Natural Hazards Research Australia

Multi-hazard public information and warning platforms for the future

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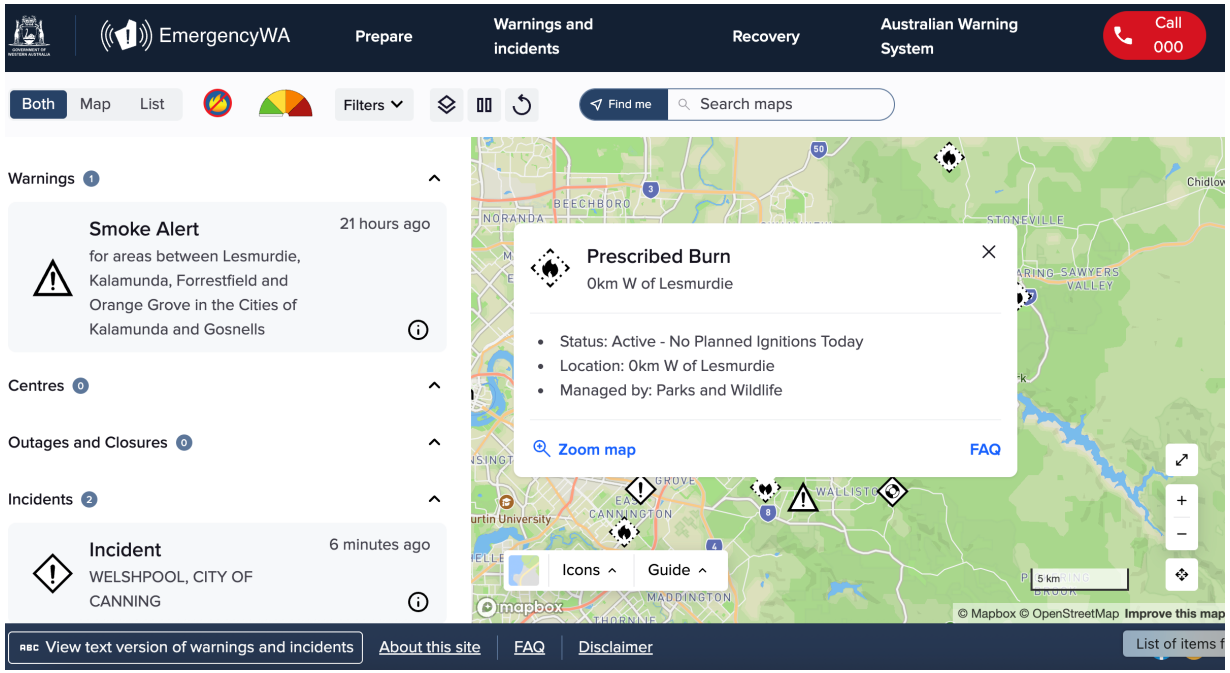
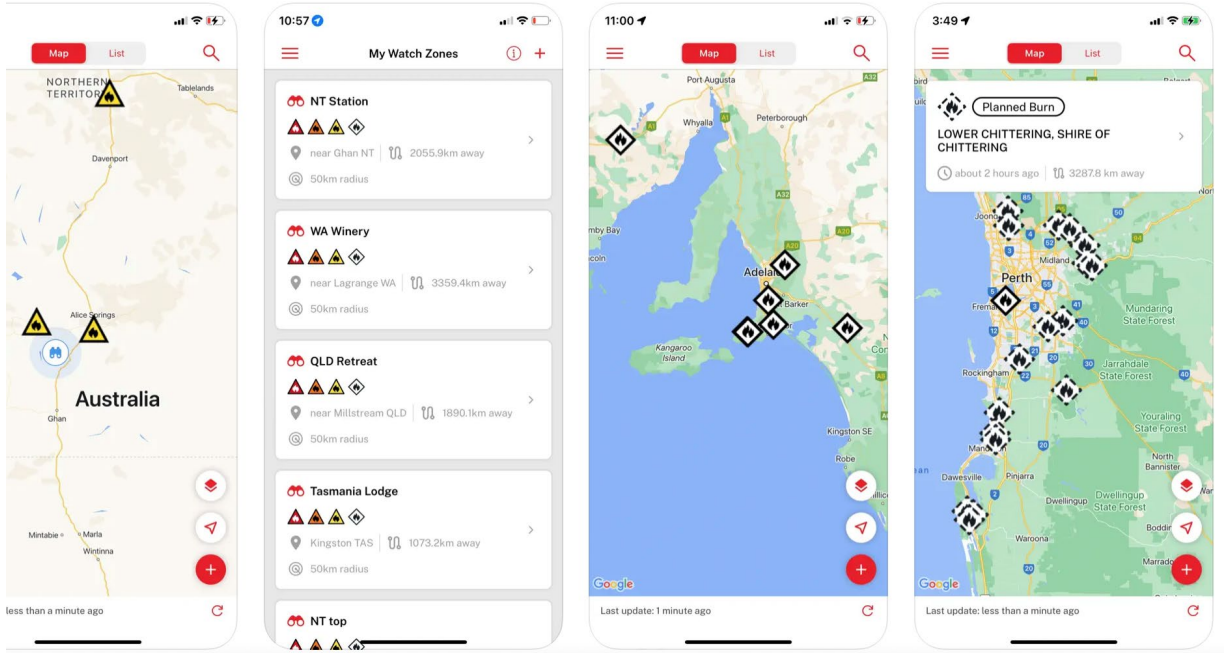
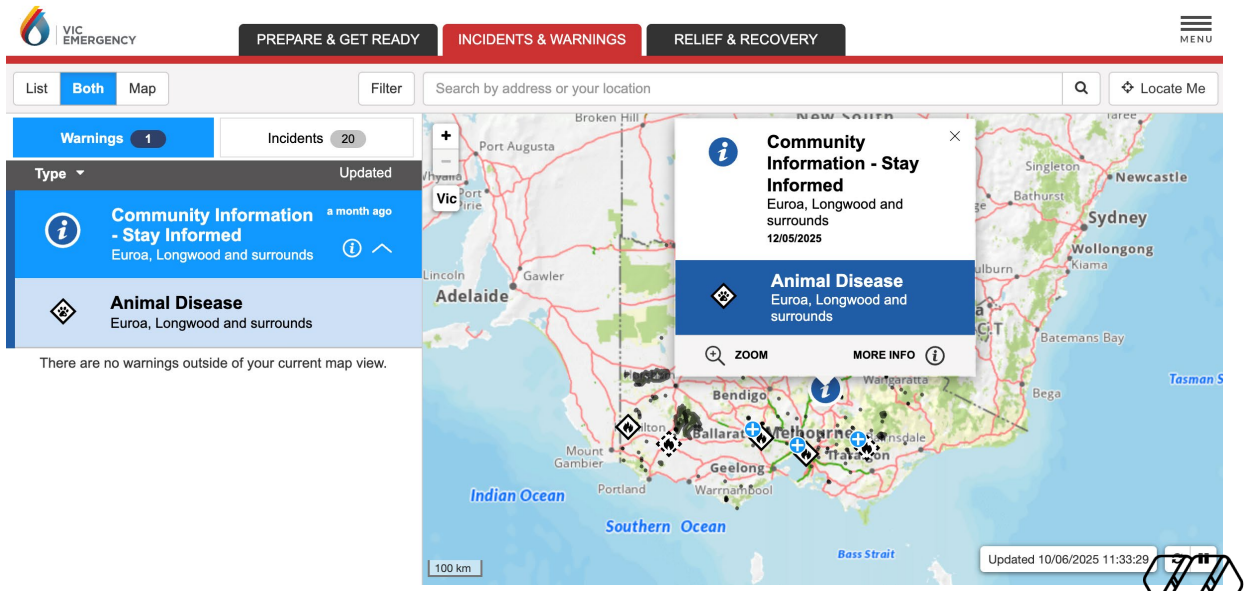
Image: Created by Paula Dootson using AI





