from the research have a potential to be embedded in training development of emergency management practitioners. Data collection and analysis for this research is currently underway.

> *"While this research aligns with complementary projects, including Centre initiatives such as the Disaster Challenge and the core project on* Enhanced decision-making in emergency management*, it distinguishes itself by adopting a more human-centered approach to disaster management. The study highlights the transformational power of emotional intelligence at high stakes environment, which poses significant impacts being captured into practice by USAR of different countries, for better operations and smarter decisions."*

Syed Adeel Akhtar, Centre PhD student

Postgraduate Scholar case study: Exploring leadership for municipal climate change adaptation planning and implementation

Nina Rogers, University of Tasmania
Supervisors: Prof Jason Byrne, Prof Vanessa Adams

This study explored climate risk governance at the local government level, focusing on how elected and executive leaders understand, prioritise, and act on climate risk. The research sought to address the implementation gap in climate change adaptation planning and stresses the need for greater investment and activity on mainstreaming climate risk management across local government operations.

Findings highlight that while climate adaptation is often treated as a discretionary and peripheral issue, it is crucial to actively support municipal leaders to institutionalise new norms, goals, and accountabilities for climate risk governance and on-the-ground adaptation that can help close the implementation gap. Research findings are applicable at local government level in Australia and internationally and organisations supporting councils manage climate risk.

This research resulted in four publications in 2023 and 2024.

"Understanding and actively responding to future climate risk is central to good municipal governance. This study is about strengthening the authorising environment and capacity of municipal councils to undertake climate risk management, so that it becomes a mainstreamed consideration across local government planning, investment, and operations. With support from the Centre and its connections across the natural hazards and climate research communities, I have been able to share and promote the findings of my PhD research and enhance my reach to end-users. Additionally, the Centre network has enabled me to test ideas with various stakeholders that may prompt further research around the issues I have examined and solutions proposed."

Nina Rogers, Centre PhD student

Postgraduate Scholar case study: Smoke exposure profiles of bushfire fighters in the south-western ecoregion of Western Australia

Kiam Padamsey, Edith Cowan University
Supervisors: A/Prof Jacques Oosthuizen, A/Prof Sue Reed

Bushfires in Western Australia pose significant health risks to both volunteer and career forestry firefighters, a historically understudied group. Following the International Agency for Research on Cancer's classification of wildland firefighting as a carcinogenic occupation and findings from the 2019–2020 Bushfire Royal Commission, this research investigated the occupational hygiene risks comprising:

- Trial occupational hygiene methods for exposure monitoring during bushfires
- Exploration of firefighters' knowledge of workplace exposures and personal protective equipment (PPE) use through interviews and thematic analysis
- Assessment of personal exposure to airborne particulates, inorganic gases and polycylic aromatic hydrocarbon using portable monitors and urine analysis
- Analysis of fire front emissions using Fourier Transform Infrared Spectroscopy (FTIR) to determine the effects of vegetation, fire phases, and soil types on chemical output
- Investigation of post-exposure off-gassing of firefighting tunics using FTIR.

Key findings highlighted volunteer firefighters' lack of awareness of smoke-related risks and had insufficient access to adequate PPE, decontamination facilities and health monitoring support. Harmful chemicals were detected near fires, even in seemingly clean air, while firefighting tunics continued to off-gas toxic chemicals post-exposure, posing secondary risk.

As a result, more than 700 forestry firefighters in WA were issued P3 masks and operational changes recommended, including workplace showering and laundering facilities, improved decontamination protocols, and health monitoring programs for more than 200,000 wildland firefighters.

"(This research) shows how academia and end-users can integrate from the outset of a project to deliver not only meaningful research but impactful, immediate change. This can show how the emergency management sector and academia should collaborate in the future. It highlights to the wider community that threat to our firefighting force extends beyond the fire, and that we need to come together to ensure protection of this workforce as fires are increasing in intensity and frequency. (Lastly,) the research adds to a body of evidence to inform policy (AFAC) and hopefully through educational packages, informs the general public and firefighting forcing of the risks of bushfire."

Kiam Padamsey, Centre PhD student

Postgraduate Scholar case study: Mitigating fire through water management in the wildland urban interface

Jady Smith, University of Sunshine Coast
Supervisors: Prof Mark Brown, Prof Sam Van Holsbeeck

Certain plants and ecosystems are naturally less prone to fire, helping break the fire's fuel and reduce fire spread. Applying proactive principles of fire ecology in a nature-based, nature-positive way can reduce the risk of fire with the added benefits of improving biodiversity and rewilding. Green firebreaks, strips of low-flammability plants grown in strategic locations, serve as a proactive risk reduction strategy that complements fire management by changing the fuel and reducing the spread and intensity of fires.

This PhD research aimed to prove that green firebreaks in the wildland-urban interface could be irrigated with urban water reuse to reduce wildfire risk and complement wildfire management. Fire spread software was used to model green firebreaks with urban water reuse, running scenarios with more consistent moisture levels and comparing potential ignition counts and fire spread between control and design scenarios.

"As climate change increases the potential for wildfires of increased scale and impact; more integrated long-term and proactive approaches to disaster risk reduction are needed to complement existing wildfire management. green firebreaks are not considered a stand-alone wildfire management approach, they are designed to complement existing strategies by slowing fire spread by altering the continuity of fuels, most importantly they provide longer-term additional benefits through biodiversity, carbon storage, local water cycle, and practical community engagement.

"The research can create more dialogue around options for proactive wildfire management and has already been included in a disaster risk reduction briefing paper. This research has been conducted with the engagement of the Noosa Council. Landcare Noosa has already shown interest in a trial on the irrigated green firebreak concept."

Jady Smith, Centre PhD student

Postgraduate Research Associate Student Program

The Centre's Postgraduate Research Associate Student Program is designed for students conducting research in relevant areas of significant interest to Participants, who are not already directly involved with the Centre. Associate Students receive in-kind support from the Centre for professional development opportunities at conferences and events, as well as the ability to apply for travel funding to support their study program. This includes free attendance at Centre events including the Natural Hazards Research Forum and dedicated student engagement and networking activities.

There are currently 22 Associate Students, as shown in Table 9. In the reporting period, two students applied and were awarded Associate Student Program membership.

Table 9: Current Centre Associate Students as of31 December 2024

Name	Institution	Project title
Active		
Sumayyah Ahmad	Curtin University	An investigation of spontaneous volunteers' social media engagement in emergency disaster management
Annal Dhungana	Massey University	Effective communication of uncertainty around modeling in hazard and risk models
Victoria Heinrich	University of Tasmania	Use of weather and climate information: risk perception and decision-making in Antarctica, the sub-Antarctic and Australia
Sara Fazeli	University of New South Wales	Measuring and improving individual preparedness in response to flood and bushfire emergencies
Sarah Hoyle	University of British Columbia	Restor(y)ing fire-adapted territories: wildfire recovery, Indigenous leadership and restoration in Secwepemcul'ecw
Tony Jarrett	Central Queensland University	Agency experts supporting bushfire disaster resilience education for primary school students: a case study in NSW
Michael Johnson	Monash University	Exploring the Australian practices of disaster resilience, with a focus on community-led approaches
Sheriden Keegan	Griffith University	Enabling governance for sustainable and resilient regional food system development in Australia
Anna Kennedy-Borissow	University of Melbourne	Creative, recovery, and resilience: How the arts strengthen resilience in communities affected by disasters
Haydn McComas	Griffith University	Working together or working apart? – Interoperability and organisational culture across RESLEM agencies and organisations during major disaster responses.
Danielle O'Hara	University of Queensland	Conflict in disaster recovery: Why does it happen? What can we do about it?
Zakria Qadir	Western Sydney University	UAV trajectory optimisation for pre- and post-bushfire disaster assessment using artificial intelligence

Name	Institution	Project title
Ahmed Qasim	Griffith University	Using digital technology to share and trade local food, and improve community food resilience
Douglas Radford	University of Adelaide	An integrated modelling approach for the planning of collaborative and adaptive wildfire risk-reduction activities
Atul Rai	University of Wollongong	Quantifying runoff in arid zone basins of central Australia
Harikesh Singh	University of the Sunshine Coast	An empirical & dynamic tool for prediction forest fire spread using remote sensing and machine learning technique
Bradley Slater	Edith Cowen University	Analysis of the Australian emergency management arrangements (AEMA)
Ryan Smith	University of the Sunshine Coast	Developing bioclimatic urban planning and design policy for the public realm
Jane Toner	Griffith University	Enhancing community ecoliteracy for regenerative design: Inspired by nature
Yunjin Wang	Griffith University	Urban green space is a critical component for children living in urban areas to enrich their mental and physical development
Eleanor Williams	University of Queensland	The effectiveness of rapid evidence in fast-paced policy contexts
Anna William	Australian National University	Exploring community resilience to cascading disasters in Australia

As of December 2024, two Associate Students have been awarded doctorates as shown in Table 10, both in this reporting period.

Table 10: Completed Centre Associate Students at December 2024

Name	Institution	Project title
Dr Heba Ali	Griffith University	How can hospitals improve their resilience and ensure business continuity during disasters
Dr Russell Dippy	Charles Sturt University	The human capacity demands of an Emergency Manager in Australia

Disaster Challenge

The Disaster Challenge is an important research-informed challenge in the Centre's calendar of events. The Disaster Challenge aims to catalyse early career researchers, postgraduate students and undergraduate students across Australia to take on a real-world natural hazards-related wicked challenge. A wicked challenge is one that is urgent but difficult to solve because of incomplete, contradictory or changing requirements that are often difficult to recognise or evaluate.

In this reporting period, the Centre hosted the 2024 Disaster Challenge, the third annual challenge which attracted 18 entries from all around Australia, coordinated by 14 Steering Group members, mentored by six Centre staff, seven industry experts, and judged by Linley Brown (DFES), Dr Margaret Moreton (AIDR) and Mal Cronstedt (Chairperson, Interchange WA). The wicked problem set by the Steering Group for the 2024 Disaster Challenge was:

> *In a world where trust is both vital and fragile, how can we build and sustain trust across our whole society to drive the collective and coordinated actions that are fundamental to reducing the risks and impacts of disasters, and strengthening the safety, sustainability and resilience of all Australians?*

Why is building and sustaining trust such a wicked problem? At the heart of society's approach to disaster resilience are the notions of shared responsibility and community-led action, backed by scientific evidence and lived experience. These all require informed, trusted and effective relationships between people and organisations involved in preventing, preparing, responding and recovering from disasters. There are many ways to build and sustain mutual trust, however trust can be eroded by the decisions and actions of people, communities and organisations. In its place people and organisations can be disconnected, communication can break down and cynicism, doubt, isolation and non-participation can grow. When trust is challenged the foundations of disaster resilience are threatened.

