

# Major Incidents Report

## 2020-21



Australian Government  
Department of Home Affairs

Australian Institute for  
Disaster Resilience



AIDR is the National Institute for disaster risk reduction and resilience. We collaborate across sectors to strengthen the resilience of Australian communities to disasters.

AIDR creates, grows, and supports a range of networks; provides opportunities for learning, development, and innovation; shares knowledge and resources to enable informed decision making and action; and facilitates thought leadership through national conversations.

AIDR is a consortium managed by AFAC as a business unit and supported by its partners: the Australian Government National Recovery and Resilience Agency and the Australian Red Cross.

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This report was compiled by Tony Murphy AFSM, former Chief Fire Officer of the Metropolitan Fire Brigade, Victoria, and Deputy Emergency Management Commissioner at Emergency Management Victoria.

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Traditional Owners of Country throughout Australia and recognises  
their continuing connection to land, waters and culture.  
We pay our respects to elders past, present and emerging.*







# Foreword

“How do we best prepare for the future?”

Achieving an effective national approach to natural disasters requires a clear, robust and accountable system capable of both providing a comprehensive understanding of, and responding to, the aggregated risks associated with mitigation, preparation for, response to and recovery from natural disasters”.

**Air Chief Marshal Mark Binskin AC (Retd)**

Chair, Royal Commission into National Natural Disaster Arrangements Report, 28 October 2020

This is the fifth Major Incidents Report commissioned by Emergency Management Australia and published by the Australian Institute for Disaster Resilience. This edition provides an authoritative overview of eight major incidents regarded as nationally significant by the emergency management sector, across the 2020-21 financial year. The report provides background information about each incident, the impact, the response to it and, where identified, observations to assist the emergency management and disaster resilience sectors identify key themes for improvement in practice at a national level, across all hazards and jurisdictions.

The report also provides a contextual snapshot of the novel environment the fire and emergency services have operated within during the COVID 19 pandemic period, in addition to the La Niña climate phenomena that delivered above average rainfall and erratic weather conditions across many parts of eastern Australia and other locations.

2020-21 was a challenging period for the fire and emergency services due to the complexity of consecutive, concurrent and compounding events. The report provides an overview of major storm and flood events in New South Wales, Queensland and Victoria that demonstrate the persistent nature of the La Niña weather pattern, its impacts and the extraordinary efforts from across the emergency management sector at state and national levels. The report includes significant bushfire events in K’gari, the World Heritage listed sand island off the coast of Queensland, and Wooroloo in the Perth Hills. It captures the impact of Tropical Cyclone Seroja, a rare event for communities on the central west coast of Western Australia, and the tsunami warning issued for Norfolk Island following a 7.9 magnitude earthquake near the Kermadec Islands region, north-east of New Zealand.

The report highlights the interoperability of the national emergency management system, the work of volunteers in communities under stress, and the diverse range of readily portable skills within these areas of the community.

I would like to acknowledge AIDR and the contribution of Tony Murphy AFSM in the development of this report, as well as the guidance and input provided by jurisdictional representatives from emergency service organisations and the Bureau of Meteorology who formed the Major Incidents Report Steering Committee.

**Joe Buffone**

Director General  
Emergency Management Australia

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# National overview

The impact of COVID-19 on frontline emergency operation and disaster recovery services has brought unprecedented challenges. The deployment of personnel and resources at short notice must now factor in COVID-19 prevention requirements and measures. These circumstances have forced us to adopt different ways to communicate, share and work. Importantly, this has also driven new ideas and the development of protocols and prioritisations for sharing personnel and resources in times of emergency.

The 2020–21 financial year (July 2020 to June 2021) was the coolest and wettest for Australia since 2016–17, after three exceptionally warm and dry years.

- A weak La Niña contributed to the third-wettest December on record and the wettest northern wet season (October to April) since 2016–17.
- La Niña developed relatively late, not being declared by the Bureau of Meteorology until 29 September 2020; it was officially declared as finished in late March 2021, with its peak strength observed during January 2021.
- Eight tropical cyclones were observed across the Australian region, slightly less than the average since 2000 of nine per financial year. Three tropical cyclones reached severe (Category 3) strength.
- Two tropical cyclones made landfall on the Australian mainland – Imogen and Seroja; Tropical Cyclone Seroja crossed the Western Australian central coast at Category 3 strength in April 2020 with wind gusts of 170 km/h recorded at Kalbarri.
- Extreme rainfall totals caused significant flooding along the New South Wales coast in March 2021 and in the Gippsland region of Victoria in June 2021.
- Improved rainfall conditions resulted in average to above average annual stream flows across large parts of the country, particularly in northern Australia and coastal catchments in the south-east.
- Although water storage levels have improved in many parts of the country, significant follow-up rainfall is still needed to fill the storages and increase water availability.
- Groundwater levels were mostly below average but are showing signs of recovery.

- Associated with the 2020–21 La Niña event, marine heatwave conditions were observed along the Western Australia west coast in early 2021, with sea surface temperatures up to 3°C above average; there was no significant coral bleaching observed.
- As at the end of July, root-zone soil moisture was generally average to above average across Australia.
- 2021 saw Australia's coolest January to June period since 2012.
- Spring 2020 saw the highest overnight temperatures ever recorded during spring in Australia; the mean spring temperature was slightly more than 2°C above the long-term average.
- Australia had its hottest November on record in 2020, with a mean temperature 2.47°C above the long-term average.
- Australian annual mean temperature has increased by around 1.4°C since 1910. Australian Government activity

The Australian Government, through Emergency Management Australia (EMA), coordinates support, collaborates with and assists the states and territories to improve the overall resilience of Australia, Australians and the things that Australians value. The Australian Government Crisis Coordination Centre (CCC), now the National Situation Room (NSR) provided stakeholders verbal and written notification on domestic and international security and emergency management events, where the event poses potential risk to the Australian community or Australian interests overseas.

During the period of 1 July 2020 to 30 June 2021 (2020–21), the CCC issued more than 900 incident notifications to key stakeholders in Australian Government and state and territory government agencies. The CCC regularly notified stakeholders of and coordinated whole-of-Australian Government responses to a range of significant incidents including:





- K'Gari (Fraser Island) bushfires, Queensland – October to December 2020
  - Significant fire which burned approx. 85,000 hectares (more than half of the island). Aerial assets from other jurisdictions were utilised to support Queensland Fire and Emergency Services.
- Wooroloo (Perth Hills) bushfire, Western Australia – 1 February 2021
  - Significant fire which burned approx. 10,900 hectares. 86 houses were destroyed.
  - The Australian Government Disaster Response Plan 2020 (COMDISPLAN) was activated on 2 February to provide non-financial assistance in relation to the bushfires.
  - The Australian Government Disaster Recovery Payments (AGDRP) and the Disaster Recovery Allowance (DRA) were activated in response to the Wooroloo bushfire.
  - An EMA liaison officer was deployed to the Western Australia State Operations Centre to assist with information flow and to support requests for Australian Government non-financial assistance.
  - Geoscience Australia, on behalf of EMA and the Australian Government, requested the assistance of the Copernicus Emergency Management Service to provide on demand mapping to assist with the response.
- Kermadec Islands earthquake resulting in Norfolk Island tsunami warning – 5 March 2021
  - A 7.9 magnitude earthquake north of New Zealand resulted in a tsunami warning for Norfolk Island. A 64 cm tsunami wave was observed at the island, but there were no injuries reported.
  - The CCC verbally notified and provided updates to a range of stakeholders to advise of the earthquake, tsunami warning and impact.
  - The CCC maintained contact with Geoscience Australia and the Bureau of Meteorology regarding the magnitude of the earthquake and tsunami forecasts.
- New South Wales/Queensland flooding event – commencing 10 March 2021
  - Extreme rainfall on the east coast of Australia, beginning on 18 March 2021, led to widespread flooding in New South Wales, affecting regions from the North Coast to the Sydney metropolitan area in the south.
  - Suburbs of Sydney experienced their worst flooding in 60 years. Far-south-eastern communities in Queensland were also affected by flooding and heavy rainfall, though to a lesser extent than those in New South Wales.
- The Australian Government declared many parts of the east coast a natural disaster zone after flooding and severe weather forced 18,000 people to evacuate, in addition to over 1,000 flood rescues.
- Three people died and it was estimated that the cost of damage would exceed \$1 billion.
- EMA liaison officers were deployed into the New South Wales State Emergency Service Operations Centre to support any requests for Australian Government non-financial assistance.
- Victorian flooding event – commencing 9 June 2021
  - An extensive severe weather system resulted in significant damage and widespread flash flooding, largely across the Dandenong Ranges and Gippsland areas. Over 160,000 properties lost power, many for over a week. Damage assessments identified at least 110 properties as uninhabitable.
  - Two deaths were reported and many communities remained in communications isolation for a number of days.
  - Assistance under the Australian Government Disaster Recovery Funding Arrangements was made available to 37 impacted local government areas. The Department of Home Affairs Critical Infrastructure Centre consulted with the Trusted Information Sharing Network to canvass requests for assistance across industry.
  - The EMA CCC reported twice daily throughout both the response and recovery phases of this event to inform stakeholders and support decision making.
  - An EMA liaison officer was deployed to the Victorian State Control Centre to support any requests for Australian Government non-financial assistance.

A Crisis Coordination Team (CCT) was established on seven occasions for a total of 330 days to support the centralised approach of the Australian Government when a National Plan was activated. In the reporting period, the COMDISPLAN was activated on five occasions. The Australian Government coordinated 13 requests for assistance from states and territories. In addition, the Australian Government Overseas Assistance Plan (AUSASSISTPLAN) was activated six times and the Australian Government Space Re-entry Debris Plan (AUSSPREDPLAN) was activated twice.

The Australian Government Crisis Committee (AGCC) and Australian Government Disaster Recovery Committee (AGDRC) met on 11 occasions during 2020–21. The National Crisis Committee (NCC) did not convene during this period.

The National Security Hotline received over 27,500 contacts, assisting state and territory law enforcement and intelligence agencies.



Image: NSW SES

## Department of Defence contribution

During 2020–21, in response to requests for Commonwealth Assistance under the Commonwealth Disaster Response Plan, the Department of Defence (Defence) provided substantial contributions to emergency response and recovery efforts across the nation. Not only has Defence provided personnel in every state and territory, their scope of support included providing quarantine compliance management, port safety and security, border control, contact tracing, planning, and logistical support for the response to COVID-19.

Of note, in February, Defence transported essential fire retardant stocks to Western Australia for the Wooroloo bushfires, for use by aerial firefighting aircraft. In March, over 900 Defence personnel supported the flood response efforts in New South Wales through search and rescue operations, recovery operations and providing essential re-supply to Lord Howe Island. After the impact of Tropical Cyclone Seroja in Western Australia, Defence personnel assisted the relief efforts through providing ground transport, logistics and field engineering support and airlift of emergency service personnel and equipment. In June, Defence assisted the response efforts to the Victorian severe weather event, by providing over 150 personnel for engineering and logistical support.

## Western Australia Tropical Cyclone Seroja

The CCC and by extension the CCT coordinated the Australian Government's response to the tropical cyclone between 11 April and 5 May. The Director General EMA activated COMDISPLAN on 11 April and 5 May for the cyclone impact as it crossed the Western Australia coast between Kalbarri and Geraldton as a Category 3 severe tropical cyclone. The Australian Government coordinated six requests for assistance related directly to the response.

The CCC coordinated and disseminated more than 6 notifications and 15 detailed incident briefs. Three liaison officers were deployed for a total of 15 days into the Western Australian State Operations Centre in support of timely, efficient and effective advice about Australian Government assistance.

To aid in situational awareness and decision making across the Australian Government, the joint AGCC and AGDRC met five times. The Commissioners and Chief Officers Strategic Committee met four times.

At the request of the Western Australian Government, and under the direction of the Australian Government, Defence provided substantial contributions to emergency response and recovery efforts for the impact of Tropical Cyclone Seroja. Significantly, Defence transported State Emergency Service vehicles – including trucks and four-wheel drives – from Melbourne to Geraldton on a C-17A Globemaster III. In addition, a Defence C-130J provided support to emergency services through the movement of personnel and supplies to the affected communities in need, including food, water and generators.

## Novel Coronavirus (COVID-19)

In anticipation of a response by the Australian Government to COVID-19, the Director General EMA authorised a national COMDISPLAN activation.

To support the unprecedented national coordination requirements across all areas of the Australian Government, state and territory governments and the commercial and private sector, the Prime Minister announced the activation of the National Coordination Mechanism (NCM) to respond to

non-health issues related to COVID-19. The NCM was supported by coordination nodes within the Department of Home Affairs that included representatives from key agencies that covered domain-specific issues, and the capabilities available to address challenges. The nodes also brought together crisis planners from Australian Government agencies including the Department of Home Affairs and Defence. The NCM coordinated 157 domain-specific sector meetings during 2020–21.

EMA, through the NCM, facilitated engagement between the Vaccination Task Force and industry groups and separately coordinated with the Department of Health and the Department of Infrastructure, Transport, Regional Development and Communications to review the freight code and protocol after the outbreak of the Delta variant and consequent imposition of new restrictions in states and territories.

When requested by the Australian Government, agencies such as Defence and the Australian Public Service Commission deploy personnel and resources to provide customised support to all state and territory authorities to reinforce, amplify and expand state and territory capacity to deal with the impacts of COVID-19. To date EMA has received 211 COVID-19 requests for assistance from states and territories and 73 COVID-19 requests for assistance from Australian Government agencies or departments. Over 17,000 Australian Government personnel have been involved in the response to COVID-19 nationally. The tasks have ranged from, but not limited to, quarantine compliance, quarantine facility management, port safety and security, border control, reception arrangements, contact tracing, planning, logistic support and providing support to the Department of Health Vaccine Program.