Australian Warning System



Research team

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RMIT UNIVERSITY

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CFA

Chloe Begg

Natural Hazards Research Australia

Project aim

This research aims to understand how multi-hazard public information and warning platforms contribute to public safety within a broader risk communication framework, seeking to explore future communication innovations and capabilities.

Image: Created by Paula Dootson using AI

Research questions

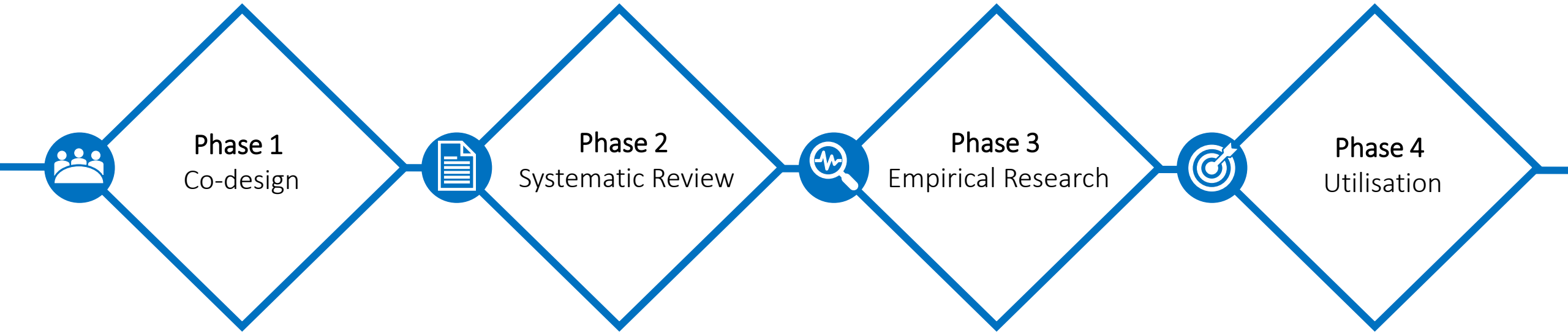
1. How and why do different community cohorts use multi-hazard public information and warning platforms in Australia?

2. What role do digital platforms play in shaping the community's information-seeking and protective action?

3. How might multi-hazard public information and warnings platforms be improved, integrated, and adapted to better meet the informational needs of diverse communities into the future?

4. What are the enablers and barriers to designing and utilising a national multi-hazard warnings platform, and why, from both the community and emergency management system perspectives?

Research design



FOCUS AREAS

Platforms in the ecosystem | Receive, Understand, Use | Calls To Action (esp. 'multi')

Visuals to empower or overwhelm | Republishing on third-party platforms | Reach by event type

Education | Future preferences and affordances

Andrew Gissing

CEO, Natural Hazards Research Australia

Warnings are about people. Legislation, frameworks and capability must support a **people-centred** approach to warnings.

Our vision

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

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.

Communities say...

- Difficult to understand terminology
- Accurate, live and visual sources of information are valued
- Desire for local level information informed by local knowledge – practical, location specific
- They use multiple sources of information
- Social media and friends and neighbors help to fill the gaps in official sources

Emergency Managers say...