The Steering Group selected three finalists from the high calibre entries to pitch their solution to the wicked problem. The final was held 3–4 October 2024 at the Department of Fire and Emergency Service Bushfire Centre of Excellence in Mandurah, WA. Finalists pitched their solutions to build trust between homeowners and insurance companies, extreme heat relief to at-risk populations during heatwaves and an AI chatbot providing localised information during disasters. All finalist pitches can be viewed at the Centre's YouTube channel, summarised in Table 11.

Table 11: Disaster Challenge 2024 finalists

Pitch title	Team member names and affiliations
Building trust and resilience: Improving community disaster response through personalised messaging	Craig Ridep-Morris (postgraduate student, James Cook University), Alison Sheaves (postgraduate student, James Cook University, Madison Green (postgraduate student, James Cook University)
Home Insurance Risk Reduction Options (HIRRO)	Natalie Oliver (early career researcher, Queensland Fire Department), Alexandra Gunn (postgraduate student, La Trobe University and Queensland Fire Department), Lillian Norris (postgraduate student, University of Queensland)
Project OutHeat	Hannah Waldron (undergraduate student, University of Western Australia), Curie Thota (undergraduate student, University of Western Australia), Anika Hill (undergraduate student, Murdoch University)

Developed by psychology postgraduate students at James Cook University, the winning pitch was titled *Building trust and resilience: Improving community disaster response through personalised messages*. Team members Alison Sheaves, Craig Ridep-Morris and Madison Green, used human behavioural theory to develop the idea of an accessible personalised AI chatbot providing current, localised emergency information that is scalable to various locations and types of disasters.

The AI chatbot would deliver postcode-specific disaster information to communities and would be integrated into existing local government disaster dashboards. The team since carried out significant media around their idea, including radio and television in Queensland and is working on developing their concept further, while balancing the completion of their respective PhDs.

An internal review of the Disaster Challenge was recently completed to ensure the event continues to generate the biggest impact while meeting the Centre's mission. The review included 16 interview sessions with coordinators, mentors and participants from previous Challenges and the findings will inform a streamlined 2025 Disaster Challenge and a reimagined Disaster Challenge from 2026.

Above: Disaster Challenge 2024 finalists, judges, keynote speaker and Centre staff at the 2024 Disaster Challenge Final.

Craig Ridep-Morris, Team Building trust and resilience

"The people we've met during the Disaster Challenge means we're optimistic of collaborating with people from a wide range of organisations and industries to develop a prototype AI chatbot providing disaster information to really help people understand their risks and prepare and respond to disasters."

Natalie Oliver, Team HIRRO

"The Disaster Challenge gave us the opportunity to work with mentors from NHRA and industry to build our idea and challenge our thinking."

Curie Thota, Project OutHeat

"Being around so many people from different sector has given me so many new perspectives, ideas and even job opportunities and avenues that I can't wait to explore in the future."

First Nations Scholarship Program

The inaugural First Nations Scholarship Program welcomed expressions of interest for six weeks, closing in mid-December 2024. Following assessment in January, recruitment of up to a total of two First Nations scholars is planned in 2025. The successful university/ies will support at least one First Nations Research Scholar for the duration of their research.

The First Nations Scholarship Program was co-designed with First Nations leaders and academics using a research scholar-centred approach, with the implementation with host university/ies to follow the same approach. The scholarship will provide students with a monetary stipend and research support, administered by their host university, as well as the opportunity to apply for community engagement support, industry placement and ECR Development Fellowships administered by the Centre.

The research scholar-centred design approach adopted for this program:

- provides incentives for the research scholars to attain a higher degree research qualification
- facilitates opportunities for the research scholars to engage with industry placements
- enables the research scholars to fulfil cultural needs for themselves and their communities.

Scholarship programs will establish a long-term pathway for First Nations scholars to develop skills and undertake research that aligns with the Centre's key research focus areas and the key capability areas, as listed in the *Biennial Research Plan 2024-26*. The program will also actively identify and encourage potential research scholars in different life stages and backgrounds to apply for support, as well as consider their specific needs, community relationships and objectives.

Research informed strategic advice

Strategic participation of Centre staff in a range of activities, events and initiatives around Australia during the reporting period connected end-users and ensure the visibility of Centre research. The Centre's projects, findings and outcomes were also highlighted through submissions to governmental reviews and policy advice; through keynote, plenary and invited presentations at sector conferences, workshops and meetings; and through support of events and communities of practice.

Participation of Centre staff in forums that provide a strategic opportunity to showcase various research projects, researchers and end-users, as well as highlight research and utilisation themes that span projects, location and natural hazard type. Staff participation also supports relationship and partnership development with Participant and other organisations.

The following sections highlight the breadth of engagement, events and opportunities undertaken by Centre staff to synthesise and share insights from the research programs.

Strategic review and policy advice

Table 12: Strategic review and policy advice provided by the Centre, 1 July to 31 December 2024

Organisation or group	Advice type	Centre contribution	Status
AFAC Research Committee	Executive	Member	Ongoing
AFAC Collaboration Groups (miscellaneous)	Executive	Advisory member	Ongoing
Australian and New Zealand Emergency Management Committee (ANZEMC)	Executive	Observer	Ongoing
Australian Climate Service	Executive	Advisory on climate risk assessment	Ongoing
Australian Fire Danger Ratings System Program Board	Executive	Member	Ongoing
NEMA'S National Disaster Risk Profile Expert Reference Group to develop national natural hazards risk profile	Executive	Member	Ongoing
NSW Nature-based Measures Working Group	Executive	Advisory member	Ongoing
NSW Rural Fire Service and Nature Conservation Council Hotspots Committee	Executive	Advisory member	Ongoing
Queensland Fire Department	Executive	Advisory on flood safety	
Working groups for the NSW State Disaster Mitigation Plan	Executive	Advisory member	Ongoing

Thought leadership

As a natural hazards and disaster resilience thought leader, part of the Centre's role is to start – and continue – progress challenging and forward-thinking conversations directed by research and evidence.

In the reporting period, the Centre's thought leadership agenda continued to focus on meeting future challenges of a climate changed Australia. The following activities continue to create opportunities for the emergency management, disaster resilience and other sectors to reflect on what is and explore what could be to address short and longer-term opportunities for disaster risk reduction.

Continuing the Be Ahead of Ready disaster readiness conversation

Following the launch of the Centre's *Be Ahead of Ready* initiative in May 2024, numerous requests from Participants were received to further explore concepts embedded in the report and facilitate discussions about how the thinking and principles can be applied to a particular setting. In the reporting period to date, the following *Be Ahead of Ready* and research priorities workshops were co-hosted:

Queensland Fire Department Forum

In July, the Centre was invited by the QFD to run a research opportunities forum, supporting the recently restructured department to imagine the possibilities of the new disaster management structure. Following presentations by the Centre's CEO, Partnerships Director and Science and Innovation Director, a brainstorming session using SLIDO identified potential evidence gaps and initiatives that could fill them, presenting research project concept opportunities with the Centre. This approach enabled participant both online and in-person.

Future Workforce, Technology and AI – Symposium Workshop

In November, the Centre was invited by the Northern Territory Government to deliver a thought leadership session around workforce capability development. Partnering with Dr Sue Keay (Director, ARC Centre of Excellence in Robotic Vision) to continue the *Be Ahead of Ready* conversation that began at the Centre's Natural Hazards Research Forum in June. During the two-hour workshop, participants considered future possibilities for the NT's emergency service workforce with a focus on technology and AI and process innovation playing a strong supporting role. Approximately 60 participants actively engaged in the structured thinking process, developing several tangible opportunities to adopt in their workplace.

NSW SES Workshop

In December, the NSW Government invited the Centre to facilitate a research prioritisation workshop with the NSW SES. The workshop was attended by 35 SES staff from all departments and geographical regions, as well as representatives from the Bureau. The workshop refined key issues previously identified by participants, prioritising more than 150 challenges to enable a program logic to be developed, ensuring research submissions had the best chance of success and the research outcomes useful, useable and used.

Nature positive solutions for disaster risk reduction

In the reporting period, the Centre launched the *Nature positive disaster risk reduction solutions* discussion paper in partnership with insurer Suncorp. The paper considers how capitalising on the natural landscape can help Australian communities to be safer, more resilient and sustainable in the face of more frequent and severe natural hazards.

Australia hosting the *2024 Global Nature Positive Summit* in October was timely in preparing the ground for the discussion paper, roundtable and publication launch. *Nature positive disaster risk reduction solutions* draws on research and case studies showcasing the power of working with nature to reduce disaster risk, as well as improve ecosystems and create additional income streams for local communities. An estimated AUD $700 billion per year globally is needed to reverse biodiversity damage. This magnitude of investment provides the opportunity to build in the secondary benefits of nature-based disaster risk reduction activities, however many emergent nature positive solutions and policies as yet do not recognise the benefit of nature-based disaster risk reduction.

Developed in consultation with local and international experts, the discussion paper highlights Australian-relevant international case studies that reduce the impact of flood, sea level rise, bushfire, extreme heat and other natural hazards. The paper also showcases Australian research and case studies that work with the natural environment, including First Nations cultural burning and fire management, floodplain restoration to manage flooding, rain gardens in yards and streets to reduce urban flooding, vegetation on urban roofs to absorb heat, coastal rehabilitation of mangroves, dunes and marshes and green fire breaks to manage bushfire risk.

More than 50 senior experts from government, research and industry attended a roundtable in Canberra on 10 September, including an opening address by Senator the Hon Jenny McAllister, Federal Minister for Emergency Management, and attended by members of parliament and senior policy advisors. Keynote speaker Amanda Sturgeon (CEO, Biomimicry Institute) spoke to the paper's actionable ideas and highlighted the importance of partnerships in delivering the required urgent and at-scale action.