In response to a request for Australian Government assistance in managing COVID-19 in the Pacific, and Australia's broader region, the Director General EMA authorised AUSASSISTPLAN activations for:

- COVID-19 Support to Papua New Guinea (July 2020 to October 2020) – the Australian Government deployed two Australian Medical Assistance Teams (AUSMAT) to assist the Papua New Guinean Government to assess medical needs for COVID-19 response.
- COVID-19 Support to Papua New Guinea (March 2021 to May 2021) – the Australian Government deployed two AUSMATs to assist the Papua New Guinean Government to assess medical needs for COVID-19 response. EMA deployed a liaison officer to support the security and safety of AUSMAT.
- COVID-19 Support to Timor-Leste (April 2021 to June 2021) – the Australian Government deployed an AUSMAT to assist the Timor-Leste Government response to COVID-19 outbreak.
- COVID-19 Support to Fiji (June 2021) – the Australian Government deployed an AUSMAT to assist the Fijian Government response to COVID-19 outbreak.

## Disaster recovery funding

During 2020–21, the jointly funded Commonwealth-state/territory Disaster Recovery Funding Arrangements (DRFA) was activated in response to 43 domestic disaster events (13 in New South Wales, 2 in Northern Territory, 11 in Queensland, 1 in South Australia, 2 in Tasmania, 5 in Victoria and 9 in Western Australia).

There were 356 DRFA local government area activations. In addition, the Australian Government provided over \$250 million directly to disaster affected individuals and families through the Australian Government Disaster Recovery Payment and Disaster Recovery Allowance.

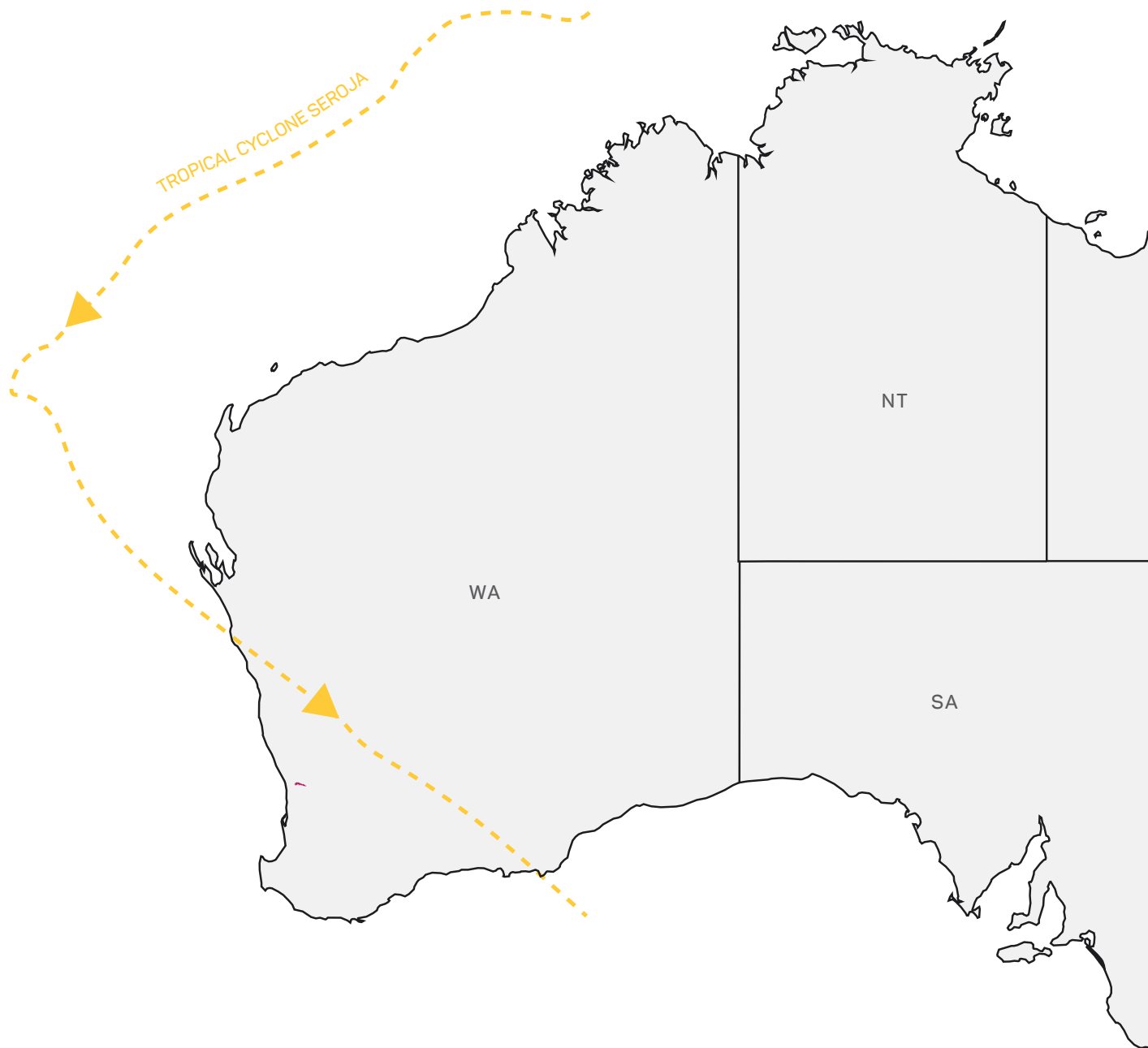




CPL David Cotton, ADF









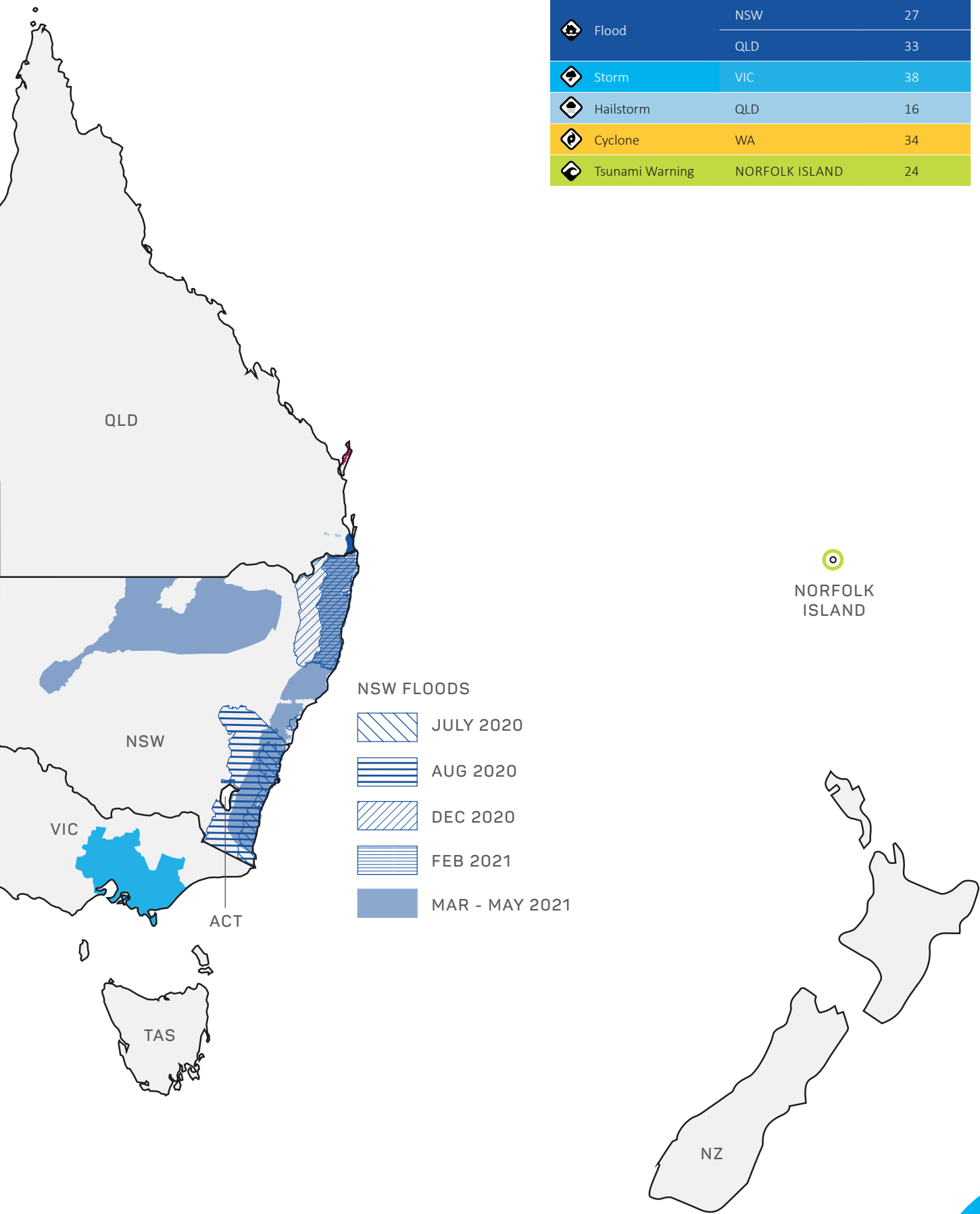
# Map of major incidents in this report





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# La Niña 2020–21

The Bureau of Meteorology (BOM) declared Australia was in a La Niña weather pattern on 29 September 2020. The phenomena resulted in spring and summer receiving above-average rainfall in most of northern and eastern Australia and persisted at weak to moderate levels into early Autumn 2021. This is typical of La Niña systems, which generally bring wetter spring and summer conditions for eastern Australia.

The weather pattern experienced during the 2020–21 period provided a number of complex, continued and compounding challenges to emergency response and emergency management agencies. During this period, many flood and storm events extended across Australia requiring response from emergency responders and recovery agencies to support communities. The incidents ranged from localised to magnitudes needing capability from interstate and the Commonwealth.

A number of localised and continued events are included in the *Major Incidents Report* to demonstrate the frequency of these weather events, their impact on communities and response efforts by emergency services agencies. A number of these events preceded the March flood event that impacted large parts of New South Wales and Southern Queensland.

The increase in rain reduced the fire risk over most of the nation, which was a welcome relief given the protracted bushfire season across several jurisdictions in 2019–20. La Niña also contributed to an increased risk of flooding as seen in the flood events through Queensland and New South Wales during March 2021.

In addition to La Niña, secondary climate drivers influenced the weather and climate of eastern Australia in the months preceding flooding events in 2021. These drivers provide additional clarity and understanding of the impacts associated with above average rainfall even as La Niña receded. During this time the BOM continued to inform the community of these drivers urging communities to remain vigilant when extreme weather was forecast.

Climate drivers during the 2020-21 season:

- The 2020–21 La Niña increased the likelihood of rain bearing weather patterns over eastern Australia and it reduced evaporation due to increased cloudiness and reduced temperatures. These conditions resulted in an increase in soil moisture during the spring and summer, meaning any heavy rainfall on the wet catchments saw less water soaked up by the ground and a tendency for rivers to respond more quickly and reach higher levels compared to dry catchments.
- The Southern Annular Mode (SAM) was in its positive phase for most of summer, although it was neutral in March. A positive SAM phase in summer is typically associated with enhanced easterly flow over eastern Australia and is favourable for above-average seasonal rainfall in most of New South Wales. The positive SAM reinforced the La Niña impacts and wetting of the catchments prior to the rainfall event of March 2021.
- The Madden–Julian Oscillation was well outside the Australian region during the second half of March 2021, while the monsoon was also relatively inactive during this period. However, relatively warm waters off northern Australia, and the lingering influence of the La Niña pattern across the Pacific, is likely to have added extra moisture to the tropical atmosphere, which then moved over central and eastern Australia during this event.

Much of the region affected by the March 2021 rainfall event experienced severe drought in 2019 and preceding years. Whilst above-average rainfall over most of eastern New South Wales eliminated short-term rainfall deficiencies, substantial long-term deficits remained in inland areas of northern New South Wales and southern Queensland. This was reflected in water storages, with storage levels in the northern Murray–Darling Basin increasing from 27.9% on 17 March to 46.0% on 28 March, reaching 47.1% of capacity at the end of March. This included the highest and third highest daily increases in combined storage volumes since 1993.



These natural climate drivers were set against the background of long-term climate change trends. As the climate warms, Australia's heavy rainfall events are expected to become more intense as moisture in the atmosphere increases by about 7% per degree of warming. Rainfall changes in specific locations, especially areas with complex topography such as coastal New South Wales, will have a higher level of uncertainty due to changes in the occurrence, strength, and position of synoptic weather systems. For the Australian continent, there is evidence that a higher proportion of total annual rainfall has come from heavy rainfall days in recent decades. Refer to the *State of the Climate 2020* (BOM and CSIRO 2020) for further details.

Figures 1 and 2 represent the rainfall parts of Australia received during the 2020-21 period and the impact on soil moisture across the nation.

A series of localised flooding events experienced in New South Wales also demonstrate the compounding and consistent nature of the flooding that challenged the emergency management system during the 2020–21 period.

### La Niña at a glance:

- La Niña and other secondary climate drivers produced significant rainfall across Australia compared to recent drier than average years, notably since 2016 when a negative Indian Ocean Dipole was active.
- September 2020 to March 2021 was the wettest across Australia since 2016.
- The 2020–21 flooding events were less significant to the previous period of La Niña in 2011–12.
- The wet conditions in 2020–21 contributed to a major drop off in widespread fire activity compared to recent years.
- Australia's rainfall during September 2020 to March 2021 was the 15th highest on record.
- New South Wales' rainfall during September 2020 to March 2021 was the 10th highest on record.
- New South Wales experienced its second highest March rainfall on record (only behind March 1956).
- The Murray–Darling Basin had its fourth highest rainfall on record for March.
- In December 2020, Australia, Western Australia and the Northern Territory experienced their third highest December rainfall on record.