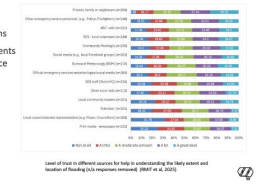
Future challenges and opportunities

Challenges

- Erosion of trust in institutions
- Communicating extreme events without historical precedence
- Coverage of flash flood warning systems

Opportunities

- Personalised
- Interactive



Level of trust in different sources for help in understanding the likely extent and location of flooding (n/a responses removed). (WART et al, 2025)

Jeannette Sutton, Ph.D.

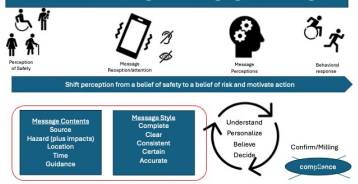
University at Albany
The Warn Room, LLC

THE WARN ROOM

Emergency Alerting in the US: present challenges and future opportunities

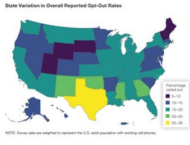
Jeannette Sutton, PhD

The second challenge is: writing a good message.



Our greatest threats to opting out

- Geography
- Relevancy
- Content
- SOUND



Source: Parker et al. 2024. Assessing Public Reach of the 2023 National Test of the Wireless Emergency Alerts (WEA) System. HSOAC.

What does a complete message look like?

Imminent Threat Message

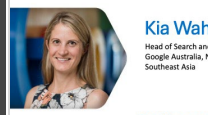
[Source]: HAZARD TYPE occurring in **[location]** at **[time]. [Hazard impact statement]. [Protective Action Guidance].** For more information visit **[URL].**

Sutton, J., Olson, M. K., Walpole, H., Cain, L. B., Waugh, N., & Wood, M. M. (2025) The complete message is the best message: The case for standardizing Wireless Emergency Alerts. *Natural Hazards Review*. 26(3).

Tools for writing a good message

- Sutton, J., Olson, M. K., Waugh, N. A. (2023) The Warning Lexicon: A Multiphased Study to Identify, Design, and Develop Contents for Warning Messages. *Natural Hazards Review.* 25(1).
- Sutton, J., Walpole, H.D., Olson, M., Cain, L., Olivas, S., Pollock, B., & Waugh, N. (in press) The Post-Alert Message Lexicon. *Natural Hazards Review.*

See www.thewarnroom.com
Follow me on LinkedIn @jeannettesutton



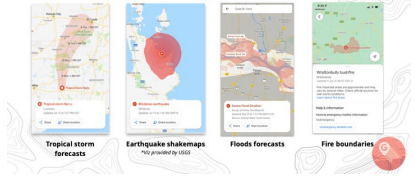
Kia Wahl

Head of Search and Gemini Partnerships for Google Australia, New Zealand, and Southeast Asia

Dr Karen O'Connor

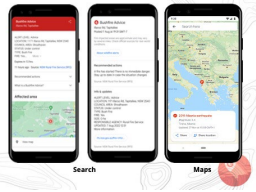
Founding Principal, Earth Fire Alliance

Improving alerts: building better visuals



Public Alerts

- Draws from automated feeds from public and government agencies
- Focused on weather, public safety & natural events
- Alerts surface when a publisher sends a new alert for moderate to severe events
- Language and description is provided by the publisher
- Reaches users via Search, Maps and notifications



Earth Fire Alliance

A Global Community-Led Nonprofit

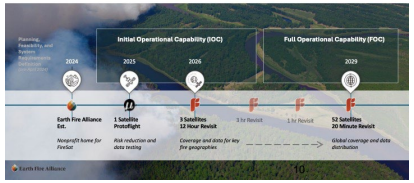
Committed to delivering transformative real-time data from all wildfires on Earth, changing our collective approach and relationship to fire.

FireSat

The Alliance's Flagship Program

A space-based fire detection and characterization system designed specifically for wildfires, providing timely and trustworthy wildfire activity data directly to agencies around the world who protect their communities.

Timeline for Operationalization of the Constellation



Earth Fire Alliance Supporters

Earth Fire Alliance is a community-driven effort and works across and with our philanthropic, private industry, government, and agency collaborators.

Google.org · Gordon and Betty Moore Foundation · Patrick J McGovern Foundation · Environmental Defense Fund · MuonSpace

Early Adopter Agencies from three continents

Technology is a tool, not a strategy

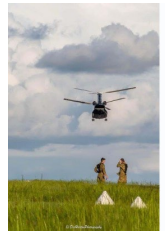
Relying solely on technology is a risk. It should support our strategy, not *be* the strategy.

Tech will always fail

"We're always looking for the technology fix to our problems, but it will fail you just when you need it the most, because that's what technology tends to do. We can't lose sight of the human piece.

— Kelly McKinney, former Deputy Commissioner, New York City Office of Emergency Management

Low-tech solutions will always have a place



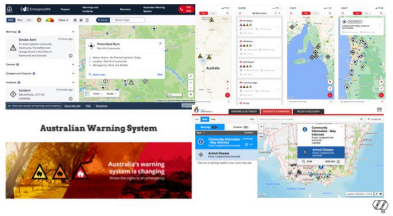
When technology fails, direct, physical communication is often the only lifeline

If tech fails tomorrow...

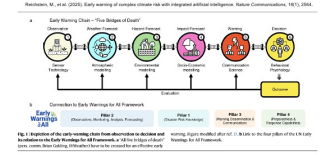
- How would you reach your community?
- Who would carry the message?
- Would people trust it and act on it?

A/Prof. Paula Dootson

Queensland University of Technology
Chief Investigator, Natural Hazards Research Australia



Value chain from detection to communication

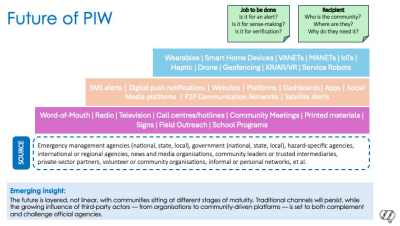


Emerging insight:
The distance between the raw data and the community accessing that data is decreasing - 'direct to consumer' (D2C) model. What is the role for authorities?