Submissions and reviews

2023–2024 Severe Weather Season Review – Queensland Inspector General of Emergency Management

Following the submission of *Sector partner engagement to enhance severe weather impact predictions*' final report for the Severe Weather Season Review, Centre staff and project lead researcher, Liza Gelt were invited to present the findings to Queensland Inspector General of Emergency Management (IGEM) staff in July 2024. The well-attended presentation was well received, and the publication of the review's final report will indicate how the findings have been integrated for implementation.

Event presentations and facilitation

- Australia and New Zealand Disaster and Emergency Management Conference
- Emergency Management Conference 2024 – Inspector-General for Emergency Management Victoria
- AFAC24 & ADRC24 Conference
- Queensland IGEM Disaster Management Research Forum 2024
- Queensland IGEM Disaster Management Officer Forum 2024
- Tasmanian Bushfire Research Group Meeting
- Victorian Disaster Research Alliance Launch Workshop
- Australasian Conference on Traumatic Stress 2024
- Northern Territory Emergency Management Symposium 2024
- WA Interagency Bushfire Operations Committee Research Subcommittee Meeting
- NSW SES Research Agenda Workshop

Events, committees and communities of practice

Research groups, panels and event committee participation

- Participant, WA Interagency Operations Committee Research Group
- Member, QLD Disaster Management Research Advisory Panel
- Member, VIC Emergency Services Foundation Learning Network
- Steering Committee, NSW Bushfire and Natural Hazards Centre
- Cooperative Research Australia CEO's Forum
- AFAC Collaboration Groups, QLD Disaster Research Alliance Stakeholder Network
- Program Committee, 2024 & 2025 Australian Disaster Resilience Conference
- Steering Committee, QLD IGEM Disaster Management Research Forum
- Program Committee, AFAC 2024 & 2025
- Program Committee, Disaster and Emergency Management Conference 2025
- Program Committee, Emergency Media and Public Affairs conference 2025

Event participation

- Resilient Futures Investment Roundtable
- AFAC Council Meetings
- Australian Local Government Association National General Assembly
- Western Australia Bushfire Conference
- Land Use Planning Roundtable hosted by the Insurance Council of Australia
- Policy Roundtable on Indigenous disaster resilience
- National Preparedness Summit 2024 – Higher Risk Weather Season
- National Indigenous Disaster Resilience Gathering Global Nature Positive Summit
- Australian Climate Science Workshop
- Artificial Intelligence and Nature Thought Leadership Forum
- National Bushfire Intelligence Capability planning workshop
- NSW Heatwave Subplan Forum
- Housing, Homelessness and Disaster Symposium
- Northern Australia Fire Managers Forum
- Joint Telco and Power Forums
- Western Australian Forest Management Plan Fire Research Collaboration Workshop
- National Recovery Leaders Forum 2024

Strategic communication

Media

The Centre's expertise continues to be sought from local, national and international media outlets. Centre CEO Andrew Gissing and Science and Innovation Director, Prof Cheryl Desha, act as main spokespeople and provide trusted, knowledgeable information and perspectives on local and international natural hazards, disasters and research. Centre researchers act as subject matter experts, contributing valuable expertise and information underscoring the Centre's knowledge leadership and agency.

Post-hurricanes John, Helene and Milton in the United States, the CEO provided commentary on ABC Radio, including *ABC Adelaide*, *ABC News Radio* and *ABC Perth* and quotes from the Australian Science Media Centre were used in coverage of Hurricane Milton. Through the Australian Science Media Centre as a trusted intermediary between science and the media, the Centre continued to strengthen its media positioning as an authority on natural hazards research. This collaboration is instrumental in promoting the Centre's research and advancing public understanding of natural hazards and disaster risk reduction.

The Centre's annual Disaster Challenge in October 2024 received coverage across digital, radio and television outlets. The winning team appeared on *Channel 7 News Townsville* and was widely interviewed on ABC Radio throughout Queensland and NSW, discussing their solution to this year's wicked problem.

In November, *The Canberra Times* published an opinion piece by the CEO detailing the importance of a long-term disaster preparation and how innovative technologies and nature positive solutions can be leveraged to help Australian communities be safer, more resilient and sustainable.

In December, the publication of the *Nature positive disaster risk reduction solutions* discussion paper received significant digital and radio media interest. The Science and Innovation Director spoke with ABC Radio stations including *ABC Southeast NSW, ABC Mid North Coast, ABC New England, ABC Riverina, ABC Western Plains, ABC Upper Hunter, ABC Central West NSW, ABC Coffs Coast, ABC Newcastle, ABC Capricornia, ABC Tropical North, ABC Western Queensland, ABC North-West Queensland* and *ABC Northern Queensland*.

The Australian interviewed the CEO to mark the beginning of the disaster season. Articles published by the *Sydney Morning Herald* and *ABC News* in December commemorating the 2004 Indian Ocean tsunami also featured the CEO.

In total, the Centre and its researchers appeared in the media 81 times during the reporting period.

Industry-focused publications

Engagement through a range of communications platforms ensures the Centre's research reaches key stakeholders and the public. Key publications include reports, Hazardous Publications, briefing papers, videos, webinars, case studies and development tools for operational personnel in partner organisations and agencies.

The Centre's monthly digital newsletter was read 6,221 times in the reporting period (average 1,036 times per edition).

Hazardous Publications expanded its suite beyond just Hazard Notes, short research briefing papers, to include Practice Notes and Policy Notes. These additions are designed to meet the diverse needs of the Centre's research portfolio and audience.

Practice Notes empower the translation and application of research findings into practice. During the reporting period, the Centre published one Practice Note in collaboration with NEMA, *Best practice strategic crisis management arrangements for catastrophic disasters*, with more in development for 2025. This Practice Note was downloaded 161 times since publication in late November. During the reporting period, the Centre also published two Hazard Notes that were downloaded 230 times. Policy Notes, organisational and governmental briefing papers summarising the policy implications of Centre research findings are in development for publication in 2025.

Centre staff continue to be members of the Editorial Advisory Board and Committee of the *Australian Journal of Emergency Management*, published by AIDR. They regularly contribute direction and content based on Centre research.

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

- Fire Australia magazine
- Australian Emergency Services Magazine
- Asia Pacific Fire magazine
- Brigade magazine (CFA)
- Bush Fire Bulletin (NSW RFS)
- Phoenix magazine (Victoria SES)
- AFAC newsletter
- AIDR newsletter
- Collaborative Research Australia newsletter
- Wildfire magazine
- IGEM Research Connect.

Website

The Centre's website, www.naturalhazards.com.au is the Centre's most prominent communication and engagement tool, offering a central platform for showcasing its vast portfolio of research, publications, news and events.

Table 13: Website traffic, 1 July – 31 December 2024

	Page views 1 July – 31 December 2024	**Website users** 1 July – 31 December 2024
Centre website	125,717	69,246

Social media

Strategic social media engagement is a key tool for connecting with the Centre's diverse audiences, including industry professionals, researchers and the broader public. Social media platforms are important in sharing Centre research, news and events while raising awareness about natural hazards and disaster resilience with the public.

In the reporting period, the Centre's social media audience grew to 9,073 followers across Facebook, Twitter, LinkedIn and YouTube, with 233,460 impressions and 14,441 engagements recorded.

Videos

Online videos are effective in making complex scientific concepts accessible and promoting the Centre's research and its impact for Participants, stakeholders and communities. Hazardous Webinars, the Centre's monthly online webinar series, continue to resonate with the Centre's audience, with more than 100 attendees joining each live session and more than 200 views per video when published to the Centre's YouTube channel.

The Centre's strategy of producing tailored video content for specific audiences includes shorter, timely videos promoting research, staff, researchers and events packaged in an accessible, visually appealing format. Longer presentations and panel discussions from the Hazardous Webinar series, Disaster Challenge and Natural Hazards Research Forum provide an in-depth insight into disaster preparedness, resilience planning and technology in emergency management and natural hazards research. The Centre produced 34 videos which totalled 5,447 views and more than 514 viewing hours on the Centre's YouTube channel.

Events

The Centre's annual calendar of engagement activities fosters greater collaboration between researchers, government and the emergency management sector to support the needs of communities across Australia. This includes events hosted by the Centre, as well as Centre support, participation and contribution to external events hosted by the emergency management and disaster risk reduction sector.

The Centre was again Research Industry Partner for the AFAC24 annual conference held 3–6 September at the International Convention Centre Sydney, as well as supporting the:

- Australian New Zealand Disaster & Emergency Management Conference, Gold Coast
- Victorian Emergency Management Conference 2024, Melbourne
- National Indigenous Disaster Resilience Gathering 2024, Lismore
- Northern Territory Emergency Management Symposium, Darwin.

Table 14 details Centre's-hosted and support events, including knowledge-sharing forums such as the free monthly Hazardous Webinar series; industry training courses such as project related research and utilisation sessions for industry personnel; workshops including one-off gatherings on sector and project related issues; and individual research projects meetings between researchers and end-users, online and in person.

The Centre's Board hosted stakeholder forums in Brisbane and Hobart during the reporting period. These events provided an opportunity for representatives from the Centre's broader knowledge network including federal and state and territory government departments, emergency service agencies, research institutions, the private sector and not-for-profits to hear about key Centre achievements and engage with impactful research around Australia.

Table 14: Centre-hosted and supported conferences, knowledge-sharing forums, training opportunities and workshops, 1 July 2024 – 31 December 2024

Event types	Centre hosted and supported events
Conferences	6
Knowledge-sharing forums	22
Industry training opportunity	3
Workshops	5

Left: CEO Andrew Gissing delivered a keynote about Centre impact at the AFAC24 conference. Credit: AFAC

Event showcase

Indigenous voices in land and emergency management at Gathering

People from across Australia and overseas came together on the sacred sovereign lands of the Widjabul Wia-bal peoples for the NIDR Gathering in September 2024.

Supported by the Centre, the Lismore Gathering was an example everyone could learn from in holding a space that facilitates genuine sharing and connection to people and place. Accompanied by the sharing of knowledge and practice to move forward in a more hopeful, supportive, connected, reverent, and respectful way with Country and community. It was three days filled with deep listening, compassion and inspiration to act, change and do things better.