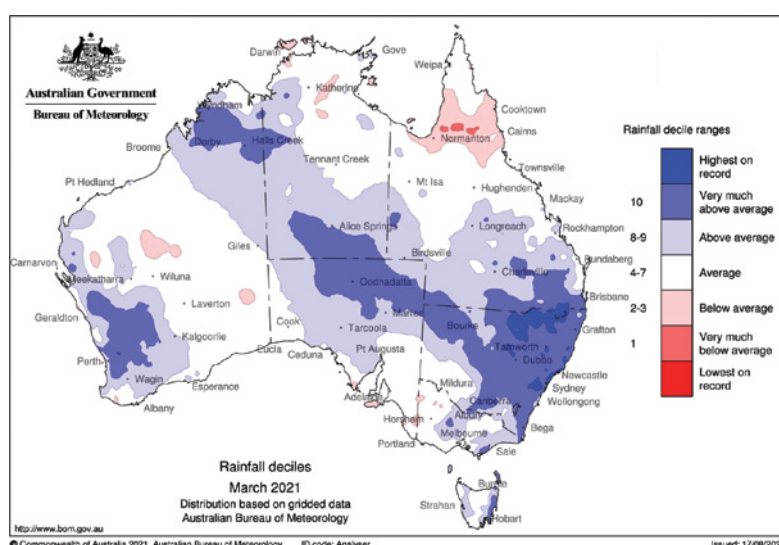


Figure 1: Rainfall deciles for March 2021 compared to historical observations from 1900

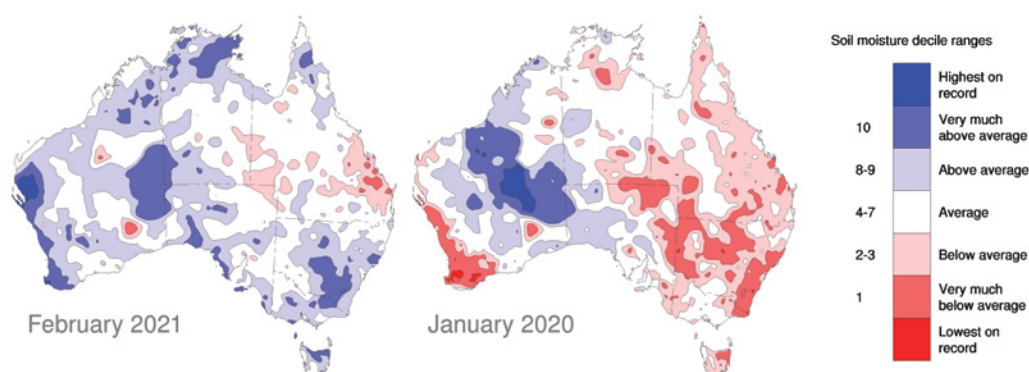


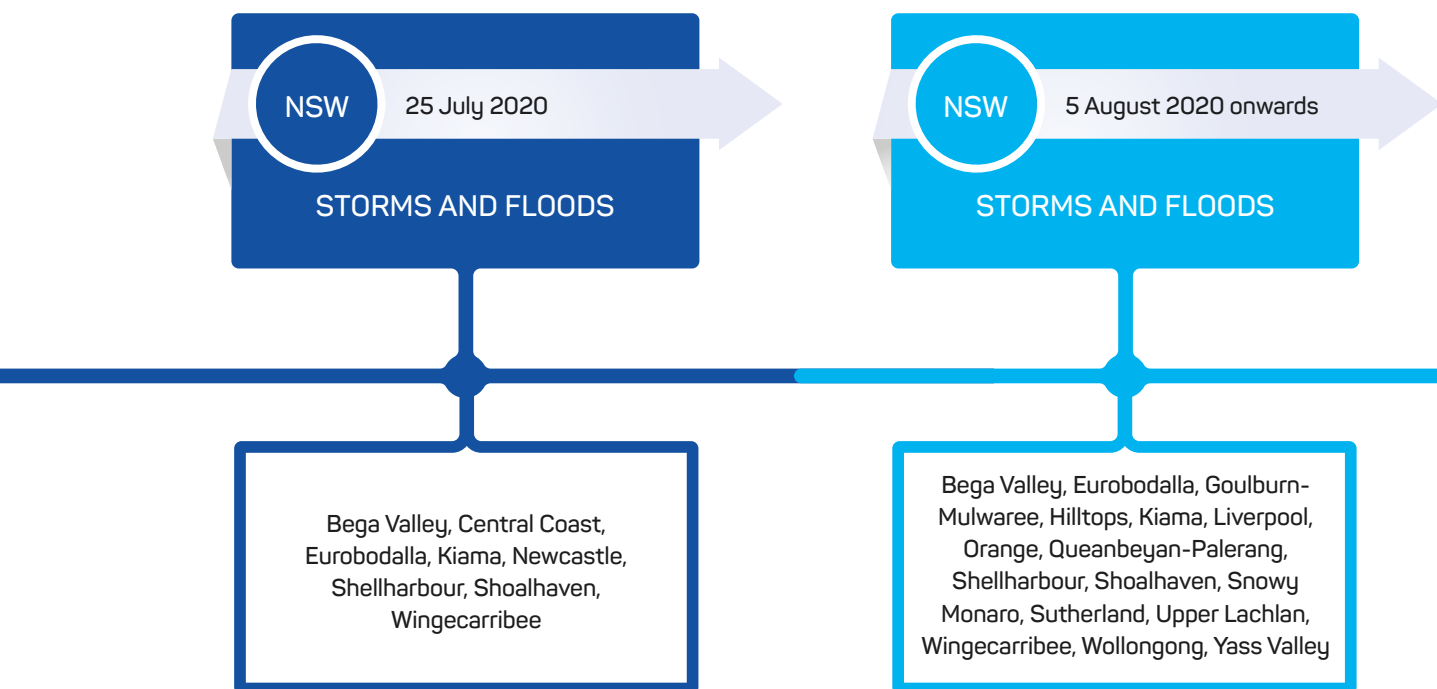
Figure 2: Root-zone soil moisture decile maps for February 2021 (left) and January 2020 (right) compared to historical observations from 1911



## Localised storms and floods in New South Wales

A series of localised storm and flood events in New South Wales between July and December 2020 provide a snapshot of the many weather-related events the emergency service and emergency management organisations responded to and managed throughout 2020–21. These events demonstrate how the La Niña weather pattern and other secondary climatic factors influenced disasters during this 12-month period. 2020–21 was a challenging period due to the complexity, consistency, and compounding nature of these events. The events summarised below precede the March floods in New South Wales that required extraordinary efforts from across the response and emergency management sector at state and national levels.

### Event statistics



A low-pressure system brought localised heavy rain, damaging winds and damaging surf to the eastern seaboard of New South Wales, from the Hunter Coast to the South Coast.

The New South Wales State Emergency Service (NSW SES) received 2,488 requests for assistance during this event. This figure included 33 flood rescue activations.

The NSW SES received 4,644 calls at the State Operations Centre during this event.

Impact occurred along coastal New South Wales, with the area from Wollongong to the Victorian border experiencing the highest impact resulting in 1,226 requests for assistance. Communities with greatest impact included Erowal Bay, Sanctuary Point and Sussex Inlet on the South Coast.

Up to 20 properties in low lying areas of Sussex Inlet on the South Coast were issued with an evacuation order. This was due to flooding caused by heavy rain and high tides. The evacuation order was in place for four days.

Across the South Coast, 90 residential and commercial properties were damaged by storm and flood, with 17 of these properties assessed as uninhabitable.

NSW SES response activities were assisted by teams from Fire and Rescue NSW (FRNSW) and the NSW Rural Fire Service (NSW RFS).

A complex low-pressure system made its way south-west across New South Wales, bringing widespread rain and windy conditions. Minor to moderate flooding was predicted along the South Coast and the Queanbeyan River. A total of 209 mm rainfall was recorded in Nowra in the 24-hour period between 3.30 pm on 7 August 2020 and 3.30 pm 8 August 2020.

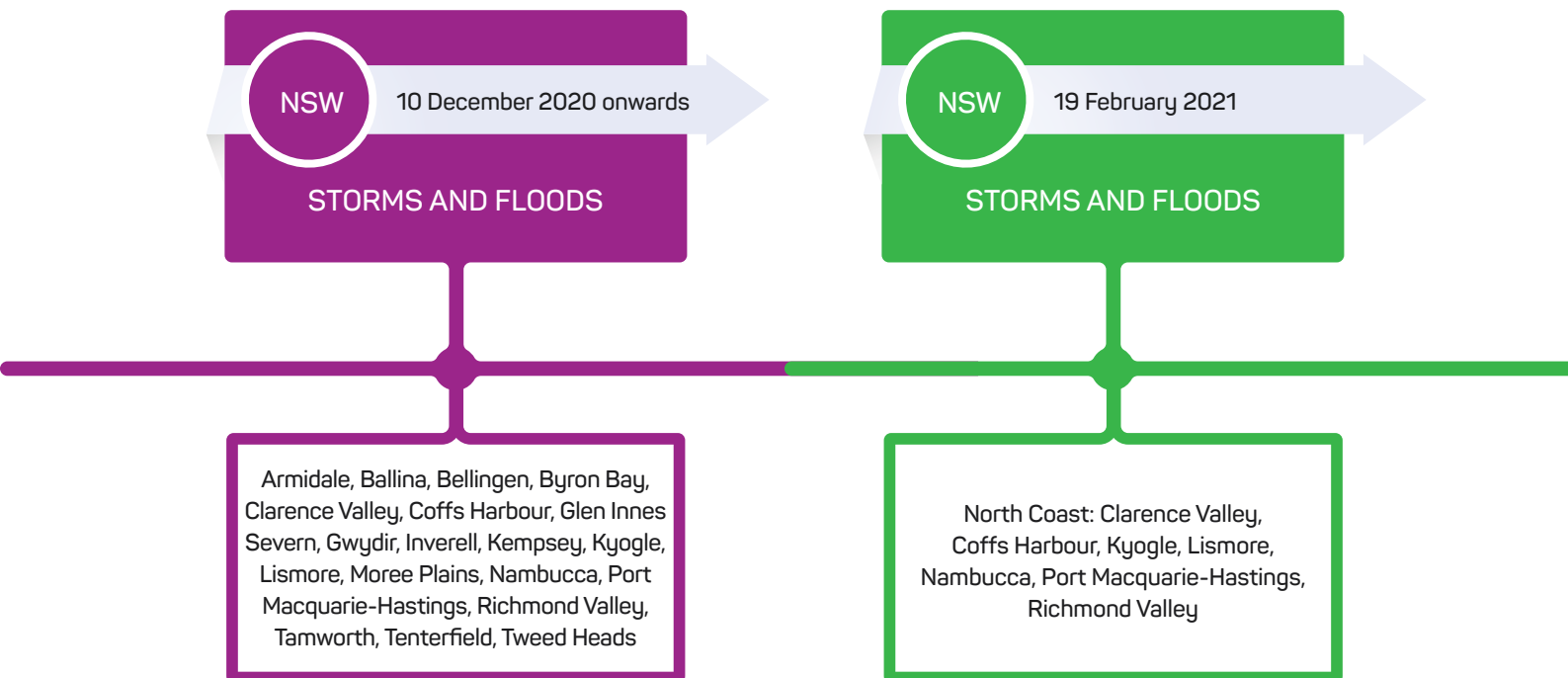
The NSW SES received 2,289 requests for assistance during this event, including 41 flood rescue activations. The greatest impact occurred in several areas across the Sydney metropolitan area (961 requests for assistance) and the South Coast from Wollongong to the border (937 requests for assistance).

The NSW SES received 3743 calls into the State Operations Centre during this event.

Localised flooding resulted in several evacuation orders being issued on the South Coast including Moruya, Sussex Inlet and parts of Terara, Worrigea and East and North Nowra. Other communities including Gerringong on the South Coast and areas in the Southern Highlands experienced short periods of localised flash flooding and road closures.

Two air assets were stationed at Moruya, Bega and Nowra over the duration of the event, supported by an Airbase Manager in Moruya.

Damage assessments in the South Coast identified 86 residential and commercial properties as damaged from flood and/or storm.



A coastal trough caused periods of widespread prolonged rainfall and thunderstorm activity in the northern coastal districts of New South Wales. This resulted in flooding across several river systems.

The NSW SES received 2,801 requests for assistance during this event, including 67 flood rescue activations. Localities of greatest impact included Tweed Heads, Lismore, and Coffs Harbour.

The NSW SES received 6887 calls into the State Operations Centre during this event.

NSW SES deployed 105 members out of area to assist with this event.

NSW RFS provided four helicopters to use during this event. NSW RFS and FRNSW provided support in the field to NSW SES teams.

A trough sitting just offshore on the New South Wales coastline brought heavy rainfall to the northern half of the coast.

Flooding occurred along the Wilsons, Richmond, and Bellinger Rivers in the north of the state. There was also minor flooding along the Paroo River in the northwest of the state.

The NSW SES received a total of 266 requests for assistance during this event, including 5 flood rescue activations. The impact was felt from the Queensland border through to metropolitan Sydney, with greatest impact in the north of the state.

The NSW SES received 647 calls at the State Operations Centre during this event.

The community of Green Pigeon in the north of the state was isolated for a short period when a bridge was washed away by floods. The local council quickly coordinated construction of a temporary bridge to provide access to the township.



Image: NSW SES

# COVID-19

## COVID-19 interstate (fire, emergency and other essential services) deployment protocol

**2020–21 was a challenging period for emergency management across Australia. In addition to the La Niña weather pattern, agencies were faced with the complexity of responding to events in a COVID-19 environment.**

This novel challenge required fire and emergency services agencies to develop strict policies, procedures, and protocols to operate safely without infection transmission, in collaboration with health department officials. These localised COVID-19 operating protocols supported day-to-day business, which included the continuance of day-to-day localised mutual aid responses across interstate borders.

With growing confidence that a La Niña presence could influence higher rainfalls and cyclonic activity, it was anticipated that interstate assistance from state and Commonwealth agencies would be needed to respond and support recovery during this period. Bushfire risk was also increasing in specific areas of Australia experiencing rainfall deficit. In this context, the AFAC National Resource Sharing Centre (NRSC) convened Commonwealth, state and territory representatives to develop a national COVID-19 protocol for deploying resources across Australia during the 2020–21 period.

The protocol development team acknowledged that each state and territory had nuanced COVID-safe plans in place to meet specific requirements. They focused on developing a national COVID-19 protocol that would support jurisdictional plans and enable interstate and Commonwealth capability to assist in providing operational assistance.

The AFAC NRSC accessed learnings from jurisdictions in the Northern Hemisphere on their experiences with sharing resources and capability across various states when COVID-19 was active. This rich information assisted the protocol team in their deliberations and framing of the Australian national protocol.

The protocol was developed through a collaborative approach and endorsed by the Commissioners and Chief Officers Strategic Committee. It was also approved by the Australian Health Principal Protection Committee.

The protocol considers responding personnel when deployed in a team, unit, or module, to be managed through collective administration and exemptions.