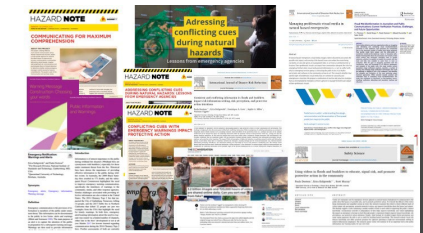
Public Information and Warnings Ecosystem

Emerging insight:
Need a global standard measure for delineating between platform, channel, and source.

Future of PIW



Emerging insight:
The future is layered, not linear, with communities sitting at different stages of maturity. Traditional channels will persist, while the growing influence of third-party actors — from organizations to community-driven platforms — is set to both complement and challenge official agencies.



Jochen Luther

Technical Coordinator for Weather, Climate, Hydrological, Marine, and Related Environmental Services and Applications
Secretariat of the World Meteorological Organization (WMO)

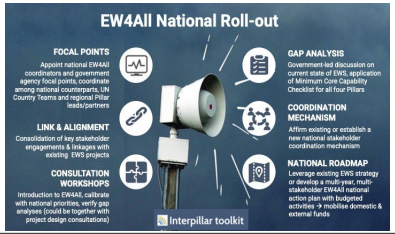
Early Warnings for All (EW4All)

A global initiative that aims to protect everyone everywhere by 2027

- Announced by UN Secretary General Antonio Guterres on **23 March 2022** (World Meteorological Day), **launched at COP27** that year as part of his **Acceleration Agenda**
- Aligns with the priorities of the **Paris Agreement**
- Supports key provisions of the **Sendai Framework for Disaster Risk Reduction 2015-2030**, particularly **Target G** on availability and accessibility of multi-hazard early warning systems
- Contributes directly to the UN's **Sustainable Development Goals** (SDGs), on poverty, hunger, health, water, clean energy, climate action and sustainable cities → **more than strengthening early warning**
- **NOT a new, standalone programme or project! Rather a campaign and new, coordinated way of working** → EW4All builds on existing or previous initiatives and partnerships, e.g. six Early Warning Conferences

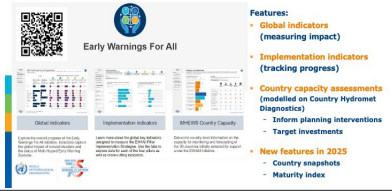
Built on **four Pillars** with **Inter-Pillar Domains**

EW4All National Roll-out



EW4All Dashboard

The Initiative's main data portal used to track progress and measure success along the M&E Framework.



Features:

- **Global indicators (measuring impact)**
- **Implementation indicators (tracking progress)**
- **Country capacity assessments (modelled on Country Hydromet Diagnostics)**
  - **Inform planning interventions**
  - **Target investments**
- **New features in 2025**
  - **Country snapshots**
  - **Maturity index**

Demonstrating Global Results

55 countries out of 195 report having available disaster risk information

This represents a year-to-year **increase of 31%**

Still, this Pillar lags most behind

Global hazard forecasting is improving, but still lagging behind

108 countries now report **strengthened MHEWS capacities**

100 countries report they are disseminating warnings – the highest number!

45 countries report use of Cell Broadcast for warning dissemination in 2024

In 2023, **47 countries** had at least one Anticipatory Action framework, nearly **doubling from 2022**