Indigenous Canadian perspectives in fire and land management

Indigenous Canadian wildfire stewardship, similarities and differences in the opportunities and barriers faced by Canadian and Australian First Nations people and the disproportionate impact of recent fire seasons on Indigenous communities were highlighted by visiting experts at an intimate event hosted by the Centre in Brisbane in October 2024.

Métis fire scientist and policy advisor, Dr Amy Cardinal Christianson (Indigenous Leadership Initiative) and Joe Gilchrist (Salish Fire Keepers Society), a cultural fire keeper in the interior region of British Columbia from the Secwepemc and Nlaka'pamux Nations, talked through Indigenous fire stewardship practices, wildfire evacuations and the enormous benefit of Indigenous-led wildland firefighting in Canada.

Awards

Natural Hazards Research Australia

Knowledge leadership and advancement

In October 2024, Victoria and Tasmania Node Research Manager, Dr Blythe McLennan was recognised for her significant impact on knowledge development and advancement in the emergency management and disaster resilience sector in the Australasian Women in Emergencies Network (AWE) Recognition Awards 2024.

Passionate about building strong and diverse collaborations to support impactful, accessible, policy-relevant research, Blythe's dedication and willingness to go above and beyond was highlighted in the award notes.

> *"Blythe is a committed and tenacious advocate for the disaster researchers she supports. She continuously demonstrates a dedicated effort to helping researchers navigate process hurdles and supporting them to deliver their work in a way that will benefit communities and the emergency management sector."*

According to Blythe, the award is especially meaningful due to the awarding organisation and its mission.

> *"It feels really special to be recognised in this way by the AWE. I love working with disaster researchers and their project partners to navigate all the twists and turns of doing good, impactful research in this sector," Blythe said.*

Blythe is among 23 women recognised this year, with award winners playing a wide range of roles and organisations across Australia, New Zealand and the Pacific.

Natural Hazards Research Australia researchers

Trailblazing strategy as practice

Centre researcher Prof Paula Jarzabkowski from the University of Queensland was awarded the Academy of Management's Joanne Martin Trailblazer Award in August for her outstanding work in the field of organisation and management theory.

The bi-annual Joanne Martin Trailblazer Award recognises experts who advance insights, expand theory and build community to develop a practice-theory based approach to strategy and organisation.

Centre CEO Andrew Gissing stated that not only is the award well deserved, it highlights the benefit of innovative, intersectional approaches disaster risk reduction and recovery.

> *"Paula is a trailblazer whose significant skills, experience and knowledge are helping Australian communities stay safer, more resilient and sustainable. Paula's application of Strategy-as-Practice to disaster resilience and risk reduction is deserving of this international recognition," Andrew said.*

Paula's research with the Centre highlights the way new and often unconventional thinking can be applied to disaster risk reduction and resilience activities, including in the current *Evaluating the Resilient Homes Fund* project.

Managing bushfire risk

The Fire Centre, established in 2018 by Centre researcher Prof David Bowman at the University of Tasmania, won the Resilient Australia National Collaboration and Partnership Award in November.

The Fire Centre is a bushfire research hub that integrates methods from science and humanities. The Fire Centre aims to achieve a holistic understanding of bushfire disasters and develop cost-effective interventions and public education campaigns to build community resilience.

The award recognises the strong collaborative relationships the Fire Centre has developed with local councils, fire-management agencies, Aboriginal communities contributing traditional knowledge and world-leading fire scientists. It acknowledges the Fire Centre's innovative use of science and community engagement to reduce bushfire risk, including the short course *Living with Fire and Bushfire*.

Natural Hazards Research Australia projects

Bushfire map research shortlisted

Centre project *Predictions in Public: Improving public-facing fire spread prediction map design* was shortlisted as a finalist for the 2024 Resilient Australia National Research for Impact Award.

A collaboration between the Centre, the Country Fire Authority, the Department of Education Victoria, RMIT University, Queensland University of Technology, Deakin University and Swinburne University of Technology, the project is gathering evidence and using collaborative processes to contribute to and support a national approach to the future use of public-facing predictive fire spread maps.

The contributions of other Centre researchers and institutions to enhancing community resilience against disasters and emergencies across Australia are evident in their nominations throughout the Resilient Australia Awards' ten award categories.

> *'Predictions in Public is already significantly impacting the sector's knowledge about the way community members use, understand and act on bushfire maps, with subsequent phases developing principles that could standardise the use of predictive maps within the Australian Warning System," Predictions in Public project team member, Dr Erica Kuligowski from RMIT University said.*
>
> *"This is crucial information that will underpin the future design of bushfire maps to ensure they meet the needs of Australians as well as emergency service agencies."*

Capturing and sharing examples of resilience in action, the Resilient Australia Awards recognise collaboration and innovative thinking across a broad range of sectors and initiatives that strengthen disaster resilience with communities, institutions, and the private sector.

Tasmanian Resilient Australia Government Award

The Social Recovery Reference Group (SRRG) in Tasmania won the Resilient Australia National Government Award for collaboration, sharing, building and enhancing social recovery across Australia. The SRRG fulfils a vital leadership role in the Centre project Insights into temporary and emergency accommodation and highly values collaboration and capacity-building. Since January 2022, the Tasmanian SRRG strategically targeted interventions that enhance social recovery efforts after natural hazards, recognising the vital role social capital plays in building community resilience. This award highlights two key initiatives the Tasmanian SSRG implemented to support the local, community-based workforce recovery and executive-level leadership to address complex national challenges.

Attachments

Attachment 1: Progress against *Biennial Research Plan 2024–26* milestones

Milestones	Agreed end date	Actual / anticipated end date	Current % complete
Centre research priorities			
Biennial Research Plan 2025–27 drafted and endorsed by Centre Board	30 June 2025	30 June 2025	10%
All funded research complies with the Centre's research data framework. Online data catalogue available, populated and utilised	30 June 2026	30 June 2026	80%
Learning from disasters			
Outcomes, findings and insights from post-disaster research projects shared in a timely manner	30 June 2025	Ongoing	As required
Engaging with other research initiatives			
The Centre engages with relevant national and international research initiatives	30 June 2025	Ongoing	100%
Research portfolio			
October 2024 research project investment round complete and approved by the Centre's Board	31 December 2024	31 December 2024	100%
April 2025 research project investment round complete and approved by the Centre's Board	30 June 2025	30 June 2025	10%
Translation and implementation			
Hazard Notes published to translate research findings in an accessible format	30 June 2025	Ongoing	100%
Establishment and initial evaluation of a Translation and Implementation Panels	30 June 2025	30 June 2025	75%
Education program			
Complete post graduate scholarship rounds	30 June 2025	Ongoing	100%
Award of at least one First Nations scholarship	30 June 2025	30 June 2025	85%
Early Career Researcher program			
Early Career Researcher Fellowships awarded	30 June 2025	30 June 2025	90%
Disaster Challenge completed	30 June 2025	31 December 2024	100%
Research-skilled workforce			
Work placements awarded	30 June 2025	30 June 2025	50%
Complete postgraduate symposium	30 June 2025	30 June 2025	25%
Knowledge transfer			
Annual Natural Hazards Research Forum delivered	30 June 2025	30 June 2025	25%
Regular series of research translation and engagement events delivered with high participation and positive feedback, for example, workshops and webinars	30 June 2025	30 June 2025	75%

Attachment 2: Research projects

The following list outlines all current (i.e., approved and contracted), completed and exploratory research projects within the Centre's core research program portfolio. Each project addresses a critical research need or knowledge gap and are selected for their fit with the Centre's overall research program; value to Participants; likelihood outputs able to be implemented that enhance safety, resilience and/or sustainability of communities; and relevance to multiple states, territories and/or sectors.

Table 14: Overview of all Centre research projects, current, completed and exploratory

Project name and code	Research provider	Research theme/s	Summarised outcomes – targeted or completed
Be Ahead of Ready	Aither	Operational response and innovation; Communities and workforces of the future	Inspire bigger, bolder thinking across the disaster resilience sector. Identify big ideas to drive a resilient, safe and sustainable future.
CR2024-01 Increasing disaster resilience – creating the next version of the Australian Disaster Resilience Index	University of New England	Resilient communities	Revised and updated Australian Disaster Resilience Index (ADRI 2) with additional datasets to inform key Commonwealth activities including NEMA's development of a national natural hazards risk assessment.
E1-A1 State of Natural Hazards Research in Australia			Understand extent of active natural hazards and disaster risk reduction, research investment in Australia across funding sources. Understand broad objectives of different research funding sources and the themes of investment. Understand capabilities of different research institutions and develop a list of active natural hazards and disaster risk reduction research projects nationally.
E1-A2 Analysis of inquiry recommendations on natural hazards and disaster risk reduction			Identify key recurring themes, patterns and insights in natural hazards and disaster risk reduction to inform future policy development, emergency management strategies and risk mitigation efforts.
Fire coalescence and mass spotfire dynamics	University of New South Wales	Operational response and innovation	Understand role of vorticity in driving lateral spread and other modes of dynamic fire propagation in the escalation of bushfires to extreme levels.
PE-2022-01 Community experiences of the 2022 Australian floods – Queensland and New South Wales	Macquarie University, Queensland University of Technology, University of Southern Queensland	Learning from disasters; Situational awareness	In-depth understanding of the communities' lived experience before, during and following the February and March 2022 floods to assist in future planning and engagement
PE-2022-01 Community experiences of the 2022 Australian floods – Tasmania	University of Tasmania, Macquarie University	Learning from disasters; Situational awareness	Improve to flood warning systems and community disaster preparedness programs.
PE-2022-02 Flood contamination sampling and analysis – regional Victoria	Environment Protection Authority Victoria	Learning from disasters; Sustainable, safe and healthy natural landscapes	Understand floodwater contamination risks to inform community engagement programs.
PE-2022-03 Community experiences of the 2022 Australian floods – South Australia, Victoria and south-western New South Wales	RMIT University, Macquarie University, Monash University	Learning from disasters; Situational awareness	Improve future community flood planning, preparedness and engagement, with a focus on First Nations and culturally and linguistically diverse people.
SES Fit for Task	Human Performance Science	Operational response and innovation; Communities and workforces of the future	Promote safety, health and wellbeing of SES members across Australia, reduce risk of injury while performing required tasks and build a culture of wellbeing and safety of SES members. Ensure SES members' ability to safely assist when deployed to support other states and territories during major emergencies.