Key elements of the protocol include governance arrangements, roles and responsibilities and guiding principles in giving effect to deployments. The protocol also features a mechanism for adapting plans from learnings.

The protocol is intended to support the safe and rapid response to emergency response situations during complex times following requests between states and territories. It specifies the minimum responsibilities of sending jurisdictions, receiving jurisdictions, transiting jurisdictions, and emergency personnel. Relevant COVID-safe plans may be modified or create additional responsibilities.

As COVID-19 is dynamic, a consistent, risk-based approach is applied across Australia to reduce the complexity of interstate movement for emergency personnel and ensure compliance, whilst minimising potential vectors for transmission of COVID-19.

The protocol highlights the importance of ongoing regular communication between Emergency Management Australia, states and territories, emergency service agencies, the Australian Defence Force (ADF), police, health agencies or any other personnel required to be deployed to provide emergency assistance in each jurisdiction. This process was critical to ensure the currency and smooth implementation of the protocol.

The COVID-19 protocol was harmonised with existing plans for interstate assistance, aviation deployment plans, associated operational plans and jurisdictional COVID-safe plans. There was a requirement for the receiving jurisdiction to provide the deploying jurisdiction with a copy of their jurisdictional COVID-safe plan when a resource request was issued to commence preparedness and briefing processes for transparency and readiness purposes.

The protocol applies to emergency personnel who perform volunteer or paid duties deployed by a sending jurisdiction to a receiving jurisdiction for the purposes of emergency management and activities for the protection of life, property, and the environment.





Emergency personnel included deployments made by the ADF and aerial resources contracted by the National Aerial Firefighting Centre (including air and ground crew responsible for the provision of aerial firefighting or emergency support). Emergency personnel also included any personnel deployed to assist relief and recovery activities such as personnel from Services Australia and recognised charity organisations. To streamline deployments, emergency personnel covered by this protocol were required to ensure they carry relevant and valid official identification or evidence that confirmed their identity and emergency response duties.

The protocol adopted several guiding principles to support deployments of emergency and essential support personnel. The protocol was designed to support COVID-safe plans developed by receiving jurisdictions, with enforcement activities by individual jurisdictions to the extent provided in any applicable public health orders and emergency management directions. An expectation of all personnel taking responsibility for infection prevention and control through common sense, vigilance, in an environment promoting hand hygiene, physical distancing and correct use of COVID-specific personal protective equipment. Appropriate measures for tracking and tracing of all personnel if required was another key element of the protocol.

There were several responsibilities of the sending, receiving and transiting jurisdictions and the emergency personnel in any interstate deployment to prevent infection. These were associated with accessibility of deployed personnel details and confirming arrangements for crossing and returning home were detailed. The protocol ensured any deployed personnel had been COVID-19 tested and had received clear operational and medical COVID-19 specific briefings.

The list contained in the protocol was extensive and focused on ensuring people deployed were not infected or suspected of being infected in travelling to the receiving and transiting jurisdictions.

A risk-management approach was taken and compliance with quarantine restrictions was required when personnel were returning to their home state.

A method to make any relevant changes is outlined in the protocol and requires consultation with other governments using the national coordination mechanism before any changes are made to the protocol.

The protocol was applied extensively throughout the 2020–21 period in supporting the deployment of emergency response, support, and ADF personnel along with specialised assets to manage floods, suppress fires and clean-up following storms and cyclones. Assistance was provided to Western Australia, New South Wales, Queensland, and Victoria during the 2020–21 period.

These deployments utilised the National Emergency Management Arrangements and the Australian Interstate Agreement, Arrangement for Interstate Assistance – Fire and Emergency Services.

The protocol will continue to inform and support capability deployments across Australia to assist in responding to emergencies during COVID-19 impacted times.

From a practical perspective the protocol was applied throughout 2020–21 period where several requests were made of jurisdictions to support major incidents. Table 1 represents the events, the jurisdictions and the numbers who lent support. The data demonstrates the agility, and the ability to strengthen the resilience of the response and recovery system and operate across borders during COVID-19.

The resources provided in these events performed a range of roles including assistance on the ground, clean up, incident management and community reassurance and connection.

Furthermore, the resilience of the system during the 2020–21 period was further fortified accessing additional resources from the ADF along with specialised aviation assets and operators from the National Aerial Firefighting Centre to work in a range of jurisdictions challenged by fires, floods, and storms.

Queensland storms - October/November 2020							
SA	NSW	TOTAL					
21	81	102					
New South Wales floods - March 2021							
SA	VIC	TAS	QLD	ACT	WA	NRSC	TOTAL
51	82	1	200	6	2	2	344
Western Australia Tropical Cyclone Seroja - April 2021							
SA	VIC	NSW	TOTAL				
31	75	99	205				

Table 1: Interstate deployments 2020–21



# Hailstorm

South-east Queensland, 31 October 2020

**The erratic weather experienced across Australia in 2020-21 is evident in the major incident referred to as the Halloween thunderstorms, which took place on 31 October, 2020.**

Widespread thunderstorms affected central and south-east Queensland between 24 and 29 October. Thunderstorms affected Brisbane on 24 and 25 October, and again on 27 and 28 October, bringing heavy rainfall to some sites, flash flooding and strong wind gusts. Thunderstorms produced large hail, with reports of up to 6 cm hail in diameter south of Gayndah, fallen power lines in the Caboolture area, and localised flash flooding on 28 October. Severe thunderstorms impacted much of south-east Queensland on the afternoon of 31 October. The main impacts were giant hail up to 14 cm in diameter along a path from Amberley to the northern suburbs of Logan, giant hail up to 7 cm in the Gympie area, and wind damage from Redcliffe to Kingston with gusts over 100 km/h recorded around Moreton Bay. Giant hail up to 14 cm in diameter was reported at Forestdale, south of Brisbane, and hail up to 13cm in diameter was reported at Hillcrest. Some other reports included giant hail up to 9.5 cm in diameter at Amberley, 8 cm in diameter at Springfield, 7 cm in diameter around Gatton, and 5 cm in diameter at Seventeen Mile Rocks.

As parts of south-east Queensland were being pummelled by a series of very dangerous and life-threatening thunderstorms, the Bureau of Meteorology (BOM) issued warnings for people in parts of Queensland's Wide Bay, Burnett, Darling Downs and Granite Belt regions. BOM also warned the situation was volatile and continuing to change quickly. The path of damage was forecast to hit from the Queensland border to the north of the Sunshine Coast and communities further inland. BOM continued to issue warnings for dangerous thunderstorms throughout Saturday afternoon and into Saturday evening for south-east Queensland. It was also revealed that wind gusts of 115 km/h were recorded at Cape Moreton which is located on Moreton Island 40 kms off Brisbane. There were nine super cell storms in the designated warning area issued by the BOM.

West of the city, the State Disaster Coordination Centre issued an emergency alert for Lockyer Valley, Ipswich, Jimboomba and Amberley residents when the severe thunderstorms were

forecasted to bring destructive winds and giant hail. Another emergency alert was issued for parts of the Gold Coast and Logan, namely Woodridge, Beenleigh, Southport and Coomera as the dangerous storms tracked over the city.

Overall, there were 296,000 lightning strikes across south-east Queensland during this event, demonstrating the violent and powerful nature of the storms. Emergency services reported an increase in requests for assistance mainly relating to trees falling down and roofs being damaged. Three people were trapped inside a Springfield Lakes residence after a tree collapsed onto the roof. No injuries were reported. The storms caused the election polling booths to be shut down, with the Electoral Commission of Queensland confirming a polling booth in Ipswich had been shut down after a hailstorm lashed the electorate. Trains were suspended on the Beenleigh and Gold Coast lines between Helensvale and Kuraby due to the overhead powerlines being down, prompting delays of up to 60 minutes.

Following the aftermath of the storms, there were 95,000 homes without power and the Queensland State Emergency Service (SES) received more than 2,900 requests for assistance in the Ipswich and Logan council areas. Queensland Fire and Emergency Services (QFES) crews conducted more than 2,000 damage assessments, including more than 500 instances of major damage.

Within 24 hours of 31 October, the Insurance Council of Australia declared the natural disaster a catastrophe with the damage bill currently at \$980 million. Insurers have received more than 42,000 claims as at 23 June 2021. Personal hardship financial assistance was activated for some communities including defined localities within the Ipswich City Council area; Greater Springfield (Springfield and Springfield Lakes); Rosewood and Willowbank; suburbs of Logan City Council; Boronia Heights; defined localities within Greenbank.

QFES worked collectively with the Ipswich City Council, Local Disaster Management Group and key stakeholders to assist those community members most severely affected. A multi-service approach to recovery operations was implemented, exemplifying the effectiveness of interoperability. Assistance was also provided by SES personnel from New South Wales and South Australia.





Following the incident, opportunities for improvement were identified, including:

- Solar panels added complexity to completing requests for assistance. Given the nature of the damage, safety measures were taken including isolation of power, tarping internally and having exclusion zones around any solar on a property. Further clarity is required for personnel working on roofs with solar panels, including curriculum and better equipment to test and isolate.
- The need for more Working Safely at Heights trained personnel. The tarping system used was resource intensive, and anchor points in new subdivisions proved difficult with houses constructed so close together.

## Observations

A series of observations were identified as delivering positive outcomes, including:

- A multi-service approach to completing requests for assistance, community welfare checks, including the engagement of chaplains to assist volunteers, and the provision of public information.
- Assistance of interstate teams supported by interstate liaison officers. The support from interstate personnel from South Australia and New South Wales was not only invaluable, it provided Queensland SES personnel with learnings and different processes and options for temporary repairs.
- Support provided to the Local Disaster Management Group and utilisation of a data collection link.





# Bushfire

K'gari (Fraser Island), Queensland, 14 October 2020

**The K'gari (Fraser Island) fire provides an insight into the ecosystems and environments of a World Heritage listed sand island, that was under threat from a bushfire that commenced on 14 October.**

K'gari is the Traditional land of the Butchulla people. It is listed as having World Heritage values and is located off the coast of Hervey Bay, Queensland. It is 122 km long and is the largest sand island in the world. Majestic remnants of tall rainforest growing on sand and half the world's perched freshwater dune lakes are found inland from the beach. The combination of shifting sand dunes, tropical rainforests and lakes makes it an exceptional site. Importantly, the island is the site of numerous places of cultural significance to the Butchulla people, with many of these sites known only to local Elders.

In October, the Bureau of Meteorology (BOM) reported that mean maximum temperatures were above average in the east. Rainfall was below average across most of Queensland for November, which marked the second-warmest November on record for Queensland in terms of mean, maximum and minimum temperatures. A low- to severe-intensity heatwave affected much of north-west to south-east Queensland from 15-17 November.

A fire was reported on 14 October, in a camping area at the northern end of the island. Over a two-month period, this fire burnt out over 85,000 hectares of bushland and posed a significant threat to several communities and assets on the island.

The source of the fire was determined to be an illegally lit campfire that was not properly extinguished. Queensland Parks and Wildlife Service (QPWS) responded as soon as the fire was reported and assumed the role of Incident Controller. Due to dry conditions, vegetation, strong winds and inaccessible terrain, it was deemed that a direct attack on the fire was not feasible.

Queensland Fire and Emergency Services (QFES), QPWS, the Butchulla Aboriginal Corporation (BAC), Queensland Police Service (QPS), Queensland Ambulance Service (QAS) and Fraser Coast Regional Council (FCRC) worked closely together during all phases of the K'gari fire event to contain and extinguish the fire, preserve life and protect property, culturally significant sites, historic structures and the natural flora and fauna.

QFES crews assisted QPWS and BAC in responding to fires through both ground and air responses. Aerial reconnaissance flights commenced on 15 October with water bombing commencing on 9 November.

At 8 am on 24 November, QFES North Coast Regional Operations Centre, based in Maryborough, was activated to support the QPWS response, maintain active oversight of fire activities on K'gari and the wider region and coordinate with the relevant disaster management partners. QPWS established an Incident Control Centre (ICC) at its Rainbow Beach depot on 24 November, with a Divisional Command Point remaining on the island. A joint Incident Management Team (IMT) consisting of members from QFES, QPWS and the BAC was established within the ICC.

The fires on K'gari, burning predominantly in inaccessible terrain, were transferred to QFES control on 27 November, from the previous lead agency, QPWS. This was done after a detailed assessment of the conditions by the departments which included the predicted weather conditions and the threat to life and assets on the Island. On 27 November, the ICC moved to the Rainbow Beach Community Centre to accommodate increased IMT personnel and on 5 December, the ICC relocated to QFES Maryborough ICC, located at the QFES Complex in Howard. The QFES ICC incorporated representatives from BAC, cultural liaison officers and a number of fire behaviour analysts to inform decision making.

On 7 December, the Happy Valley township on the eastern side of the island and three properties at Yidney Rocks were threatened by fire. Firefighters conducted structural protection resulting in no loss of life or property. There were multiple fire fronts and significant QFES, QPWS, and BAC resources responded to these fires. Among many others on the island, three sensitive cultural sites have been identified in the 'Valley of the Giants' by the Butchulla people. QFES and QPWS worked closely with the Butchulla people in protecting these culturally significant assets.

Favourable conditions and rainfall contained the fire and QFES handed back control to QPWS at midday on 13 December. Table 2 demonstrates the scale of the event.



## Event scale

14 October - 28 December 2020



**85,300 hectares burnt**

(approximately 50% of the island's total area)



**367 personnel deployed**

(including 8 QPS and 13 QPWS personnel)



**144 appliances**

(671 responses and 18,979 vehicle hours)



**1 emergency alert campaign**

(1,220 text messages delivered successfully)



**30 aircraft utilised**

(1,630 hours)



**13,306,800 litres dropped**

(freshwater, saltwater and mixed gel additive)



**114 predictive services products issued**



**82 bushfire community warnings issued**

## Following the incident, opportunities for improvement were identified, including:

- Agencies would benefit from further development of multi-agency debriefing and shared learnings from joint operations.
- There are opportunities to enhance integration of communications, logistics and community engagement.
- Collaboration and proactive assessment of multi-agency capability and capacity will improve resource availability and address risk in management of fatigue.