Improved preparedness to respond reported by countries

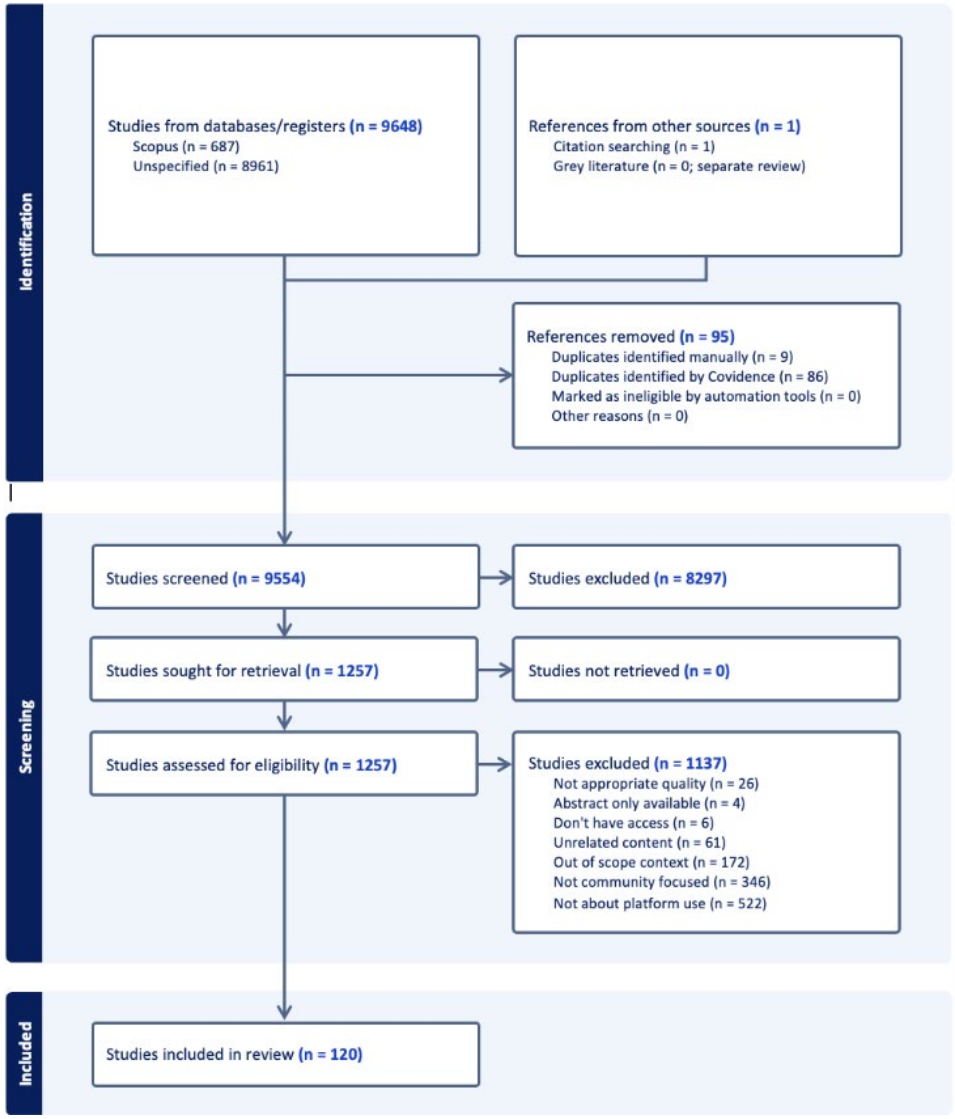
Phase 2: Systematic review

RQ1. How and why do different community cohorts use multi-hazard public information and warning platforms ~~in Australia~~?

RQ2. What role do digital platforms play in shaping the community's information-seeking and protective action?

Search String:
TITLE-ABS-KEY("public information and warnings" OR warnings OR "risk communication") AND TITLE-ABS-KEY(platform* OR channel* OR app*) AND TITLE-ABS-KEY(disaster* OR emergency OR emergencies OR "natural hazard*" OR bushfire* OR flood* OR cyclone* OR wildfire* OR storm* OR earthquake*) AND NOT TITLE-ABS-KEY(health OR hospital* OR patient* OR disease* OR medical OR epidemiology OR pandemic)

Source: Scopus, ProQuest, Science Direct; **Timeframes:** 2015 – 2025; **Peer Reviewed; Language:** English; **Document type:** article, conference paper, book chapter, case study, review articles, encyclopaedia, case reports, practice guidelines, short communications



Phase 2: SLR

Terminology inconsistencies. The literature conflated key terms such as 'channel', 'source', 'early warning system', and 'platform'. Unclear terminology creates barriers to translating research into policy and practice.

Multi-channel strategy. Strong, consistent support for a multi-channel strategy. Consistent information. Benefits outweigh risks of misinformation, conflicting information.

Changing information flows. I2A2C; I2C; C2A The information flows are more complex than ever before. Role of intermediaries to translate the data (common in earthquakes; not all hazards).

Platforms. ell broadcast (almost all WEAs US), web-based and mobile applications (e.g., proof-of-concepts; single hazard apps; multi-hazard apps), social media (Twitter saturation)

Multi-hazard apps. National and local. Greater retention. Preferred combining natural hazards with anthropogenic hazards (such as power outages and infrastructure damage). National as entry point , then directed to local/hazard specific. Interconnected with other channels outside app for specific community populations.

Phase 2: SLR

Key functions for multi-hazard apps. Alerts, immediate warning, buttons to request help or indicate safety,sharing capabilities to send warnings to family and friends through existing platforms such as WhatsApp and Messenger, chat functionality for two-way communication, and the ability to report hazards or hazardous local conditions. But also, 'slim'.

Timing and frequency of warnings. The area of least community consensus concerned the optimal timing and frequency of warnings. Real-time. Over-alerting (e.g., fear; welcomed; did not lead to uninstall rates). Post-alert messages help with false alerts, missed events, etc.

Community preferences and cohort differences. Occupation based (farmer), tourist, DHH, CALD, rural/regional, low literacy. Personal preferences and structural limitations (e.g., telecomms). Under representation in the dataset. But did have a lot of cultural diversity.