Project name and code	Research provider	Research theme/s	Summarised outcomes – targeted or completed
T1-A1 Translation of observed and modelled extreme bushfire behaviours to improve fire prediction and fireground safety	Bureau of Meteorology, Curio	Situational awareness; Learning from disasters	Increase situational awareness and fire ground safety through interoperable language and concepts/ shared understanding. Improve risk communication.
T1-A2 Predictions in public: understanding the design, communication and dissemination of predictive maps to the public	RMIT University, Queensland University of Technology, Deakin University, Swinburne University	Situational awareness; Resilient communities	Evidence-based principles informing a nationally consistent approach to the future design and communication of predictive bushfire and incident maps. Understand current levels of comprehension and use of maps for public information and warnings. Develop principles for the standardised use of predictive maps within the Australian Warning System.
T1-A3 Connecting Indigenous people and the emergency management sector – effective partnerships	North Australian Indigenous Land and Sea Management Alliance	Communities and workforces of the future; Sustainable, safe and healthy natural landscapes	Strengthen Indigenous understanding and position on emergency management engagement in northern Australia. Joint statement of intent developed to share a stronger and better-informed foundation for future work practice and partnerships between Indigenous people and the emergency management sector.
T1-A4 Cultural land management research and governance in south-east Australia	Deakin University	Sustainable, safe and healthy natural landscapes; Resilient communities	Strengthen collaborative governance and research involving Indigenous land and fire managers and state, territory and local government agencies. Principles and protocols for cultural land management governance and research and the companion usage guide.
T1-A5 Community-led recovery: Evidence, dimensions, and supports for Community Recovery Committees	University of Melbourne	Resilient communities; Communities and workforces of the future	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 the 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	Frontier SI, Geoscience Australia	Operational response and innovation; Situational awareness	Prototype spatial product workflow accurately identifying locations of accessible water bodies. Prototype now in use by NAFC and GA to improve the accuracy of location data for aerial firefighting.
T1-E1 Bushfire information database – scoping study	University of Sydney	Evidence-informed policy, strategy and foresight; Learning from disasters	Evidence base and recommendations to support the development of a National Bushfire Information Database.
T1-E2 Understanding the resilience of lifelines for regional and remote communities	RMIT University	Resilient communities; Resilient built environment	Increase knowledge about Australia's lifeline characteristics, interconnections, vulnerabilities, strengths, needs and opportunities for improving resilience, of relevance to practitioners and researchers. Enhance understanding of the primary research needs and opportunities around lifeline resilience in Australia to inform future work at the Centre and other organisations strategically.
T1-P1 Research data management	Frontier SI	Evidence-informed policy, strategy and foresight; Learning from disasters	Accessible and centralised research data from Centre and BNHCRC projects.

Project name and code	Research provider	Research theme/s	Summarised outcomes – targeted or completed
T2-A1 Awareness, education and communications for compound natural hazards	Deakin University, University of Tasmania	Resilient communities; Operational response and innovation	Improve shared understanding of the threats posed by compound disasters. Inform community engagement programs and agency capacity to ensure the public understands 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 Flash flooding case studies to improve predictions and the communication of uncertainty	Bureau of Meteorology	Learning from disasters; Situational awareness	Increase understanding of how to prepare systems, people, public messaging and warnings to reduce the impact of flash floods and enhance community resilience.
T2-A3 Integrated solutions for bushfire-adaptive homes	CSIRO	Resilient built environment; Resilient communities	Increase understanding of effectiveness and feasibility of integrated physical and social strategies to improve residential property protection from the effects of fire.
T2-A4 Enhancing decision making in emergency management	CQUniversity	Operational response and innovation; Communities and workforces of the future	Enhance effective and appropriate crisis decision making in all levels of the Australian and New Zealand emergency management sectors. Well-designed and implemented training and learning products building on existing programs and tools. National approach to decision making across services and multi-agency training to support cross-agency decision making.
T2-A5 Bushfire risk at the rural-urban interface	University of Tasmania	Operational response and innovation; Resilient communities	Understand ways to engender and support community-led/centred action in the rural-urban interface to reduce risks in and around asset protection zones. Identify key rural-urban interface site and vegetation characteristics affecting bushfire behaviour, including garden plant flammability and garden arrangement/landscaping. Develop informed fire behaviour modelling capturing interface and garden fuels, fire spread and ember production in rural-urban interface zones. Identify and evaluate potential mitigation measures for reducing and stopping fire spread into the rural-urban interface.
T2-A6 Sector partner engagement to enhance severe weather impact prediction	Collaborative Consulting Co	Operational response and innovation; Situational awareness	Understand information needed by emergency management partners to support decision-making in preparing for and responding to severe weather, mitigating the impacts on communities.
T2-A7 Modelling impacts of natural hazards on interconnected infrastructure networks	University of Queensland	Resilient built environment	Improve estimation of direct infrastructure damage costs and assess financial benefit of infrastructure betterment to current and future climates. Develop the capability to estimate infrastructure restoration timeframes to inform emergency management planning and risk assessment.
T2-A9 Natural hazards and resilience in complex urban systems	RMIT University	Resilient communities; Resilient built environment	Understand impact of complex natural hazard-related disasters on communities in major Australian urban areas and how climate change and rapid urbanisation may impact these disasters and recovery over time.
T3-A1 What makes a good fire simulator?	University of Melbourne	Situational awareness; Evidence-informed policy, strategy and foresight	Understand what makes a good fire simulator in Australia. Improve future fire simulators to enhance fire prediction and modelling.

Project name and code	Research provider	Research theme/s	Summarised outcomes – targeted or completed
T3-A2 Storing and sharing qualitative data	Altometer	Evidence-informed policy, strategy and foresight; Learning from disasters	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.
T3-A3 Community risk assessment	University of Sydney	Operational response and innovation; Communities and workforces of the future	Understand value of systematic approach to community-based risk using latest computational and risk modelling advancements. Inform future multi-hazard, compound and cascading community risk assessment approaches.
T3-A4 Fire case studies	Bureau of Meteorology	Learning from disasters; Situational awareness	Systematise and consolidate existing fire case study methodology to enable quicker results in future. Identify learnings to enable fire agencies to prepare and respond to future bushfires.
T4-A1 Identifying and defining landscape dryness thresholds for fires	University of Melbourne	Operational response and innovation	Metrics identifying bushfire risk, guiding suppression tactics and supporting prescribed burning operations. Improved accuracy of fire simulation systems and fire danger rating systems, added value to seasonal forecasts and better interpretation of landscape condition monitoring systems, leading to enhanced community safety, better preparedness and reduced fire impacts.
T4-A2 Capturing uncertainty in bushfire spread	University of Wollongong	Situational awareness	Bayesian ROS model for forest (and grass) fire, probiding fire behaviour analysts an additional, powerful tool to understand expected ROS probabilistically (which currently does not exist). ROS database regularly updated and shared with fire agencies and researchers. Fast access to the history of ROS available to fire behaviour analysts to understand how a particular fire sits in the context of previous fires.
T4-A3 Long-range flood outlook for strategic preparedness	Bureau of Meteorology	Operational response and innovation	Suite of national probabilistic long-range flood outlook and inundation products as a proof-of-concept for evaluation and testing.
T4-A4a Operationalising Aboriginal land and sea management	Department of Climate Change, Energy, the Environment and Water NSW	Sustainable, safe and healthy natural landscapes; Evidence-informed policy, strategy and foresight	Foundational understanding needed to implement Aboriginal land and sea management. Foundational understanding to support government implementation and development of accompanying research program to document learning and problem solving in line with living lab model.
T4-A4b Healing Country through Wolgalu/Wiradjuri-led land management	University of Wollongong and Brungle-Tumut Local Aboriginal Land Council	Sustainable, safe and healthy natural landscapes; Evidence-informed policy, strategy and foresight	On-Country activities to revitalise and share cultural knowledge Develop resources that tell Wolgalu/Wiradjuri histories and knowledge of Country to better understand what Wolgalu/Wiradjuri Caring for Country looks like today
T4-A5 Why fly? How do we know that aerial operations are effective and efficient?	University of Wollongong and CSIRO	Operational response and innovation	Understand and build 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.

Project name and code	Research provider	Research theme/s	Summarised outcomes – targeted or completed
T4-A6 Evaluating the Resilient Homes Fund	University of Queensland	Resilient built environment; Evidence-informed policy, strategy and foresight	Measure extent of resilient reconstruction incentivisation programs' in reducing home flood risk reduction increase insurability through the following two questions: -How does a resilient reconstruction program enhance the physical and financial resilience of homeowners and communities? -What are the key components of the successful implementation of a resilient reconstruction program?
T4-A7 Developing an integrated predictive capability for extreme rainfall and inundation	Bureau of Meteorology	Operational response and innovation	Prototype predictive capability in collaboration with stakeholders and supported by social scientists to enhance forecasts of extreme rainfall, inundation and risk communication for emergency management.
T4-A8 Safety of alternative and renewable energy technologies		Resilient built environment; Operational response and innovation	Understand stationary Battery Energy Storage Systems (BESS) risks related to fire propagation due to external factors. Prevent injuries to people and minimisation of damage to buildings, infrastructure and the environment.
T4-A9 Emergency management volunteering: more than just words	Victoria University	Communities and workforces of the future	Blueprint of tangible and actionable guidance for volunteer-involving organisations in the emergency management sector. Improve sustainability of emergency management volunteering through sector changes.
T5-A1 Colonial load and cultural conflict		Communities and workforces of the future; Evidence-informed policy, strategy and foresight	Identify systemic and behavioral drivers of colonial load and cultural conflict affecting First Nations staff and volunteers and develop recommendations for interventions based on identified gaps to enhance the participation of First Nations people.
T5-A2 Foundations in Indigenous disaster resilience		Resilient communities; Communities and workforces of the future	Evidence-based policy framework to guide Indigenous disaster resilience policy and practice across Australia. Build trusting relationships between Indigenous communities and peak organisations. Indigenous disaster resilience community of practice. Increase confidence in Indigenous communities to respond to disasters.
T5-A3 Heatwave resilience and impacts		Resilient communities; Situational awareness	Improve communication of heatwave risk to agencies, the public and the media. Understanding of the full costs and impacts of extreme heat events to allow agencies and health departments to better plan, prepare and respond to heat events, as well as inform possible future business cases for investment in heatwave resilience. Understand extreme heat impacts associated with electricity disruption to improve planning for the future adaptation of infrastructure.
T5-A4 Best practice for tracking and responding to potentially traumatic event exposure	University of Melbourne	Communities and workforces of the future; Evidence-informed policy, strategy and foresight	Enhance psychological health and safety of fire and emergency service workers through the effective use of best practices and tailored psychosocial risk management systems implemented by their agencies. Evaluate feasibility and benefits of Australian emergency services collaboration to develop new psychological wellbeing and safety risk management system.
T5-A5a Understanding intangible flood costs and impacts		Resilient communities; Learning from disasters	Understand true costs of flooding, including short – and longer-term social impacts. Improve decision making and case for flood mitigation investment through enhanced knowledge of the true extent of flood costs.