## Observations

A series of observations were identified as delivering positive outcomes, including:

- Embedding the BAC within the ICC to support decision making around culturally sensitive assets is considered a best practice approach and key to future firefighting strategy.
- Early and proactive collaboration between the Happy Valley Community Association Inc, Area Fire Management Groups, Happy Valley Brigade and agencies. This engagement resulted in a prepared community through the development and execution of the Happy Valley Hazard Reduction and Fire Management Plan. Evident benefit of this planning was the communities' awareness of their risk and confidence in executing their bushfire survival plans, providing an example of resilience achieved through a community-led risk reduction and planning. This approach would benefit other isolated communities.
- Development of predictive services capabilities based on the increasing risks associated with bushfire frequency, severity and duration. The officers deployed to support the K'gari bushfire were crucial to informing incident management strategies, including key suppression tactics and timings. Experienced officers adapted systems settings based on local knowledge of QPWS and BAC staff, to allow for the unique fuel types on K'gari enabling improved accuracy in predictions.

**Table 2: K'gari bushfire event scale, 14 October – 28 December 2020**

The Minister for Police and Corrective Services and Minister for Fire and Emergency Services approved the activation of the Disaster Recovery Funding Arrangements on 2 December.

On 2 December, the Premier and Minister for Trade announced a review of the event by the Inspector General Emergency Management (IGEM). The IGEM review was tabled in Parliament on 27 May 2021 and publicly released on the IGEM website ([www.igem.qld.gov.au/kgari-bushfire-review](http://www.igem.qld.gov.au/kgari-bushfire-review)). The report contains 38 recommendations that have been supported or supported in principle.



# Bushfire

Wooroloo (Perth Hills), Western Australia, 1 February 2021

The antecedent climate conditions that influenced the Wooroloo fire provide insight to the fire behaviour during the bushfire. During November 2020, most parts of Perth recorded record high rainfalls for November. Gidgegannup (a township 40 km north-east of Perth) recorded 137.8 mm rainfall, surpassing the previous record of 85 mm set in 1985. This potentially contributed to increased fuel loadings from the growth of grass and vegetation. In December 2020 and January 2021, Perth recorded less than 5 mm of rainfall and temperatures averaging over 30 degrees, resulting in the curing of available fuel loads.

A fire in the Perth Hills suburb of Wooroloo (45 km north-east of Perth) was reported at 12.02 pm on 1 February. The potential of the fire was immediately recognised by first responders and incident management personnel, with the subsequent rapid escalation of resources and issuing multiple community warnings crucial in protecting lives and property. Within the first hour, the Department of Fire and Emergency Services (DFES) had received 66 triple zero calls, mobilised 6 aerial assets and multiple firefighting crews and issued emergency warnings for multiple suburbs within the Shire of Mundaring and the City of Swan advising those at risk to evacuate.

More than 140 firefighting appliances and 280 firefighters from various agencies would attend in the first 12 hours of the incident. The first reports of property damage were received a little over an hour after the start of the fire, as it rapidly spread through the semi-rural townships of Wooroloo, Gidgegannup and Tilden Park.

The fire impacted an area of more than 10,500 ha inside a perimeter of 154 km, with 86 homes lost and more than 100 other structures in its path destroyed or damaged. The majority of the property losses were experienced in the first 24 hours however, more than 200 properties were reported as saved during the incident as a result of carefully planned and executed strategies and the outstanding work of fire crews, aircraft and support personnel. Rainfall associated with a slow-moving tropical low moving down the south-west coast assisted in extinguishing the fires on 7 February.

It was evident from the start this fire was going to provide challenges for emergency responders. Rates of spread up to 5 km/h were recorded and spot fires several kilometres ahead of the fire front made containment difficult as crews reported exploding trees and flame heights in excess of 20 m. High temperatures, strong persistent winds, low humidity and

extremely low dew points coupled with steep and inaccessible terrain and high fuel loads made suppression very difficult, especially in the first days of the fire. Historically, night-time conditions provide an opportunity for firefighters to consolidate containment lines however, little relief was provided on the first night with the fire nearly trebling in size from 1680 ha reported at 7.30 pm on 1 February to 6228 ha at 8.00 am on 2 February (4548 ha increase) as a result of strong winds and an unusually low dew point (-5°C).

The bushfire coincided with a five-day lockdown of Perth metropolitan and Peel regions that started at 6 pm on 31 January due to a case of COVID-19 community transmission arising from hotel quarantine. Many of the bushfire impacted areas were within the Perth metropolitan region which added a layer of complexity to the management of the incident. Specific community messaging, planning and procedures were required to manage COVID-19 safety for affected community and responders throughout the duration of the incident.

The DFES Commissioner stressed to residents that if they were being told to evacuate because of the fire they should go if the way was clear. Residents affected were permitted to evacuate to family member's homes despite the COVID-19 lockdown. Speaking from a DFES Incident Control Centre set up at the Mundaring Arena, Western Australian Premier Mark McGowan described the current situation as unprecedented and dangerous, '...we're facing disasters on two fronts, the devastating bushfires and COVID-19 pandemic'.

There was little respite as dangerous conditions persisted on 2 February and reports of damage to properties from the fire grew. The emergency alert warning area continued to expand, encompassing more localities. A smoke alert was issued for much of the Perth metropolitan area, extending from Joondalup (26 km north of Perth) to Fremantle (19 km south-west of Perth) warning communities of the dangers associated with smoke from the bushfire and the actions they should enact. Hot and dry conditions with winds from the north and north-east were predicted to put pressure on the 30 km long southern flank of the fire, presenting significant risk to the suburbs of Gidgegannup, Bullsbrook and Brigadoon. It was reported by the early evening on 2 February the bushfire had grown to 8,000 ha.

Numerous emergency alerts and public warnings were issued throughout the incident, with the Emergency WA website regularly updated. On 2 February, more than 544,000 people viewed the website which peaked at 120,000 users in one hour.



Additional firefighting crews from throughout the state were mobilised to the incident, with operational support to ground crews delivered by aerial assets. At the peak of the fire response this totalled 25 aircraft, including Large Air Tankers (LAT), fixed wing water bombers, helitacks and the Eriksson Skycrane.

Pivotal to controlling the bushfire was the effective use of these assets, particularly the use of the LAT capability. With the Western Australia based LAT demonstrating its capability on the first day of the fire, arrangements were put in place to access additional LATs coordinated through the AFAC National Resource Sharing Centre (NRSC). Less than 12 hours after the request, an additional LAT arrived from New South Wales to support operations on the evening of 2 February. The second additional LAT arrived from New South Wales on 3 February and was laying retardant the following day.

Specific COVID-19 approvals and arrangements were put in place in order for these aircraft to support the Western Australia fleet. Additional support was provided by the Australian Defence Force who used aircraft to transport additional retardant supplies from New South Wales.

The State Emergency Services (SES) volunteer crew that supported the LATs were integral to the success of the operation. They worked collaboratively under extreme pressure to develop solutions within hours that allowed them to resupply multiple aircraft simultaneously and reduce turnaround times. Over the duration of the Wooroloo bushfire, the three LATs flew 46 hours and dropped 469,000 litres of fire suppressant. When added to the total aviation commitment to the incident, 2,145 drops were made and more than 6,156,000 litres of water, foam and fire retardant were delivered.

The third day of the bushfire saw another hot and windy day with hilly terrain hindering fire crews and earthmoving machinery. The number of communities on alert from the fire had grown to 69, with the evening of 3 February presenting challenges with wind speeds gusting to 60 km/h resulting in spot fires emerging 200 m in advance of the fire front. Earthmoving machinery was being utilised to track and contain the fire however, crews resorted to using hand tools and other strategies in inaccessible areas.

In addition to the evacuation centre at the Brown Park Complex which had been in operation since initial evacuations commenced, the Department of Communities opened two additional evacuation centres at Swan Active in Midvale and Swan Active in Beechboro. More than 700 people registered at evacuation centres during the fire, with 230 sleeping overnight. Many more attended the daily community meetings held on the Brown Park oval to accommodate COVID-19 social distancing requirements. Veterinarians were also on hand to care for injured animals brought into the animal evacuation control centre.

More than 500 emergency services personnel worked through the night, defending the Avon Ridge Estate and Shady Hills (suburbs north of Perth in the Perth Hills precinct) with strong easterly winds impacting the north and western edges of the fire. More than 200,000 litres of retardant was used by the LATs and bombers to construct 13.8 km containment line, which

was crucial in assisting firefighters to protect homes in these residential estates.

Significant risk persisted during 4 and 5 February however, weather conditions began to ease and rain was forecast for the weekend. This situation allowed for the emergency areas under threat to be reduced and residents in various locations began to return to their properties. From 4 February, buses were used to take residents into the fire impacted areas to view their homes with further measures taken during 5 and 6 February to allow residents to return home and commence recovery. On 6 February the fire was downgraded and advice messages were applied to the fire location. Resources working the fire were reduced and some roads were reopened to the public. Further rain fell on the fire on 7 February.

The fire caused significant damage to critical infrastructure and services including power, telecommunications and roads. Impact and risk assessments on 240 kms of roads and tracks were undertaken to assess burnt trees and to understand the dangers that needed to be addressed to allow access to ordinary traffic. With more than 2000 residences affected by power outages, Western Power began the process of replacing power poles destroyed by the bushfire and reinstating power.

On 4 February, the Western Australian Premier advised people who had lost homes of a \$4,000 payment for loss and \$2000 payment for damaged homes from the fires. The Commonwealth and State Government also announced a joint \$18.1 million recovery package on 25 February to assist with the residential clean-up and provide psycho-social support to the affected communities, in addition to the Australian Government Disaster Recovery Payments to support individuals who had lost their homes. The Lord Mayors Distress Relief Fund (Wooroloo and Hills Bushfire) Appeal was launched on 3 February and by 12 February \$12.3 million had been donated. The appeal ended on 31 March, with more than \$16.7 million received in donations.

On 5 February, the insurance Council of Australia declared an Insurance catastrophe for the Perth Hills bushfires. The declaration extended to communities in the north-east Perth Hills region. Currently 1067 claims have been received at 24 June 2021, totalling \$92 million.

Dr Ron Edwards was appointed as State Recovery Controller for the Wooroloo bushfire on 5 February. The purpose of this role was to ensure the provision of a coordinated recovery support to emergency affected communities through the direction and coordination of resources made available by public authorities and other persons and is complemented by a State Recovery Coordination Group. The group is being supported by DFES and is committed to ensuring a whole-of-government approach to recovery efforts. The intent is to facilitate a personalised approach to help those impacted get back on their feet and ensure state, local and not for profit organisations work together to support those affected. The group first met on 5 February and prioritised immediate actions of clean up, damage assessment as well as longer term aspects. Work on the recovery from the devastating impacts of the Wooroloo bushfire is anticipated to continue throughout the next two years.









Images: Evan Collis, DFES WA



# Tsunami

Norfolk Island, 5 March 2021

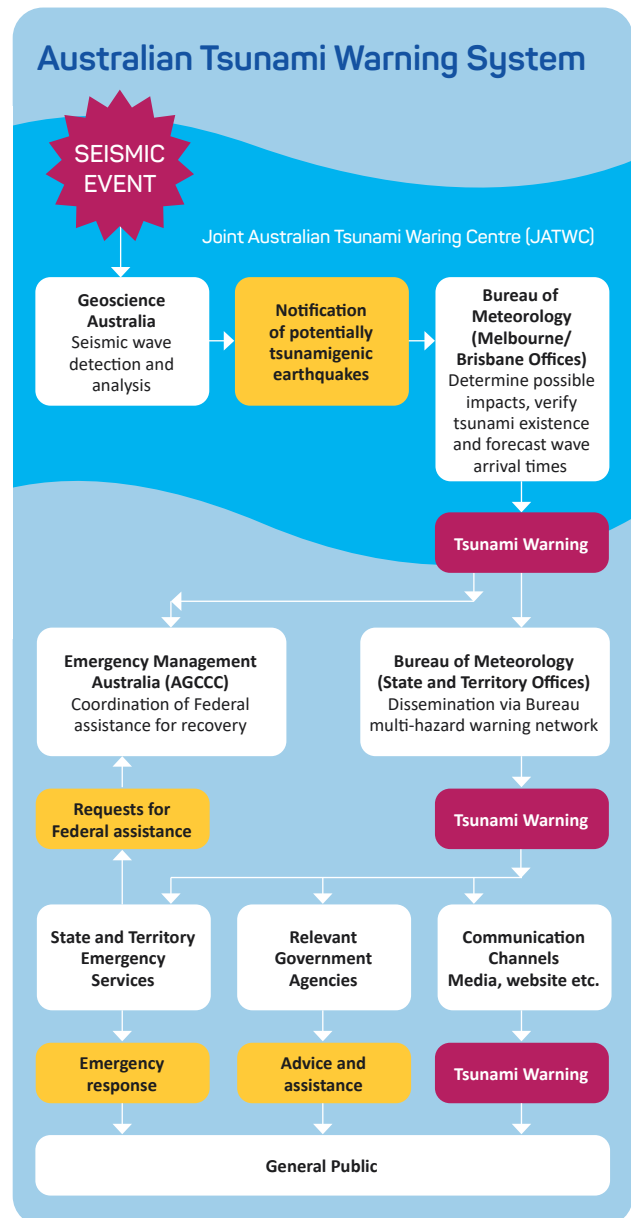
On 5 March, an earthquake occurred near an island group north-east of New Zealand that required the Joint Australian Tsunami Warning Centre (JATWC) to act. Tsunamis are a rare event for Australia but, this unique incident provides insight into the system and processes that exist to promptly and effectively respond to a major tsunami event in Australia.

Specifically, the coordination driving the system, the criticality of timely communications across organisations and connecting with community members to stay informed and prepared to act in advance of these potentially high impact events.

A tsunami marine warning was issued early on 5 March for Norfolk Island following a 7.9 magnitude earthquake near the Kermadec Islands region, north-east of New Zealand. A further aftershock of 6.6 magnitude was recorded at 10.13 am Australian Eastern Daylight Time (AEDT) at the same location. There was no tsunami threat to the Australian mainland or to Lord Howe Island. The impact of the tsunami was observed near Norfolk Island. A sea level gauge at Norfolk Island recorded a 64 cm tsunami wave. While this may not seem very high, tsunami waves are much more powerful than beach waves of the same height due to the strong current and surge capable of drowning swimmers and toppling small boats.