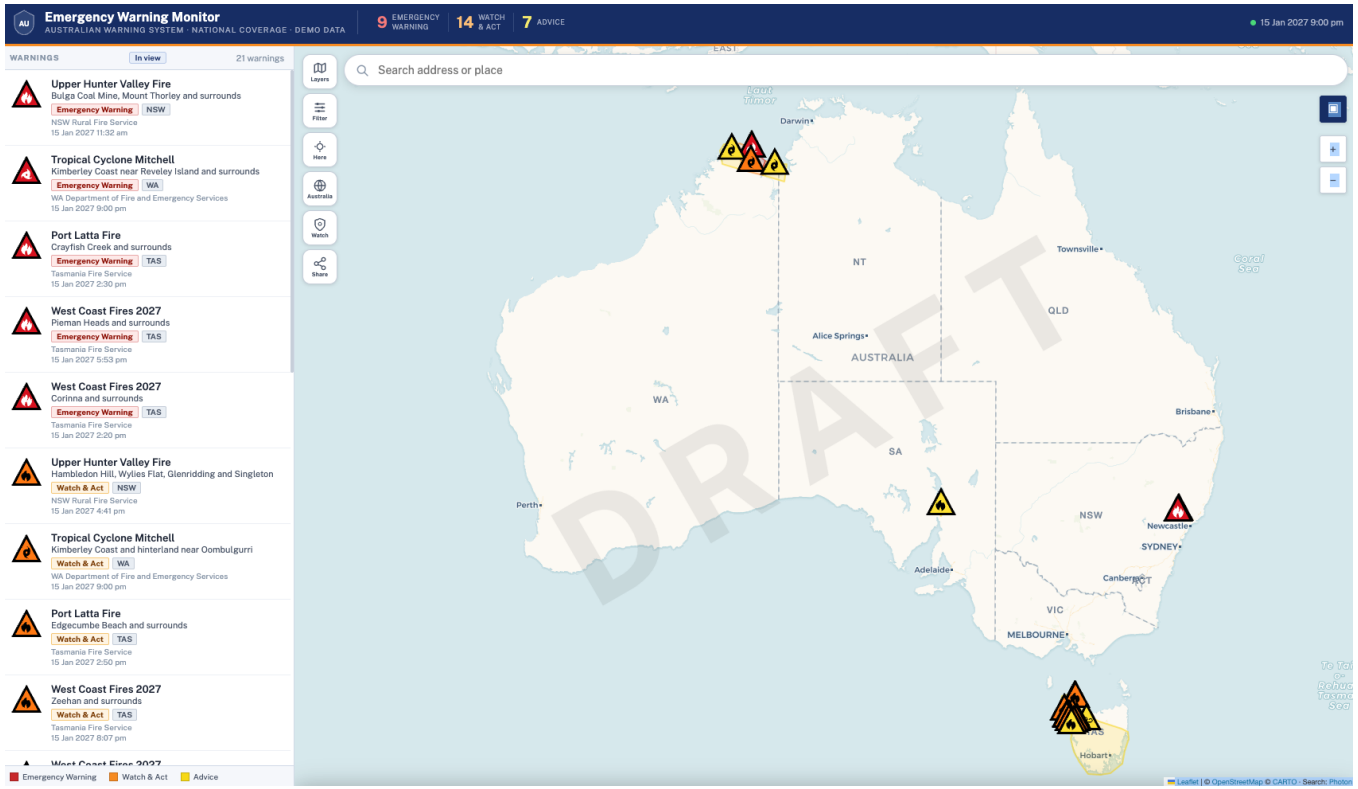
Platform use and protective action. No linear connection. Platform afford warning receipt --> insert other variables (e.g., trust in the source, prior knowledge and preparedness, and the ability to make sense of the information received) --> action

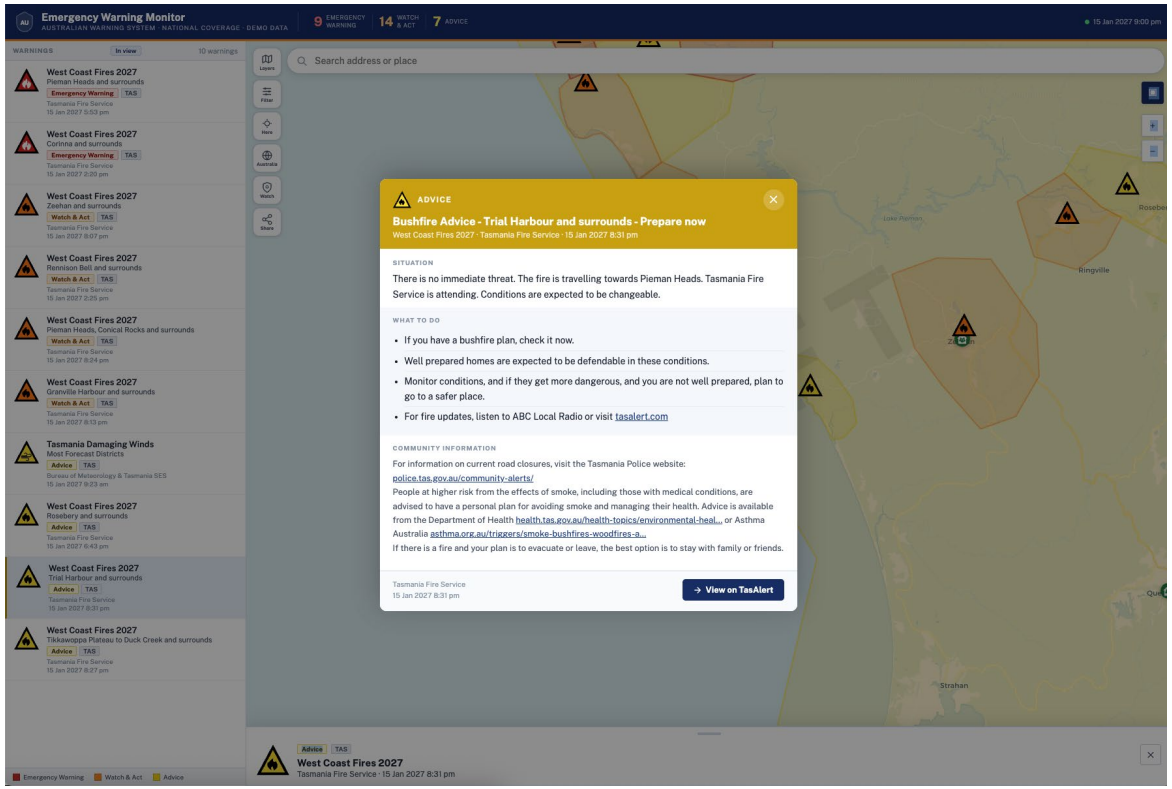
Trust is critical for platform effectiveness. Trust emerged as a critical factor influencing platform use, information acceptance, and protective action.