Project name and code	Research provider	Research theme/s	Summarised outcomes – targeted or completed
T5-A5b Communicating flood risk.		Resilient built environment; Resilient communities	Identify improved methods of communicating flood risk to inform decisions community members make on a floodplain. Understand the challenges of communicating flood risk to communities.
T5-A5c Effectiveness of land use planning flooding controls on buildings	Meridian Urban	Resilient communities; Learning from disasters	Identify effectiveness of land-use planning flooding controls on buildings impacted by the 2020, 2021 and 2022 NSW floods. Improve community resilience via land use planning.
T5-A6 Utilisation of transformative scenarios in a climate-challenged world	Collaborative Consulting Co	Evidence-informed policy, strategy and foresight	Translate and utilise Transformative scenarios in a climate-challenged world resources with professional development modules and user-friendly train-the-trainer applications.
T5-A8 Evaluating and monitoring for impact: developing a framework for risk prevention programs	Victoria University	Operational response and innovation	Inform the monitoring and evaluation of community education programs in the emergency services sector. Enhance the evaluation of education programs across the sector, contributing to the development of best practices through documented learnings.
T6-A1 Conserving and reconnecting floodplains to mitigate flood risk		Sustainable, safe and healthy natural landscapes	Address key knowledge gaps towards implementing nature-based flood risk mitigation strategies in Australia Increase biodiversity and improving water quality and community wellbeing.
T6-A2 Insights into temporary and emergency accommodation		Resilient built environment	Guide design and implementation of temporary housing from research and resources developed.
T6-A3 Hazard workshops for evacuation modelling		Operational response and innovation	National roadmap for evacuation modelling design and development. Improve evacuation decisions and support tools.
T6-A4 Support integration of Recovery Capitals in service plans for communities with different levels of social disruption		Resilient communities	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.
T7-A1 Multi-hazard public information and warning platforms for the future		Situational awareness	Improve national capability for public information and warnings. Emergency agencies understand communities' hazard and emergency communication needs, preferences and capabilities. Improve reach of public information and warnings. Strengthen public trust in emergency agencies and their authority to issue public information and warnings.
T7-A2 Predicting prescribed burning and low intensity forest fire behaviour		Operational response and innovation	Quantification/model enabling accurate prediction of the full range of forest fire behaviour. Improve operational response, firefighter safety, understanding of risk and situational awareness, mitigating and improving community safety and ensuring future workforce have fit-for-purpose tolls for operational and prescribed burning decisions.
T7-A3 Fire mosaics in landscape fire planning		Sustainable, safe and healthy natural landscapes	Shared understanding of the objectives of mosaic burning. Develop information and tools to assist in planning, implementing and assessing fire mosaics.
T7-A4 Managing earthquake risk: unreinforced masonry buildings database		Situational awareness	Reduce unreinforced masonry building risk posed to communities during an earthquake.

Project name and code	Research provider	Research theme/s	Summarised outcomes – targeted or completed
T7-A5 Measuring success for fire and rescue services		Operational response and innovation	Support emergency response agencies to optimise policy and regulatory framework and streamline governance, plans and efforts, with a focus on fire and rescue services. Relevant, measurable meaningful measures that effectively demonstrate the value of the services delivered to the community.
T7-A6 Assisted relocations after flood		Evidence-informed policy, strategy and foresight	Build disaster management capability by identifying lessons learnt from existing large-scale assisted relocation programs.
T7-A7 Managing smoke impacts on firefighter eye health	UNSW	Communities and workforces of the future	Improve safety of firefighters on duty. Reduce smoke-related eye discomfort for firefighters. Improve readiness and recovery of workforce during bushfire disasters and improved confidence of the workforce with possibly greater retention.
T7-A8 Understanding the resilience of Australia's Energy Networks to storms – severe convective wind impacts		Evidence-informed policy, strategy and foresight	Increase knowledge of Australia's lifeline characteristics, interconnections, vulnerabilities, strengths, needs and opportunities for improving resilience, of relevance to practitioners and researchers. Connection and conversations between professionals in diverse sectors and areas about their shared role within and reliance upon lifelines, improving resilience literacy and enhancing the potential for collaborative solutions.
T8-A1 A national framework and toolkit for multicultural inclusion in emergencies		Resilient communities	Improve outcomes for multicultural communities during disasters.
T8-A2 Healing Country through Wolgalu/Wiradjuri-led cultural land management		Sustainable, safe and healthy natural landscapes; Evidence-informed policy, strategy and foresight	Build resilient people and landscapes through rekindling and strengthening Wolgalu/Wiradjuri connections to Country, cultural knowledge and inter-generational knowledge exchange.
T8-A3 Managing the risk of heat stress for first responders: understanding the role of diverse heat sources and environment		Communities and workforces of the future	Understand heat stress experienced by first responders and empower stakeholders with comprehensive knowledge to reduce the risk of heat stress.
T8-A4 Remote sensing of grass condition		Situational awareness	National satellite-derived model to detect changes in grass fuel conditions in crops and pastures. Improve agencies' fire danger ratings and warning messaging.
T8-A5 Multi-hazard resilient buildings		Resilient built environment	Identify gaps in multi-hazard building standards. Create best practice building outcomes, elements and testing.
T8-A6 First Nations women, cultural fire knowledge, wellbeing and memory		Resilient communities	Improve understanding of how gathering and sharing cultural burning knowledge impacts First Nations women and explore culturally protective factors in building disaster resilience.
T8-A7 Unlocking risk: Enhancing hazard risk assessment through historical archival reanalysis		Learning from disasters	Improve the way historical hazards are characterised, incorporating First Nations knowledge to enhance the archives of these historical events, making data more accessible for researchers, emergency managers and the public.

Project name and code	Research provider	Research theme/s	Summarised outcomes – targeted or completed
T8-A8 Understanding the effectiveness of current communication mediums and messaging used to communicate information on planning, preparing/ responding and recovering from an emergency event to remote First Nations communities		Resilient communities	Provide evidence-based data to inform fit-for-purpose future communication strategies and messaging in a remote First Nations community to enhance safety and resilience.
T8-A9 Quantifying and predicting bushfire risk following large-scale, drought-induced vegetation die-off		Evidence-informed policy, strategy and foresight	Quantify fuel characteristics of different plant types affected by vegetation die-off across southwestern Australia to calculate potential fire behaviour.
U1-A1 Streamlining SWIRLnet data acquisition, analysis, storage and dissemination procedures	University of Queensland	Situational awareness	Streamline and automate collection and distribution of data, providing end-users with improved access to real-time information and a more efficient analysis process.
U1-A2 Schools in Fire Country	Leadrrr	Communities and workforces of the future	Community-centred, place-based participatory bushfire disaster risk reduction program for upper primary school students. Quality, research-backed resources and localised support to significantly enhance student and teacher contributions to bushfire risk management.
U1-A3 Fire ember transport	Bureau of Meteorology	Operational response and innovation; Situational awareness	Software interface between the development version of Spark Operational and ember transport parameterisation model.
U1-A6 Detecting fire plumes with mobile radar	Bureau of Meteorology	Situational awareness; Operational response and innovation	Pperating procedures and approaches for the safe location and operation of a mobile radar. Requirements for robust operational radar deployment practices. Strengthening researcher and practitioner networks through cross-agency and cross-jurisdiction collaboration.
U1-A8 Australian emergency law blog	Dr Michael Eburn	Evidence-informed policy, strategy and foresight; Learning from disasters	Support Australian Emergency Law communications.
U1-A9 Maintenance of the Australian Flammability Monitoring System	Australian National University	Operational response and innovation	Clearer picture of immediate fire risks using satellite data to collect information on live moisture content in trees, shrubs and grass. Information helps fire managers' prescribed burning efforts and prepositioning firefighting resources.

Attachment 3: Research outputs

1. New technologies and systems (1)

T1-A1	**Knowledge Module:** Three Extreme Bushfire Behaviour modules (complete)