The first element is about the key agencies who, as part of the nationally coordinated Australian Tsunami Warning System, respond to these incidents, their capability and the performance requirements established because of the time critical aspects associated with tsunamis.

Australia has a Joint Australian Tsunami Warning Centre (JATWC), which involves Geoscience Australia (GA) and the Bureau of Meteorology (BOM). GA operates a national network of seismic stations and accesses data from international monitoring networks. GA performs real-time seismic analysis, advising BOM within ten minutes of the magnitude, location, and characteristics of any earthquake with the potential to generate a tsunami of impact to Australia.



Based on this information, BOM determines the possible tsunami threat and the expected tsunami arrival times, using a library of pre-computed earthquake and tsunami scenarios generated from a tsunami propagation model. BOM also verifies tsunami generation using its Australian coastal and deep ocean sea level networks, as well as sea level data from international networks.

BOM then issues tsunami bulletins and warnings for the Australian coastal areas and external territories assessed to be under threat. BOM distributes these products to the media, key agencies such as Commonwealth departments, state and territory emergency services, local councils, port authorities, police, and the public. Importantly, BOM provides the latest update of tsunami information on its JATWC website ([www.bom.gov.au/tsunami](http://www.bom.gov.au/tsunami)) and the 1300 TSUNAMI phone services. BOM's state and territory offices are the main liaison points for state and territory emergency services during tsunami events.

In the event of a tsunami, state, and territory (including offshore) emergency services take charge of the tsunami emergency response in their jurisdictions, liaising closely with their respective BOM offices. This includes providing timely emergency advice to the public; an evacuation order may be issued following a Land Inundation Threat warning. If an event threatens to overwhelm the emergency response capability within a particular jurisdiction, federal assistance will be sought through Emergency Management Australia (EMA).

The Australian Government Crisis Coordination Centre (CCC) within EMA in the Department of Home Affairs provides 24/7 whole-of-government situational awareness to inform national decision making and support responses to requests for Commonwealth assistance during a crisis. In a tsunami event, the CCC liaises directly with JATWC to monitor and report timely tsunami information products to whole-of-government stakeholders. On receipt of warnings for the event in the Kermadec Islands, the CCC provided written and verbal notifications to stakeholders, including Norfolk Island Emergency Management.

The Norfolk Island tsunami warning event commenced with a 7.9 magnitude earthquake at 6.28 am AEDT on 5 March near the Kermadec Islands region approximately 1,400 km east of Norfolk Island and 1,000 km north-east of New Zealand.

There had been two previous large earthquakes overnight in the same region, the first was a 7.3 magnitude earthquake at 12.27 am AEDT on 5 March near the north island of New Zealand which prompted a tsunami warning for parts of the New Zealand coastline but was no threat to Australia. The second was a 7.3 magnitude foreshock earthquake at 5.09 am AEDT on 5 March near the Kermadec Islands, which again posed no threat to Australia.

A tsunami threat assessment placed Norfolk Island under Marine Threat and an Australian Tsunami Warning System National Watch Bulletin was issued at 6.46 am AEDT, 18 minutes after the earthquake.

At 7.10 am AEDT, BOM issued the first tsunami marine warning for Norfolk Island as the predicted tsunami impact was imminent. This is in accordance with the JATWC Standard Operating Procedures and provided the Norfolk Island community an advanced warning of 1 hour and 49 minutes prior to the expected earliest impact and 2 hours 20 minutes prior to observed impacts.

Confirmation of a tsunami had been generated and was obtained at 8.33 am AEDT, 2 hours and 5 minutes after the earthquake when a 6 cm tsunami wave was observed at the Nuku Alofa tide gauge in Tonga. There were further observations in Fiji and the Cook Islands.

At 9.45 am AEDT the largest wave peak of 0.64 m was observed at the Norfolk Island tide gauge. At 10.33 am AEDT the Norfolk Island Police also reported the bay next to the pier was observed to fill up with the water level rising by an estimated 30 to 60 cm. This lasted a couple of minutes before the water subsided. After 10 minutes the process was repeated.

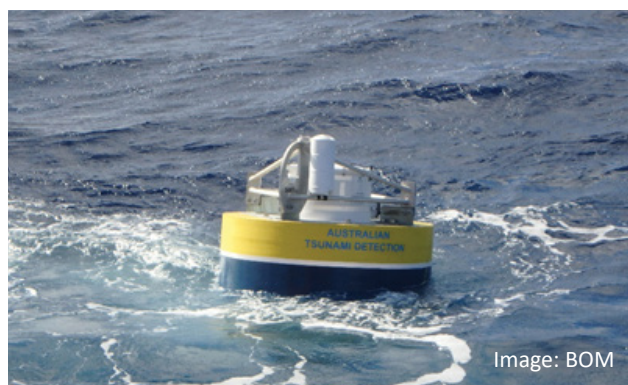


Image: BOM

A further aftershock was reported at 10.13 am AEDT, the particulars of this event were included in the source information for the next round of warnings, but there was no change to the warning level.

Further small, less than 40 cm observations were recorded at several locations in New Zealand, New Caledonia, Vanuatu, French Polynesia, and other locations across the South Pacific. In Australia there was a 15 cm wave observed at the a Port Kembla tide gauge and a report of a 10 cm wave at Tweed Heads by the Department of Environment and Science.

The JATWC was effective in avoiding over warning for mainland Australia by maintaining its No Threat advice, based on detailed BOM modelling and real time observations.

Nine tsunami warnings for Norfolk Island were issued on an hourly basis until a warning cancellation at 2.20 pm AEDT, just over four hours since the last Norfolk Island observation of a Marine Threat.

The Pacific Tsunami Warning Centre continued with its threat advisories for the rest of the Pacific until 12.27 am AEDT the following day when it finalised the event. Its information was to help national tsunami warning centres to make their own decision about whether to issue warnings to their respective communities as is their sovereign right.

Regular briefings were provided by JATWC to Norfolk Island Emergency Management, New South Wales State Emergency Service, the CCC, and the Department of Foreign Affairs and Trade Global Watch Office to provide awareness of the incident and to assist these organisations in their planning and notifications. The CCC further distributed notifications to inform wider Commonwealth stakeholders including the Department of Defence, to provide awareness of the potential for a request for Commonwealth assistance.

BOM conducted a full-scale media communications response to the Kermadec Island Tsunami when the National Tsunami Watch was issued at around 7.00 am AEDT because of the significant consequences of drowning that could emerge from such a Marine Threat tsunami event. An initial media statement was released at 7.25 am AEDT, and these statements were updated and distributed every hour by the BOM National Media Manager.



The media were constantly updated on the situation, with seven media statements published to update the public and video recordings of the event published on Twitter and the BOM website. The potential threat was tweeted on BOM's national Twitter account, and new tweets were issued as required by JATWC. There was constant monitoring of media channels where it was identified the threat to New Zealand was the key focus of coverage.

The seventh and final media statement was released at 2.40 pm AEDT following the cancellation of the warning.

No press conference was organised; however, the BOM video team produced tsunami videos in a 'Severe Weather Video' format. These were published to the BOM's main webpage and Twitter and Facebook accounts. Three videos were produced, including a final wrap-up video.

Once news of the tsunami broke (including impacts to New Zealand and Pacific islands), Australian national news agencies began to report on the event, including the ABC.

Both the BOM website and the 1300 TSUNAMI phone service were all well visited during this event and the 11 February 2021 tsunami event of Loyalty Island when JATWC also timely and effectively responded with a marine warning to Lord Howe Island.

Social media posts enabled warnings to be more widely distributed, and for more complex aspects of the warning itself to be explained.

Social media disseminated educational content following the event to explain various facets of the tsunami observations and warning network. Tsunami education forms an important part of BOM's ongoing community engagement.

The system, processes, coordination, and communication for managing a tsunami affecting Australia were activated in a real-life situation on 5 March. This event demonstrated that the Australian Tsunami Warning System was effective and seamless in managing warnings and the emergency response. However due to the nature and impacts of these events the readiness and resilience of the system can be further enhanced by running regular exercises and public education campaigns to raise tsunami awareness and help coastal communities be prepared for the next tsunami.

### Observations

- One overriding lesson from the series of deadly tsunamis seen over the past decade is early warnings can, and do, save lives.
- While Australia may not be as vulnerable as many of our neighbours, coastal communities and maritime users can still face serious dangers from changing sea conditions and, in the worst case, flooding of low-lying coastal areas, due to tsunamis caused by undersea earthquakes. Fortunately, Australia has access to a world-class tsunami monitoring and warning service operated by the Joint Australian Tsunami Warning Centre.



AUSTRALIAN  
TSUNAMI - DETECTION

# Flood

New South Wales, 18 March - 1 June 2021

**New South Wales experienced extreme rainfall on the east coast of Australia beginning on 18 March, together with significant rainfall in many other parts of the state. This led to widespread flooding in New South Wales affecting regions from the Queensland border through to the Sydney metropolitan area, parts of the South Coast and multiple locations in inland New South Wales.**

The floods occurred less than 18 months after Australia was affected by the Black Summer bushfires, impacting many towns still recovering from that disaster. They had been preceded by five months of severe weather associated with La Niña, which resulted in minor to major flooding in many parts of northern New South Wales. New South Wales State Emergency Service (NSW SES) had 100 days of operational response activities in the five months before this flood event.

The extreme weather conditions delivered incredible amounts of rain in a rapid period over an already well-drenched landscape and catchments, causing evacuations, isolations, and disruption to communities at a time when the state was also being challenged by the COVID-19 pandemic. At one stage, flood warnings covered an area of New South Wales that included a population of six million people. Across the event, over 25,500 residents were subject to evacuation orders.

## Weather systems

A major rain event affected significant areas of Australia in the second half of March 2021. The highest rainfall totals occurred in eastern New South Wales, with almost the whole coastline and adjacent ranges receiving significant falls. Extensive heavy rainfall also occurred over large areas of inland New South Wales. In total, 30 of 37 river catchments in New South Wales experienced significant flooding because of this rainfall.

Moist easterly flow became established over coastal New South Wales on 17 March, associated with a strong, slow-moving high-pressure system in the southern Tasman Sea. This onshore flow persisted for nearly a week. Troughs formed near the coast from time to time, and a small low-pressure system moved slowly south along the New South Wales coast on 19 and 20 March, reinforcing the easterly flow on its southern side.

Some of the heaviest rain occurred during these two days. The low did not reach the intensity required to be formally classified as an East Coast Low.

Meanwhile, a separate area of low pressure formed over central Australia on 22 March, with a trough and associated north-west cloud band extending from the Kimberley in north-western Australia to the far south-west of Queensland. This consolidated over the following 24 hours into a low-pressure system over inland areas of southern Queensland and northern New South Wales. The low then moved south over inland New South Wales, reaching Bass Strait early on 24 March.

Significant rain began along parts of the New South Wales coast on 17 and 18 March, with heavy falls in the Port Stephens area on 18 March. There was also significant thunderstorm activity in northern inland New South Wales during this period, with locally heavy falls. The heaviest rain began on 19 March, focused on the Mid North Coast, with significant falls covering much of the coast from the Illawarra northwards. Heavy falls extended south to the Sydney region on 21 and 22 March, and northwards to inland NSW and south-east Queensland on 22 and 23 March. The South Coast received regular rain during this period, with its heaviest falls on 24 March as a low approached it from inland. By 25 March rain had largely cleared from New South Wales, except for isolated severe thunderstorm activity on parts of the South Coast that afternoon.

The influx of moisture from a high-pressure system in the Tasman Sea and a low-pressure system in the Timor Sea led to very high daily rainfall totals on several days during the event across south-east Australia. Daily totals exceeded 150 mm somewhere in New South Wales on each day from 18 to 24 March. One of the most significant aspects of this event in coastal NSW was its persistence, which resulted in many very high multi-day rainfall totals. Many locations received several days of heavy rain, particularly on the Mid North Coast, where several sites had four consecutive days with 100 mm or more.

The heaviest rainfalls away from the coast occurred on 23 March, with daily totals exceeding 100 mm in the Northwest Slopes and Upper Western regions of New South Wales. The town of Moree received 150 mm of rain on 23 March – more than it did in the entire severe drought year of 2019 (125.4 mm). Daily totals above 50 mm were widespread through other parts of inland New South Wales.

Several records were broken during this flood event. New South Wales had its second wettest day, third wettest week and second wettest March on record since 1900.