Phase 3: Empirical research

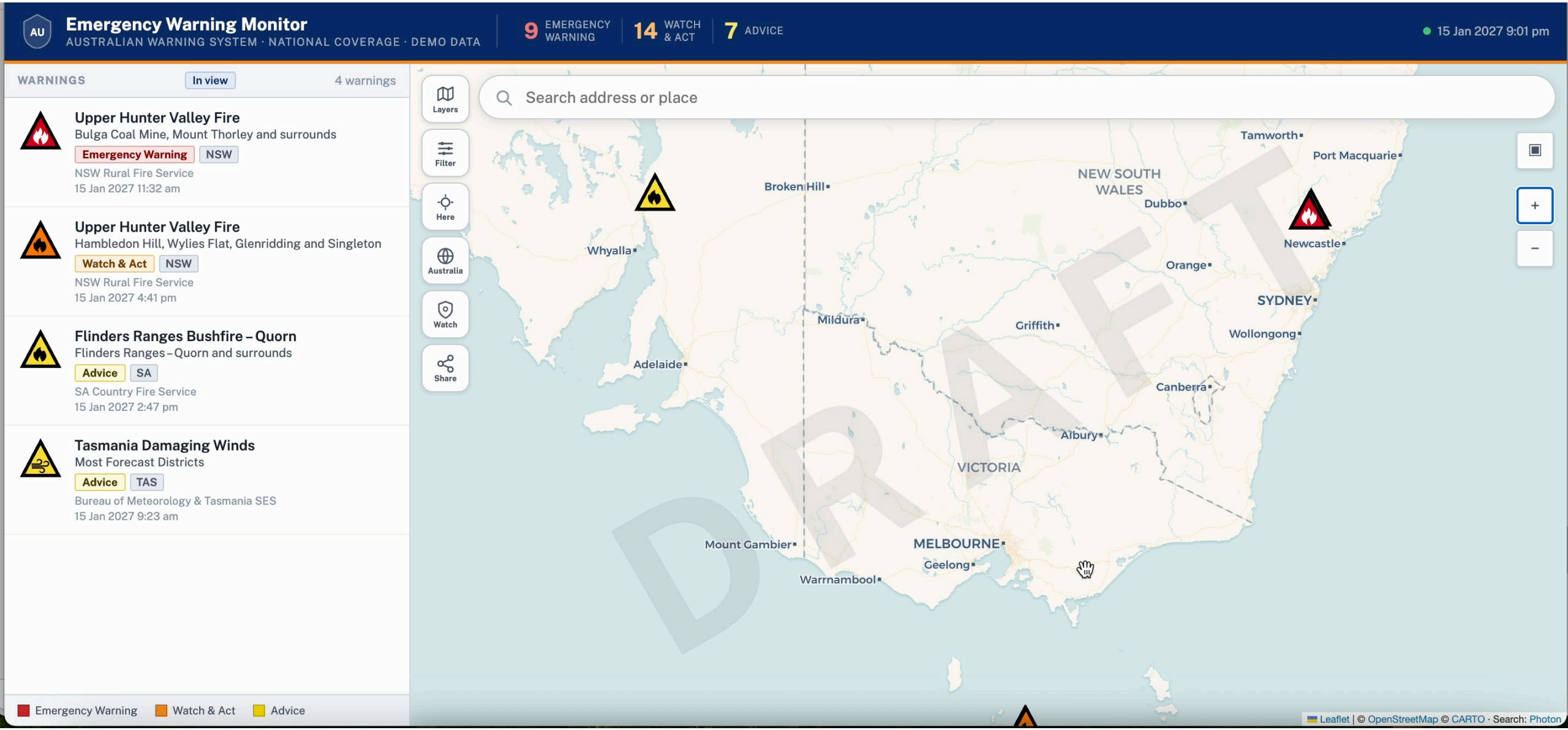
Study	RQ	Details	Progress
Survey 1 (QUT)	RQ1: How and why do different community cohorts use multi-hazard public information and warning platforms in Australia? RQ2: What role do digital platforms play in shaping the community's information-seeking behaviour and protective action? RQ3. How might multi-hazard public information and warnings platforms be improved, integrated, and adapted to better meet the informational needs of diverse communities into the future?	National sample	Finalising design
Case Study 1 Interviews (UTAS)		Sample and locations: Regional and Remote in Tasmania; Transient population (tourists, remote) in Western Australia (Broome) (N=25 in each locations; 50 total); individual or group interviews (e.g., household)	Tas fieldwork complete WA field work in July
Case Study 2 Interviews and focus groups (RMIT)		Sample: CALD; Regional (N=25 in each locations; 50 total) + 2 x focus groups (N=16) Locations: Victoria and cross-border NSW	Location decision-making
Case Study 3 (Monash)		(a) Review of accessibility design standards; (b) Workshops with CALD; Accessibility cohorts (N=40) Victoria	Designing workshops Identifying artefacts
Survey 2 (QUT)		National sample Experimental design tests (e.g., overwhelm)	Pending other study outcomes
Interviews (QUT)	RQ4. What are the enablers and barriers to designing and utilising a national multi-hazard warnings platform, and why, from both the community and emergency management system perspectives?	NHRA Forum Workshop (10/6) Interviews	Designing workshop Recruiting interviewees