2. Journal articles (25)

Research projects

Project	Paper publication details including digital object identifier (DOI) and Impact Factor (IF)
T1-A2b	Morrison, R., Kuligowski, E., Dootson, P., Griffin, A. L., Perry, P., Pupedis, G., Begg, C. & Gardner, A. (2024). Understanding the challenges in bushfire map use and effective decision-making amongst the Australian public. *International Journal of Wildland Fire*, *33*(10). http://www.doi.org/10.1071/WF24071 (IF 2.9)
T2-A1	Nemeth, N., Johnson, M. S., Mocatta, G., & Hawley, E. (2024). Communicational responses for compound natural hazards: A systematic review. *International Journal of Disaster Risk Reduction*, 105041. http://www.doi.org/10.1016/j.ijdrr.2024.105041 (IF 4.2)
T2-A4	Bearman, C., Hayes, P., McLennan, J., Penney, G., Butler, P. C., & Flin, R. (2024). The challenges of decision-making in emergency management, the cognitive aids people use and the decision-making training they receive. *The Australian Journal of Emergency Management – October Edition*, *39*(4), 10–12. *(Introductory Article, no DOI)*
	Butler, P. C., Flin, R., Bearman, C., Hayes, P., Penney, G., & McLennan, J. (2024). Emergency management decision-making in a changing world: 3 key challenges. *The Australian Journal of Emergency Management – October Edition*, *39*(4), 23–32. http://www.doi.org/10.47389/39.4.23 (IF 1.2)
	McLennan, J., Hayes, P., Bearman, C., Penney, G., Butler, P. C., & Flin, R. (2024). Training to improve emergency management decision-making: what the research literature tells us. *The Australian Journal of Emergency Management – October Edition*, *39*(4), 33–45. http://www.doi.org/10.47389/39.4.33 (IF 1.2)
	Penney, G., Bearman, C., Hayes, P., McLennan, J., Butler, P. C., & Flin, R. (2024). A review of cognitive aids and their application to emergency management in Australia. *The Australian Journal of Emergency Management – October Edition*, *39*(4), 13–22. http://www.doi.org/10.47389/39.4.13 (IF 1.2)
T2-A5	Ondei, S., Price, O. F., & Bowman, D. M. (2024). Garden design can reduce wildfire risk and drive more sustainable co-existence with wildfire. *Nature: npj	Natural Hazards*, *1*(1), 18. http://www.doi.org/10.1038/s44304-024-00012-z
	Campbell, S.L., Williamson, G.J., Johnstone, F.H., and Bowman, D.M.J.S. (2024). Social and health factors influence self-reported evacuation intentions in the wildfire-prone island of Tasmania, Australia. *International Journal of Disaster Risk Reduction*, 11, https://doi.org/10.1016/j.ijdrr.2024.104712
PE-2022-02	Saaristo, M., Johnstone, C. P., Lewis, P., Sharp, S., Chaston, T., Hoak, M., Leahy, P., Cottam, D., Noble, L., Leeder, J., and Taylor, M. P. (2024) *Spatial and temporal dynamics of chemical and microbial contamination in nonurban floodwaters.* Environmental Scient & Technology, 58, 21411-21422. https://doi.org/10.1021/acs.est.4c03875

Postgraduate Research Scholars

Scholar	Paper publication details including digital object identifier (DOI) and Impact Factor (IF) (supported student in bold)
Fadia Isaac, Federation University	**Isaac, F.**, Toukhsati, S. R., Klein, B., Di Benedetto, D., & Kennedy, G. (2024). Differences in anxiety, insomnia, and trauma symptoms in wildfire survivors from Australia, Canada and United States of America. *International Journal of Environmental Research and Public Health*, 21(1), 38. https://www.doi.org/10.3390/ijerph21010038 (IF 0.8)
Kiam Padamsey, Edith Cowan University	**Padamsey, K.**, Liebenberg, A., Wallace, R., & Oosthuizen, J. (2024). Characterising the Chemical Composition of Bushfire Smoke and Implications for Firefighter Exposure in Western Australia. *Fire (2571–6255)*, *7*(11). https://doi.org/10.3390/fire7110388 (IF 0.6)
	Padamsey, K., Wallace, R., Liebenberg, A., Cross, M., & Oosthuizen, J. (2024). Fighting fire and fumes: risk awareness and protective practices among Western Australian firefighters. *International Journal of Wildland Fire*, *33*(4). https://doi.org/10.1071/WF23147 (IF 0.8)
	Padamsey, K., Liebenberg, A., Wallace, R., & Oosthuizen, J. (2024). Preliminary Assessment of Tunic Off-Gassing after Wildland Firefighting Exposure. *Fire*, *7*(9), 321. https://doi.org/10.3390/fire7090321 (IF 0.6)
Nina Rogers, University of Tasmania	**Rogers, N. J.**, Adams, V. M., & Byrne, J. A. (2024). Agenda-setting and policy leadership for municipal climate change adaptation. *Environmental Science & Policy*, *161*, 103869.https://www.doi.org/10.1016/j.envsci.2024.103869 (IF 1.6)
	Rogers, N. J., Adams, V. M., & Byrne, J. A. (2024). Moving beyond the plan: Exploring the opportunities to accelerate the implementation of municipal climate change adaptation policies and plans. *Environmental Policy & Governance*. http://www.doi.org/10.1002/eet.2142 (IF 1.2)
Rebecca Ryan, University of Wollongong	**Ryan, R.,** Thomas, Z., Simkovic, I., Dlapa, P., Worthy, M., Wasson, R., Bradstock, Mooney, S., Haynes, K., & Dosseto, A. (2024). Assessing changes in high-intensity fire events in south-eastern Australia using Fourier Transform Infra-red (FITR) spectroscopy. *International Journal of Wildland Fire*, *33*(9). https://www.doi.org/10.1071/WF24064 (IF 0.8)
Jady Smith, University of the Sunshine Coast	Sothearith, Y., Appiah, K. S., Sophea, C., **Smith, J**., Samal, S., Motobayashi, T., & Fujii, Y. (2024). Influence of -Ionone in the Phytotoxicity of the Rhizome of Iris pallida Lam. *Plants*, *13*(2), 326. http://www.doi.org/10.3390/plants13020326 (IF 0.8)

Postgraduate Research Associate Students

Scholar	Paper publication details including digital object identifier (DOI) and Impact Factor (IF)
Sara Fazeli, University of New South Wales	**A Fazeli,** S., Haghani, M., Mojtahedi, M., & Rashidi, T. H. (2024). The role of individual preparedness and behavioural training in natural hazards: A scoping review. *International Journal of Disaster Risk Reduction*, 104379. https://doi.org/10.1016/j.ijdrr.2024.104379 (IF 1.1)
Anna Kennedy-Borissow, University of Melbourne	Woodland, S., Hassall, L., & **Kennedy-Borissow, A.** (2024). Youth theatre and the climate crisis in Australia: the role of 'unmediatised liveness' in performing recovery, resistance, and survival. *Research in Drama Education: The Journal of Applied Theatre and Performance*, *29*(2), 382–391. https://doi.org/10.1080/13569783.2024.2312184
	Kennedy-Borissow, A. (2024). How "Creative Recovery" Stimulates a Culture of Democracy: Case Studies of Post-Disaster Creativity in Rural Australia. In *Democracy as Creative Practice* (pp. 49–62). Routledge.
Heba Mohtady Ali, Griffith University	**Ali, H.** M., Ranse, J., Roiko, A., & Desha, C. (2024). Developing a healthcare transformational leadership competency framework for disaster resilience and risk management. *International Journal of Disaster Risk Reduction*, *113*. https://doi.org/10.1016/j.ijdrr.2024.104898 (IF 1.1)
Douglas Radford, University of Adelaide	**Radford, D. A.,** Maier, H. R., van Delden, H., Zecchin, A. C., & Jeanneau, A. (2024). Predicting burn probability: Dimensionality reduction strategies enable accurate and computationally efficient metamodeling. *Journal of Environmental Management*, *371*, 123086. https://doi.org/10.1016/j.jenvman.2024.123086 (IF 1.7)
	Radford, D. A., Maier, H. R., van Delden, H., Zecchin, A. C., & Jeanneau, A. (2024). An efficient, multi-scale neighbourhood index to quantify wildfire likelihood. *International Journal of Wildland Fire*, *33*(5). https://doi.org/10.1071/WF23055 (IF 0.8)
Harikesh Singh, University of the Sunshine Coast	**Singh, H.**, Ang, L. M., Lewis, T., Paudyal, D., Acuna, M., Srivastava, P. K., & Srivastava, S. K. (2024). Trending and emerging prospects of physics-based and ML-based wildfire spread models: A comprehensive review. *Journal of Forestry Research*, *35*(1), 1–33. https://www.doi.org/10.1007/s11676-024-01783-x (IF 0.7)
	Singh, H., & Srivastava, S. K. (2024). From Firestick to Satellites: Technological Advancement and Indigenous Cultural Practice in Managing Forest Fires in Australia. *The Historic Environment: Policy & Practice*, 1–24. https://www.doi.org/10.1080/17567505.2024.2425246

3. Conference presentations (22)

This category comprises oral, poster, and paper conference presentations.

Research projects

Project	Conference presentation details
T1-A4	**Conference (oral):** Beggs, L. (2024) Partnership futures: understanding the practice of collaborative Indigenous fire and land management in mainland southeast Australia. Presentation to the Alfred Deakin Institute Annual Conference, 25–26 November, VIC, Australia.
T2-A2	**Conference (oral):** Mooney, C. (2024) Examining the flash flood warning value chain in Australia: An interdisciplinary and mixed methods approach. Presentation to the HiWeather Final Conference, 9–13 September, München, Germany.
T2-A4	**Conference (oral):** Hayes, P. (2024) Enhancing Emergency Management Decision Making. Presentation to the NT Emergency Management Symposium, 27–28 November, NT, Australia. **Conference (oral):** Bearman, C., Hayes, P., McLennan, J., Penney, G., Butler, P., Kuhn, M., & Flin, R. (2024). How emergency managers make decisions and use cognitive aids. Presentation to the AFAC Conference, 3–5 September, NSW, Australia.
T2-A5	**Conference (oral):** Price, O. (2024). Can we use house loss patterns in the 2019/20 fire season to predict Wildland Urban Interface conflagrations. Presentation to the Australian Bushfire Building Conference, 11–13 September, NSW, Australia.
T2-A7	**Conference (oral):** Henderson, D. (2024) Building beyond the minimum. Presentation to the NT Emergency Management Symposium, 27–28 November, NT, Australia.
T4-A3	**Conference (oral):** Pickett-Heaps, C. (2024 Nov). Long-Range Flood Outlook for Australia. Presentation at Hydrology and Water Resources Symposium
T5-A4	**Conference (oral):** Howard, A., Molyneaux R., & Newnham, E. (2024) Disasters and Mental Health: Advancing evidence of traumatic stress impacts and improving outcomes. Presentation to the Australasian Conference on Traumatic Stress (ACOTS), 7–9 November, VIC, Australia. **Conference (poster):** Phelps, A., Howard, A., Pedder, D., Watson, L., Savic, A., & Varker, T. (2024). Establishing best practice for tracking potentially traumatic event exposure in emergency services: a comparative analysis and implications for response policies. International Society for Traumatic Stress Studies (ISTSS) 40th Annual Meeting, 25–28 September 2024, Boston, Massachusetts, USA. Public Health Track, Poster Number 80.
BNH-CRC	**Conference:** Edwards, A. (2024) NT focused Bushfire & Emergency Management Research. Presentation to the NT Emergency Management Symposium, 27–28 November, NT, Australia.