Location and rainfall in March 2021		Previous record rainfall
Wingham	609.2 mm	574.8 mm
Craven (Longview)	392 mm	374.6 mm
Yarras (Mt Seaview)	889.4 mm	609.2 mm
Krambach (Tipperary)	506 mm	463.2 mm
Comboyne	943 mm	875.3 mm

Table 3: Rainfall records – March 2021

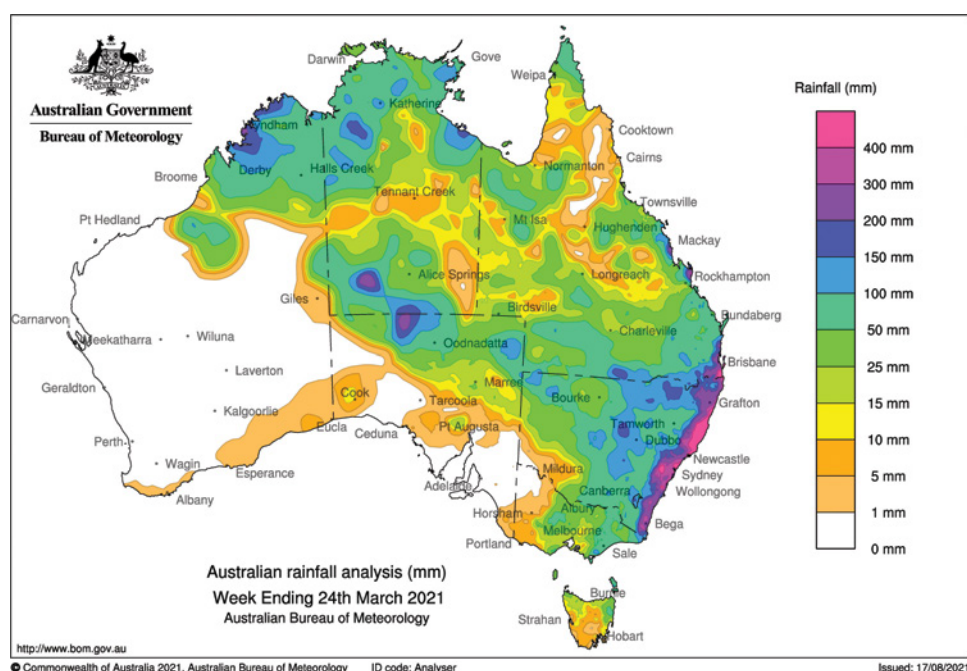


Figure 3: Weekly rainfall totals, week ending 28 March 2021

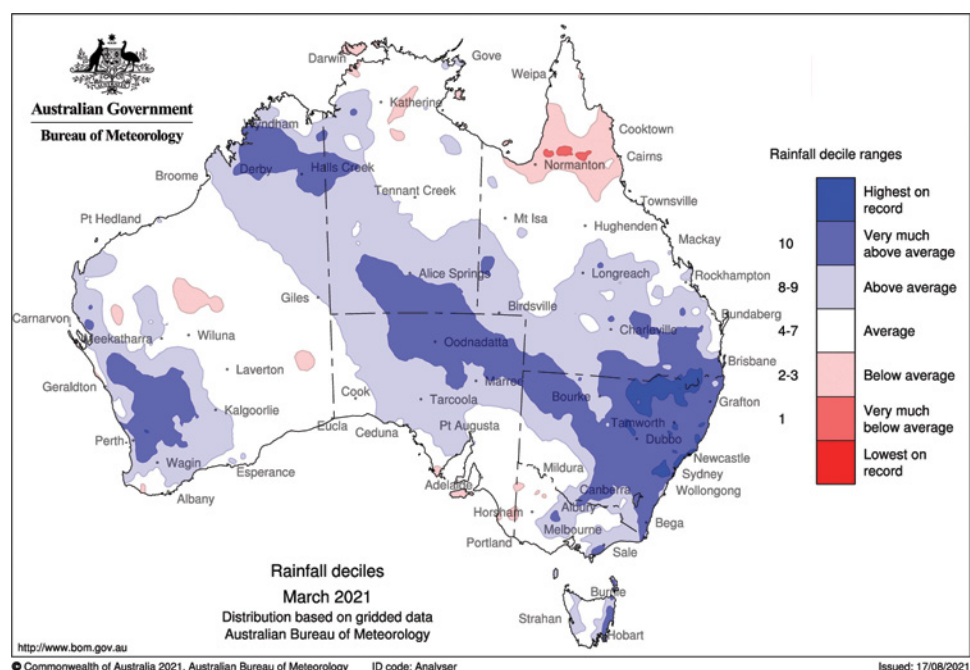


Figure 4: Rainfall deciles for March 2021 compared to historical observations from 1900

## Flooding

The extent of the March flooding in New South Wales was vast and numerous flood records were broken. Several locations saw almost record flood levels (see Table 3). The heavy rain fell against a backdrop of relatively wet antecedent conditions across most of the affected regions, associated with a La Niña which developed in the second half of 2020. Soils became more saturated during 2020, and water storage levels generally increased. This contributed to flooding being more widespread and severe than had been the case during a broadly comparable rain event in February 2020.

In the Northern Rivers area of New South Wales there was minor to major flooding along several river systems. Communities impacted included Grafton, Ulmarra, Maclean, Glenreagh, and Coutts Crossing. NSW SES issued three evacuation orders and a further evacuation warning for communities in the area, affecting approximately 800 people. A total of 16 communities were isolated due to flooding.

Numerous communities in the Mid North Coast were impacted by flooding including Thora, Bellingen, Bowraville, Macksville, Kempsey, Smithtown, Wauchope, Settlement Point, Wingham, Taree, Gloucester, and Laurieton. Numerous evacuation warnings and orders were issued in this area, impacting over 18,000 people. A total of 23 communities and locations were isolated due to flooding, requiring resupply by NSW SES.

Rainfall in the Hunter-Central Coast area resulted in major flooding along the Hunter River at Bulga and moderate flooding at Singleton. Moderate flooding was also experienced in the Tuggerah Lakes area. Communities impacted included Bulga, Wollombi, Singleton and Tuggerah Lakes. Evacuation warnings were issued for areas in Dungog, Singleton and the Upper and Lower Mooney Dams. None of these warnings progressed to evacuation orders. The community of Whittingham, consisting of 16 dwellings, was isolated due to flooding.

Flooding in the Hawkesbury-Nepean Valley and across Sydney impacted numerous communities. The Warragamba Dam spilt, the first significant overflow of the reservoir since 1990, which contributed to the flooding. The Hawkesbury River had multiple flood peaks with waters receding and then rising again in several communities. Communities impacted included Pitt Town, Grono's Point, Cornwallis, Freemans Reach, North Agnes Banks, Windsor, McGraths Hill, Wilberforce, Colebee Stonecutters Ridge, Marsden Park, Mulgrave, Vineyard, Clarendon, Londonderry, Colo, Wisemans Ferry, parts of Jamisontown, Mulgoa, Penrith, North Richmond, and Eastern Creek. Caravan parks along the Hawkesbury River were also flooded.

Approximately 65,000 people were subject to evacuation warnings and evacuation orders across Sydney, with the majority in the Hawkesbury-Nepean Valley. A total of 35 communities were isolated for varying lengths of time because of the flooding.

Whilst there were no flood warnings provided for the Parramatta River, flash flooding did occur and warnings were issued from the flash flood warning system (Flood Smart) to residents subscribed to this system.

Flooding in the river systems in western parts of NSW was much slower moving. Towns and communities along the Darling, Paroo and Barwon River systems faced flooding and subsequent isolation for approximately six weeks after the rainfall and flooding impacted the eastern coast of NSW. The final flood warnings for these rivers were issued at the end of May 2021.

The township of Moree was severely affected by flooding in western New South Wales. Major flooding impacted low-lying areas of the town, resulting in NSW SES issuing an evacuation order which impacted approximately 4,000 residents. Other areas of the township were isolated during the flooding, with NSW SES assisting residents with resupply.

River	Location	Height (m)	Date	Status
Manning	Wingham	14.3	20 Mar	Highest since 1978
Manning	Taree	5.7	20 Mar	Highest since 1929
Manning	Gloucester	6.4	20 Mar	Highest on record
Hastings	Kindee Bridge	12.1	19 Mar	Highest since 1968
Hastings	Wauchope Railway Bridge	8.6	19 Mar	Highest since 1968
Hastings	Settlement Point	2.5	22 Mar	Highest since 1968
Camden Haven	Logans Crossing	8.8	20 Mar	Highest on record
Clarence	Grafton	6.5	24 Mar	Highest since 2013
Coxs	Kelpit Point	7.6	21 Mar	Highest since 1986
Coxs	Island Hill	3.1	23 Mar	Highest since 1998
Coxs	Glenroy Bridge	2.8	23 Mar	Highest since 1998
Hawkesbury	North Richmond WPS	14.0	21 Mar	Highest since 1998
Hawkesbury	Windsor PWD	12.7	24 Mar	Highest since 1990
Hawkesbury	Sackville	9.7	24 Mar	Highest since 1990
Gwydir	Pallamallawa	10.5	24 Mar	0.2 m below 1955 record
Gwydir	Yarraman Bridge	10.0	23-26 Mar	0.2 m below 1955 record
Mehi	Moree	14.2	25 Mar	0.2 m below 1955 record
Macintyre	Yetman Bridge	10.0	24 Mar	Highest since 2000

Table 4: Significant flood peaks during the event



NSW SES received over 14,557 requests for assistance during this flood event, with over 26,000 calls to 132 500. There were 1,052 flood rescue activations across the impacted communities.

This flood event saw the largest number of people covered by NSW SES evacuation warnings and orders in any one weather event. A total of 28 evacuation warnings were issued, impacting approximately 62,000 people. There were 24 evacuation orders issued, impacting over 25,500 residents. There were 33 evacuation centres activated across the impacted areas with 2,854 people registering at these evacuation centres.

Aircraft were used to support the response to the flooding with tasks including resupply, reconnaissance, moving personnel into isolated communities and evacuations.

There were two flood-related fatalities during this event, both motorists whose cars became submerged in floodwaters.

A total of 15,462 rapid damage assessments were carried out across the impacted areas on a range of buildings. Of these, 10,540 were residential, with 4,375 houses sustaining damage and 1,196 houses found to be uninhabitable.

There were numerous instances of power outages across the impacted communities. Flights at Port Macquarie were cancelled after the airport was cut off by flooded roads. In the Hunter Valley, flights to and from Newcastle Airport were suspended due to flooding of the airfield.

A number of educational facilities were closed because of the floods including 376 schools, 244 early childhood centres and 10 TAFE facilities. As at 30 July, all facilities have reopened.

Stock and crop losses from the floods have contributed to some shortages and higher costs of food items. The New South Wales Farmer's Association recognised the impacts the floods would have on farmers and established an appeal through its natural disaster relief fund to assist farmers to continue to operate.

From a wildlife perspective, the floods adversely impacted many burrowing animals such as echidnas and wombats which are feared to have been drowned when their burrows were inundated. It will take some time and analysis to understand the full extent of the impact of this event on fauna. During the event wildlife rescuers were active in rescuing kangaroos stuck in drains, animals hit by cars when fleeing to higher ground as well as turtles and seabirds who were swept away from their natural habitat.



## Relief and recovery

Natural disaster declarations were made by the New South Wales Government for 78 local government areas impacted by this storm event. This provided affected communities and individuals with a range of special assistance measures including access to financial assistance. The New South Wales Government adopted a policy where recovery work was to be contracted to local small and medium enterprises as a priority to assist the recovery of local communities.

The Australian Defence Force provided a range of support services to the response and relief effort, assisting with damage assessments, helping householders and property owners to commence the recovery effort by cleaning out homes and businesses and moving debris in many locations impacted by the flooding.

The State and Commonwealth Governments have provided disaster relief payments to various groups impacted by the floods including Primary Producer Grants, where there have been 3,575 applications made, of which 2,200 have been approved with \$24.5 million disbursed.

Disaster Relief Grants were made to low-income households where the property suffered structural damage and household contents were destroyed by the floods. As at the 30 July, there have been 333 grant applications made and \$2,204,635 paid.

A total of \$435,388,090 in Australian Government Disaster Payments has been made to individuals impacted by the floods along with \$4,441,630 in Australian Government Disaster Allowance payments paid out.

There have been emergency accommodation arrangements for 1,662 affected individuals as of 30 July.

On 22 March, the Insurance Council of Australia declared an insurance catastrophe for large parts of New South Wales following the devastating storms and flooding. As of 30 July, the Insurance Council of Australia reported there had been 53,144 claims lodged with \$629.6 million damage incurred associated with this event.

## Observations

NSW SES has recorded several initial observations following this event. After action reviews and an AFAC coordinated independent review of the event were occurring at the time this report was compiled. Observations include:

- Interagency support is essential during large scale and campaign events. This support is enhanced by relationships developed and joint training undertaken between events.
- The benefits of community education and engagement programs were seen during this event, with an improved response to flood warning and evacuation products seen in many communities where these programs have been undertaken.
- The impact of long-term operational activity cannot be underestimated when preparing for yet another event. Fatigue levels need to be considered when rostering members, as well as the availability of volunteers who have already been assisting their communities for many months and whose incomes may have also been impacted by the COVID-19 pandemic.









# Interstate flood response

Queensland resources deployed to New South Wales, March 2021

The influx of moisture from a high-pressure system in the Tasman Sea, combined with a low-pressure system in the Timor Sea, resulted in very heavy rainfall totals on several days during the event across south-east Australia. The largest amount of rainfall in this system persisted across New South Wales. The extraordinary rainfall impacted the south-east Queensland border to the Sydney metropolitan area, parts of the New South Wales South Coast and inland. Queensland did not experience the same rainfall figures as New South Wales and the impacts were less severe on communities, infrastructure and community lifelines.

The vast extent of flooding along the New South Wales coast placed pressure on the emergency response to communities affected by the floods. Queensland Fire and Emergency Service (QFES) activated a task force to deploy to assist in the flood operation.

In Queensland, the floods inundated homes and surged over roads, leading to more than 1,400 calls for assistance. State Emergency Service (SES) and Rural Fire Service (RFS) volunteers and Fire and Rescue Service (FRS) swiftwater technicians were quick to respond to support people caught in floodwaters.

Once the situation in Queensland was under control, about 170 QFES members deployed and travelled south to support emergency services in New South Wales. There is a longstanding interstate agreement coordinated by the AFAC National Resource Sharing Centre to facilitate resource sharing across jurisdictions.

The interstate team supported the huge flood response in Coffs Harbour, Nambucca Heads, Kempsey, Port Macquarie, Taree, Newcastle and around Western Sydney.

The taskforce commented on the extent of the devastation, with a lot of people isolated or their properties impacted and requiring assistance. This included clean-up operations and also mental health support.

The taskforce assisted with a wide range of tasks, including making homes safe and habitable by addressing storm damage, heights work to make buildings safe, public relations, reconnaissance and intelligence gathering, and tasks using flood boats including rescues, evacuations and assisting with food and medical resupplies.

The taskforce helped the Port Macquarie SES unit restock its shelves and distribute goods to community hubs where people impacted by the floods could pick up clothes, food and other essentials. One Queensland SES team was tasked with a particularly challenging job to assess damage and people's wellbeing in a remote valley cut off by floodwaters. The community's spirits were uplifted upon learning that emergency responders had come from Queensland to provide assistance. This is a telling moment and demonstrates people's resilience being enhanced during difficult times.

The size of the event covering both Queensland and New South Wales strained resources and impacted on fatigue management. Lessons identified were that there were opportunities for improvement in the communications and processes for requesting assistance between jurisdictions to ensure appropriate support is being provided in the right location. However, Queensland personnel deployed to New South Wales acknowledged the value of the deployment experience and felt respected and appreciated by their interstate colleagues.