The national platform …





https://www.griffinstudents.com/MHazWarn/AWS_warning_map_vTAS.html


AU
Emergency Warning Monitor
AUSTRALIAN WARNING SYSTEM · NATIONAL COVERAGE · DEMO DATA
9 EMERGENCY WARNING
14 WATCH & ACT
7 ADVICE
15 Jan 2027 9:01 pm
WARNINGS
In view
4 warnings
Upper Hunter Valley Fire
Bulga Coal Mine, Mount Thorley and surrounds
Emergency Warning
NSW
NSW Rural Fire Service
15 Jan 2027 11:32 am
Upper Hunter Valley Fire
Hambledon Hill, Wylies Flat, Glenridding and Singleton
Watch & Act
NSW
NSW Rural Fire Service
15 Jan 2027 4:41 pm
Flinders Ranges Bushfire – Quorn
Flinders Ranges – Quorn and surrounds
Advice
SA
SA Country Fire Service
15 Jan 2027 2:47 pm
Tasmania Damaging Winds
Most Forecast Districts
Advice
TAS
Bureau of Meteorology & Tasmania SES
15 Jan 2027 9:23 am
Emergency Warning
Watch & Act
Advice
Layers
Filter
Here
Australia
Watch
Share
Search address or place
Tamworth
Port Macquarie
NEW SOUTH WALES
Broken Hill
Dubbo
Newcastle
Whyalla
Orange
SYDNEY
Mildura
Griffith
Wollongong
Adelaide
Canberra
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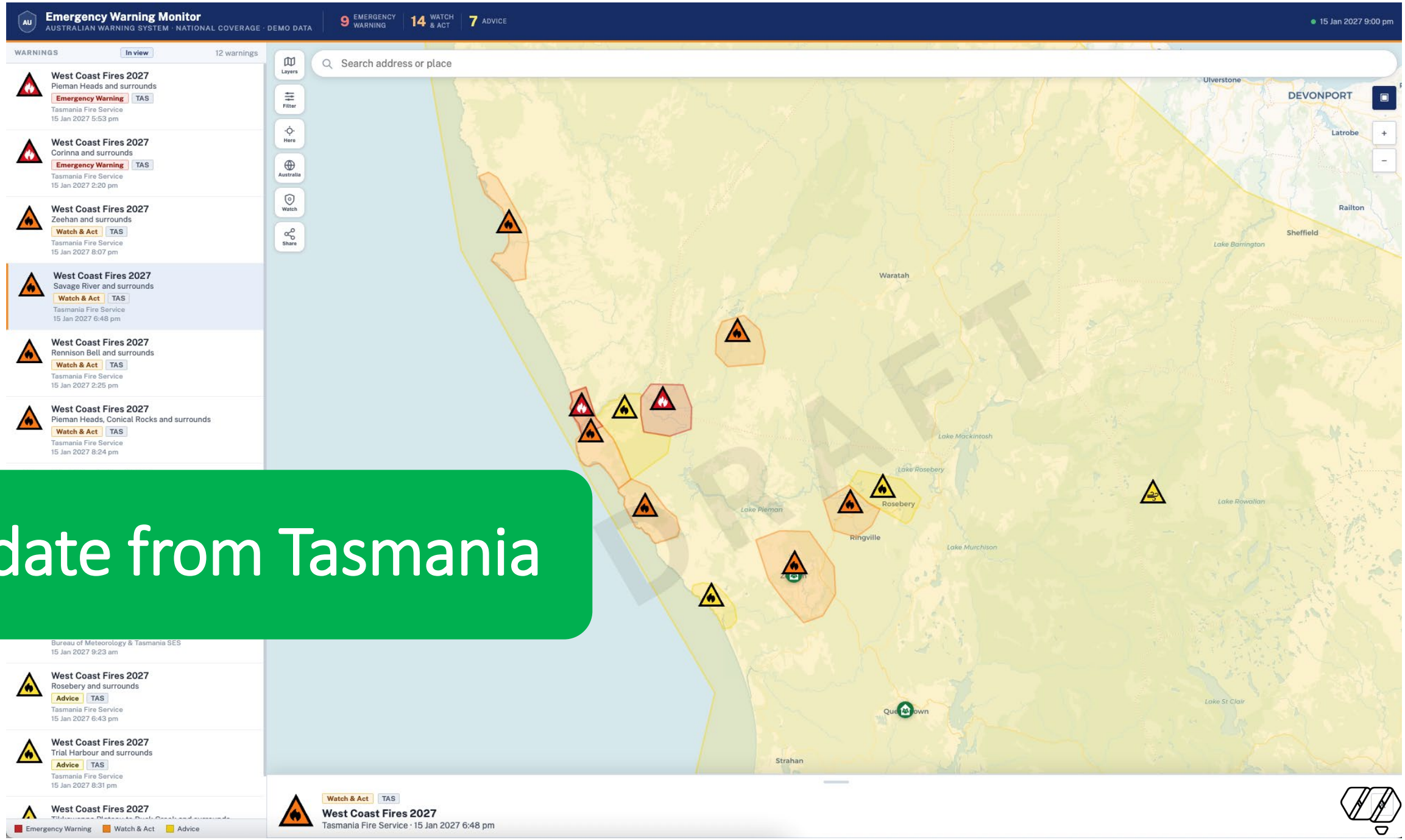

Update from Tasmania

Study 2: Northwest Tasmania

Regional/Remote, Low Literacy and Digital Access

- Case study in regional and remote Northwest Tasmania.
- Digital access & literacy can be limited; some people struggle with reading.
- Population is older than national average
- Internet/phone signal is limited in many areas.
- NW Tas has recent experience with hazards including significant fires and storms.

Study 2: Fieldwork

42 semi-structured interviews undertaken in:

- Smithton (remote, pop. 3990)
- Marrawah (remote, pop. 152)
- Arthur River (remote township, pop. 32)
- Zeehan (remote, pop. 700)
- Lorinna (remote, off grid, pop 81)

Study 2: Initial findings

Interviewees:

- Predominantly use current Tasmanian app. (TasAlerts), or do not use digital warnings.
- Face barriers to connectivity for use of any app (eg: black spots/travelling in & out of range)
- Want simple text/read aloud capacity within app and text messages.
- Note that some community members (esp. elderly) have no digital access/capability.
- Advocated for non-digital warnings, including sirens, door knocks.
- Trust in other community members most. Verify warnings using social media, trusting known people and ‘visual proof’ of hazards on these platforms.
- Questioned whether a national platform could be sufficiently locally relevant, detailed and timely enough to be relied upon.