Postgraduate Scholars

Scholar	Institution	Event presentation details
Cameron Atkinson	University of Tasmania	**Conference (oral):** Integrating artificial intelligence and machine learning into research for critical infrastructure resilience and sustainability: insights for practitioners and academics. Presentation to the AFAC Conference, 3–5 September, NSW, Australia.
Fadia Isaac	Federation University	**Conference (oral):** Bushfires, trauma and sleep: Help me sleep please. Federation University Annual Conference. 11 July, VIC, Australia.
Oscar Metcalf	Charles Darwin University	**Conference (oral):** Martuwarra scenario analysis. Presentation of emergent PhD findings to the NT Emergency Management Symposium, 27–28 November, Darwin, Northern Territory, Australia.
Fadia Isaac	Federation University	**Conference (poster):** Online psychological intervention for insomnia, nightmares and PTSD in bushfire survivors: A pilot study. ADRC Conference, 3–5 September, NSW, Australia.
Elena Skoko	Queensland University of Technology	**Conference (poster):** Mothers and babies in disasters. We can do better. Presentation to the ADRC Conference, 4–5 September, NSW, Australia.
Jady Smith	University of the Sunshine Coast	**Conference (poster):** Irrigated green firebreak research to complement wildfire management in Queensland's wildland urban interface. Queensland IGEM Disaster Management Research Forum, 19 November 2024, QLD, Australia.

Associate Students

Scholar	Institution	Event presentation details
Russell Dippy	Charles Sturt University	**Conference (oral):** Professionalisation of the Australian emergency manager. Presentation for Queensland IGEM Disaster Management Research Forum, 19 November 2024, QLD, Australia.
Anna Kennedy-Borrissow	University of Melbourne	**Conference (oral):** When cultural workers become disaster workers: Identifying the risks of delivering arts programs in post-disaster contexts. Presentation for 17th International Conference on Arts and Cultural Management (AIMAC 2024), June 2024, Lisbon, Portugal. **Conference (oral):** Defining and understanding 'creative recovery': Case studies of community-engaged arts and cultural programs in Australian disaster contexts. Presentation for Fostering Creative Health Conference, April 2024, Melbourne, VIC, Australia.
Harikesh Singh	University of the Sunshine Coast	**Conference (oral):** An empirical & dynamic tool for prediction forest fire spread using remote sensing and machine learning technique. Presentation for Queensland IGEM Disaster Management Research Forum, 19 November 2024, QLD, Australia.
Winty Wang	Griffith University	**Conference (poster):** Queensland IGEM Disaster Management Research Forum
Jane Toner	Griffith University	**Conference (poster):** Empowering Community to Speak for and about Nature where they live. Queensland IGEM Disaster Management Research Forum, 19 November 2024, QLD, Australia.
Danielle O'Hara	University of Queensland	**Conference (poster):** Understanding conflict in disaster recovery collaborations. Queensland IGEM Disaster Management Research Forum, 19 November 2024, QLD, Australia.

4. Media interviews (81)

The Centre's expertise continues to be sought from local, national and international media outlets. This category comprised 81 interviews held with Centre experts and its researchers.

5. Other outputs (31)

The category includes industry training courses, workshops, knowledge sharing forums and international exchanges/collaborations and output-targeted meetings, award courses, final project reports, thought leadership reports and briefing notes.

Project/initiative	Output details
T1-A2a	Hazardous webinar: Predictions in Public (31 July 2024)
T1-A2b	**Knowledge sharing forum**: Dootson, P. (2024) Pre-recorded presentation to the Queensland IGEM Disaster Management Officer (DMO) Forum, 20 November, QLD, Australia
T1-A2b	**Hazardous webinar**: Community perceptions and understanding of predictive maps (17 September 2024)
T1-E2	**Hazardous webinar**: Understanding the important of resilient lifelines in regional and remote communities (21 November 2024)
T1-A4	**Knowledge sharing forum**: Beggs, L. (2024) A sense of partnership: understanding the practice of collaborative Indigenous fire and land management in mainland southeast Australia. Presentation to the Tasmanian Bushfire Research Group, 25 September, TAS, Australia.
T2-A1	**Hazardous webinar**: Awareness, education and communication for compound natural hazards (14 October 2024)
T2-A4	**Knowledge sharing forum**: Why Are Non-Technical Skills Important? Presentation to Centre Stakeholder Forum, July 2024 **Knowledge sharing forum**: Decision Making in Emergency Management. AUS02 Urban Search and Rescue Exercise International Observers Oct 2024 Industry Training Course: Enhanced Decision-making Training NPWS SA **Workshop**: Decision Making and Non-Technical Skills. Professional Development Workshop for New South Wales SES Level 3 Incident Controllers, December 2024 **Webinar**: Decision Making and Non-Technical Skills. Tasmanian Fire Service Senior Station Officer Promotion Course – Nov 2024. National Online Webinar, October 2024 **Workshop**: Decision Making and Non-Technical Skills. Professional Development Workshop for New South Wales SES Level 2 Incident Controllers, January 2025 **Hazardous webinar**: Enhance Decision Making in Emergency Management (26 August 2024) **Webinar**: Enhancing emergency management decision making. Webinar presentation to the AFAC Learning & Development Group Meeting **Webinar**: Options for training and learning products to enhance emergency management decision making
T2-A5	**Knowledge sharing forum**: Bowman, D. (2024) Pre-recorded presentation to the Queensland IGEM Disaster Management Officer (DMO) Forum, 20 November, QLD, Australia.
T2-A5	**Knowledge sharing forum**: Bowman, D. (2024) Soil, not fire determines button grass forest boundaries: recent studies settling 44 years of puzzlement. Presentation to the Tasmanian Bushfire Research Group, 25 September, TAS, Australia.
T4-A3	**Knowledge sharing forum**: Navid, G. Pickett-Heaps, C. Moore, N. (2024 Oct). Long-range flood outlook for strategic preparedness. Project presentation and briefing for QLD Police Service
T4-A4b	**Knowledge sharing forum**: Slater, L. (2024) Healing Country through Wolgalu/Wiradjuri-led land management. Presented a paper at Australian Centre for Culture, Environment, Society, UOW
T4-A4b	**Knowledge sharing forum**: Slater, L. et al (2024) BTLALC Community members meeting – Knowledge sharing and exchange with Yuin (Batemans Bay): Nation networking and building – Aboriginal people out on country, knowledge sharing
PE-2022-01	**Knowledge sharing forum**: Taylor, M. (2024) Community experiences of the 2022 Australian floods – Queensland and NSW. Presentation on recovery policy implications to the National Recovery Leaders Forum, July 2024.
PE-2022-01	**Knowledge sharing forum:** Taylor, M., Miller, F. (2024) Community experiences of the 2022 Australian floods – Queensland and NSW. Presentation to the Queensland Reconstruction Authority, 15 November 2024.

Project/initiative	Output details
Postgraduate Scholar: Christy Hung, University of Sydney	**Knowledge sharing forum**: In the hot seat – effects of fire temperature on ash properties from Eucalyptus litter. Presentation to the Ecological Society of Australia, 9–13 December, VIC, Australia
Postgraduate Scholar: Phoebe Quinn, University of Melbourne	**Knowledge sharing forum**: Live Polis Experience: Tackling Academic Flying and Climate Change. Platform Blues: The Sad States of Social Media. University of Canberra. 21 November, ACT, Australia.
Thought leadership	Suncorp and Natural Hazards Research Australia (2024) Nature positive disaster risk reduction solutions
Hazardous Publications	Eburn M & Gissing A (2024) Principles of best practice strategic crisis management arrangements for catastrophic disasters, Practice Note 1, Natural Hazards Research Australia Kuligowski E, Perry P, Pupedis G, Griffin A, Begg C, Dootson P, Gardner A, Neale T, Dwyer G (2024) Community comprehension, perception and use of maps during bushfires, Hazard Note 5, Natural Hazards Research Australia Parkins K, Bentley P, Cirulis B, Penman T, Florec V (2024) Bushfires and power networks – identifying areas of highest risk in Queensland, Hazard Note 6, Natural Hazards Research Australia
Project reports	Archer R, Hunter B, Yanner Snr M, Yanner Jnr M, Amini-Yanner R, Anderson K, James G, Ford A, Pearse M (2024) Connecting Indigenous people and the emergency management sector – pathways to effective partnerships, Natural Hazards Research Australia Eburn M & Gissing A (2024) Principles of best practice strategic crisis management arrangements for catastrophic disasters, Natural Hazards Research Australia Naderpajouh N, Zolghadr A, Habibi Moshfegh P, Pakizeh A, Schlosberg D, Opdyke A, Van Ogtrop F, Howard A, Matous P, Bailie J, Hadigheh A, Crock M, Zhang H, Vervoort W, (2024) Community Risk Assessment: Connecting technical knowledge with local and Indigenous knowledge, Natural Hazard Research Australia

Attachment 4: Acronyms and abbreviations

AEMA	Australian Emergency Management Arrangements
AFAC	Australasian Fire and Emergency Service Authorities Council
AIDR	Australian Institute Disaster Reduction
ARC	Australian Research Council
BNHCRC	Bushfire and Natural Hazards Cooperative Research Centre
Centre	Natural Hazards Research Australia
CFA	Country Fire Authority
CLCAC	Carpentaria Land Council Aboriginal Corporation
CRC	Cooperative Research Centre
DEECA	Department of Energy, Environment and Climate Action
ECR	Early career researcher
EMCAP	Early and Mid-Career Academic and Practitioners
EOI	Expression of interest
FTIR	Fourier Transform Infrared Spectroscopy
IARC	International Agency for Research on Cancer
IAWF	International Association of Wildland Fire
ICIP	Indigenous Cultural Intellectual Property
NAFC	National Aerial Firefighting Centre
NAILSMA	North Australian Indigenous Land and Sea Management Alliance Ltd
NEMA	National Emergency Management Agency
NGOs	non-government organisations
NIDR	National Indigenous Disaster Resilience
NPWS	National Parks and Wildlife Service
PSC	Project steering committee
QRA	Queensland Reconstruction Authority
RHF	Resilient Homes Fund
RHP	Resilient Homes Program
RIEL	Research Institute for the Environment and Livelihoods (Charles Darwin University)
SES	State Emergency Service
SRRG	Social Recovery Reference Group