More information about this event is included in [QFES Response Magazine](https://www.qfes.qld.gov.au/sites/default/files/2021-05/Response-Magazine-36-April-2021.pdf). ([www.qfes.qld.gov.au/sites/default/files/2021-05/Response-Magazine-36-April-2021.pdf](https://www.qfes.qld.gov.au/sites/default/files/2021-05/Response-Magazine-36-April-2021.pdf))





# Tropical cyclone

Tropical Cyclone Seroja, Western Australia, 11-12 April 2021

Two tropical lows formed well off the north-west of Australia on 4 April in the vicinity of the monsoon trough. One of these tropical lows later developed into Tropical Cyclone Seroja on 5 April in the Timor Sea, north of the Kimberley in Western Australia. On 7-8 April, Tropical Cyclone Seroja remained weak while interacting with a tropical low that later became the short-lived Tropical Cyclone Odette. The following day, the system was slow-moving and well west of the Pilbara but entered a more favourable environment and began to intensify. The system then accelerated towards the south-east and intensified into a Category 3 severe tropical cyclone on 11 April 2021.

Tropical Cyclone Seroja crossed the coast south of Kalbarri in the central west coast later that evening and tracked rapidly across northern and eastern parts of the South-West Land Division

before moving into the Great Australian Bight as a low-pressure system. Maximum wind gusts of 170 km/h were recorded near Kalbarri and the strongest winds were experienced for 1-2 hours at all locations as it tracked inland. The impact area of the cyclone was estimated to be more than 133,000 km<sup>2</sup>.

Significant damage occurred to critical infrastructure including roads, telecommunications and emergency services buildings. Several towns received damage with properties in Kalbarri, Northampton, Mullewa, Morawa and Mingenew sustaining considerable damage. The widespread damage prompted many calls to the State Emergency Service (SES) 132 500 emergency line requesting assistance. Department of Fire and Emergency Services (DFES) as the designated Hazard Management Agency for cyclone, received 1,659 requests for assistance and conducted 3,228 rapid damage assessments, with 317 residential properties assessed as being uninhabitable.

An emergency situation was declared at 3.50 pm on 11 April for 45 local government areas. To minimise the risk of fire impacting the state while emergency services were managing the cyclone, pre-emptive total fire bans were declared for the period to 12 April in 70 local government areas.



## Observations

This is a rare event for people on the central west coast of Western Australia and many properties in the affected areas were not constructed to withstand a Category 3 cyclone impact. Many of the damaged properties contained asbestos building materials resulting in extensive contamination across much of the impacted area. DFES established a separate Asbestos Risk Management Division to develop an Asbestos Management Plan in consultation with the Department of Water and Environmental Regulation and Department of Health. Contractors were engaged in applying asbestos risk treatment through the application of sealant to prevent the release of asbestos fibres and making sites safe.

Approximately 30,000 homes and businesses were without power, and communication systems were extensively damaged. The damaged network covered an area more than 700 km long and 150 km wide which presented challenges to the community gaining emergency assistance, and for emergency teams operating in the affected areas. Generators, mobile satellite units and portable radio repeater towers were used extensively to re-establish communications with the Incident Management Team and emergency crews and to restore temporary power to affected communities.

In preparation for the impact of Tropical Cyclone Seroja, a Level 2 Incident Management Team and urban search and rescue resources were deployed to assist the Midwest–Gascoyne region on 8 April. Key stakeholders, pastoralists, remote communities (including the Abrolhos Islands) were engaged to ensure appropriate preparation action was taken and any emerging issues identified and mitigated. Extensive public consultation was initiated with public safety information and emergency warnings issued. The incident escalated to Level 3 on 12 April and subsequently a Level 3 Incident Management Team was established in Geraldton.

The DFES Geraldton Regional Operations Centre (ROC) transferred functions to the Kimberley ROC on 11 April until the red alert phase of the cyclone was lifted on 12 April. In addition, contingencies were established to transfer functions to the Metropolitan Operations Centre (MOC) in Perth should the Geraldton ROC redundancy plans become unachievable.

More than 600 DFES personnel and volunteers, over 200 personnel from Victoria, New South Wales, South Australia and 68 Australian Defence Force (ADF) personnel were deployed to the region to assist. Interstate SES teams were provided by Victoria, New South Wales and South Australia through

coordination with the AFAC National Resource Sharing Centre. The first teams arrived from South Australia on 12 April. A request for Australian Government Physical Assistance for an airlift of personnel and equipment between Perth and the impacted tropical cyclone area was approved on 11 April. ADF personnel and aircraft were used extensively to move people, vehicles and equipment between Perth and Geraldton. Five Victorian SES vehicles were transported from Melbourne to Geraldton by an ADF aircraft.

Prior to the cyclone, the impacted areas had experienced a significant surge in temporary population due to the Easter long weekend and the commencement of school holidays. Aggregate numbers indicated a rise of the transient population to be in the vicinity of 20,000 to 30,000 people. As a result, extensive media coverage and public warnings were issued advising people to leave the area before the arrival of Tropical Cyclone Seroja. National parks in the forecasted path of Tropical Cyclone Seroja were also closed.

On 24 April, a COVID-19 lockdown by the Western Australian Government prompted enhanced Interim Operating Procedures. This included the introduction of face masks, daily briefings and the suspension of incoming interstate crews. All responders were offered testing, self-isolation in Geraldton for any positive test results and appropriate accommodation for self-isolating personnel was secured by the Incident Management Team. DFES monitored cases of personnel that may have visited exposure sites during the specified periods of concern. Replacements for the interstate teams were sourced from regions outside the Perth and Peel region affected by the COVID-19 lockdown. Transport arrangements were established to ensure the incoming teams bypassed or did not stop in the Perth and Peel region.

There were significant challenges with the provision of accommodation for personnel. The shortage of accommodation was caused by a number of factors:

- Many accommodation providers were unable to open because of the power outage.
- Many accommodation facilities were damaged and uninhabitable.
- Essential service network operators competing for accommodation for additional personnel.
- Tourist numbers for the area were high and lessened the availability.

DFES established temporary accommodation with the assistance of ADF personnel for 210 people.



Image: Morten Boe, DFES WA









Image: Morten Boe, DFES WA



Image: Lewis van Bommel, DFES WA



# Storm and flood

South-east Australia, 7-11 June 2021

**A low-pressure system moved across south-eastern Australia during the week beginning 7 June. The severe weather impacts associated with this system were focussed over Victoria, although South Australia, south-eastern New South Wales and Tasmania were also affected.**

In Victoria, damaging to destructive winds and heavy rainfall affected central and eastern parts of the state overnight on 9 June, gradually easing on 10 June. The winds and rain caused significant impact and damage, including riverine flooding, falling trees, damaged power infrastructure, telecommunication outages and major damage to road networks. Victoria State Emergency Service (VICSES) received more than 9,100 requests for assistance across the state relating to the flood and storm event. The majority of those related to trees, building damage, assist fire service and assist police.

Widespread 24-hour rainfall totals of 50-150 mm were observed through west Gippsland, with several stations recording totals above 200 mm. Between 10 am on 9 June to 10 am on 10 June, Victoria recorded more than 280 mm of rain at Mt Baw Baw, 250 mm at Thompson Catchment and 270 mm at Mount Tassie. Strong winds were observed, with wind gusts of 119 km/h recorded at Puckapunyal and 115 km/h at Wilsons Promontory.

The rainfall resulted in moderate to major flooding in several catchments in eastern Victoria, with parts of Traralgon evacuated. Several rivers in eastern Tasmania also reached minor to moderate flood levels. Widespread snowfall was observed through the New South Wales alps all the way to the Queensland border, and hazardous surf conditions affected the Gippsland coast.

The Gippsland town of Traralgon was particularly impacted by flooding. At 10 am on 10 June, an evacuation warning was issued for the vicinity of Traralgon and subsequently Traralgon Creek, which continued until 11 June. Some residents close to Traralgon Creek were rescued from floodwaters by swift water crews. An emergency flood warning was also issued for the Yarra River between Coldstream and Warrandyte.

## Storm impact

The weather caused major impacts to critical infrastructure, damage to properties and isolation of multiple communities across Victoria. The most storm-affected areas in Victoria were the following local government areas:

- Baw Baw, La Trobe, Wellington, South Gippsland and Bass Coast (central and south-west Gippsland)
- Murrindindi, Yarra Ranges and Cardinia (eastern metropolitan)
- Hepburn, Moorabool, and Macedon Ranges (central highlands).

There were two confirmed fatalities relating to the storm event, one in Gippsland floodwaters in Woodside and another in floodwaters off Maddens Bridge Road in Glenfyne, 45 km east of Warrnambool.

Approximately 200,000 customers were left without power on the night of 9 June, with more than 4,000 power-dependant customers being left without power at one time. This number increased to approximately 300,000 customers the following day.

A number of communities were isolated from any communication access, including landline, mobile phone, internet, emergency broadcast and Triple Zero. Several communities experienced power outages for many days and weeks. On 17 June, AusNet Services stated at least 3,000 of the households in the Dandenong Ranges could be without power for the next 3 weeks or until 10 July. The main suburbs without power included Ferny Creek, Kalorama, Mount Dandenong, Olinda, Sassafras, Sherbrooke, The Basin, Tremont, and Upwey.

There was significant damage to major road networks, as well as transport routes and other infrastructure. During the event, six water treatment plants lost main power and were required to operate on generators. Seventeen health services experienced disruptions to power supplies and were required to operate back-up generators. Eight schools in the Dandenong Ranges were closed because of the weather impacts. Many national parks were shut after being deemed inaccessible or dangerous.

Public information disseminated through various channels provided regular advice for people in impacted areas, including messages about emergency risk, potential health impacts,



mental health support, power outage information and availability of relief and recovery supports. This included the an advisory notice warning people not to drink tap water in a number of locations, including Trentham, Kallista, Sherbrooke and The Patch.

The storm and associated flooding impacted the Yallourn mine in the Latrobe Valley, which supplies more than a fifth of Victoria's energy. Cracks were identified in the wall of the mine, which had the potential to cause a collapse of the mine wall. The significant consequences had to be carefully managed, including the implications for supply of coal. On 17 June, a state of emergency was declared for energy. The declaration allowed Energy Australia to undertake emergency works and divert river water away from the mine.

The storm event also impacted the COVID-19 response through the closure of some testing sites and vaccination centres in the impact areas for a short period of time, although this had no effect on capacity or testing times.

As of 27 June, a total of 2,395 initial impact assessments had been undertaken across the state with 135 properties classified as damaged but habitable and 129 properties classified as damaged and uninhabitable.

## Relief and recovery

On 9 and 10 June, response, relief and early recovery activities were initiated and taking place under state control arrangements. In the days following the storm, significant work was undertaken across the state to provide relief, commence clean up and support early recovery. A wide range of agencies and organisations provided relief to impacted community members, including food, accommodation, telecommunications access, alternative power sources and welfare support. Specialist resources were engaged to clear trees, stabilise roads, repair bridges and undertake other critical work. Power crews cleared multiple areas where trees have taken down powerlines, making repairs, restringing the lines, and testing them for safety.

The Victorian Government provided additional help to residents who were expected to be without power due to the devastating storms by distributing generators to households. The on-loan generators from the Victorian Government gave people who wanted to stay at home enough energy to power the basics like some lights, a microwave and a small heater.

On 17 June, Bushfire Recovery Victoria (BRV) was requested to coordinate recovery and clean up from the event. From 18-21 June, BRV established a regional presence in the most storm-affected areas. On 25 June, transition from relief to recovery coordination formally commenced with the State Emergency Management Committee approving recovery governance.

## Funding support

On 11 June, Victoria activated jointly funded Commonwealth-State Disaster Recovery Funding Arrangements with the Commonwealth Government. Payments activated under these arrangements for the event included:

- Emergency relief payments provided assistance of up to \$560 per adult and \$280 per child (up to a maximum of \$1960 per eligible family) to help meet immediate needs. As of 3 August 2021, 651 payments had been made of over \$700,000.
- Emergency re-establishment assistance grants provided assistance for households of up to \$42,250. The funding provided for a range of relief measures, including accommodation and repairing damaged houses. As of 3 August 2021, 40 payments had been made of over \$150,000.

Joint Commonwealth and State Government support was provided for those impacted by the prolonged power outage. As of 19 July, a total of \$11.2 million in Prolonged Power Outage Payment payments have been administered by AusNet Services to residents and businesses.

The Insurance Council of Australia declared the Victorian flood disaster of 9 June a catastrophe which triggered Insurance Council of Australia resources in coordinating insurers to work as a priority with people affected by the flood who had lodged insurance claims. As of 14 June, more than 6,500 claims had been made relevant to the impact of the 9 June storm and floods event.

On 1 July, the Commonwealth Government activated the Australian Government Disaster Recovery Payment and the Disaster Recovery Allowance to support those most impacted by the storms and flooding in Victoria. Where eligible, people in the nominated municipalities directly impacted by the event were able to apply for one-off payments and income support.

In addition to relief supports previously announced, additional support payments announced in July included the council support fund (\$8.2 million), clean up (initially \$55.5 million and private property) and social recovery supports, including recovery case support (\$17.55 million).

## Multi agency collaboration and coordination

This event involved a huge collaborative effort across all emergency services and departments, including personnel from VICSES, Country Fire Authority, Fire Rescue Victoria, Victoria Police, Department of Environment, Land, Water and Planning, Parks Victoria, Emergency Management Victoria, Emergency Services Telecommunications Authority, Ambulance Victoria, BRV, Department of Jobs, Precincts and Regions, Department of Health, Department of Families, Fairness and Housing, Life Saving Victoria, and Australian Red Cross, Victorian Council of Churches Emergency Ministries and significant efforts by local councils.

More than 1,450 personnel responded to this event: comprising of 950 personnel in the field, and approximately 500 personnel supporting the response, including in the State Control Centre (SCC).

The SCC was activated to Tier 3, its highest level of activation, on 10 June in response to the severe weather impacts across Victoria. On 14 June, the SCC activation level was downgraded to Tier 2 to manage the impacts of this event.

Following the storm event, and to provide assistance and support to impacted Victorian communities, requests for Commonwealth assistance were made via Emergency Management Australia. On 16 June, the Emergency Management Commissioner made an initial request for Australian Defence Force (ADF) personnel to assist with logistics and planning. On 18 June, the Emergency Management Commissioner made a further request for 120 ADF personnel to provide support to Victorian communities impacted by the storms. On 7 July, all ADF resources for this event were demobilised.

Recovery activities will continue for some time, with agencies working closely together to support the recovery needs of communities.





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