



# Major Incidents Report 2018–19



The Australian Institute for Disaster Resilience (AIDR) is a disaster resilience knowledge centre. We develop, maintain and share knowledge and learning to support a disaster resilient Australia. We work with government, communities, non-government organisations, not-for-profits, research organisations, education partners and the private sector to enhance disaster resilience through innovative thinking, professional development and knowledge sharing.

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Disasters and disruptions provide an opportunity to learn. Distilling the causes and sharing experiences of what contributed to each disaster, providing evidence or unpicking what happened, all provide important opportunities to learn so that measures can be taken to reduce the chance of the same thing happening again.

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Profiling Australia's Vulnerability 2018  
Australian Government Department of Home Affairs

# Foreword

This is the **third annual *Major Incidents Report*** published by the Australian Institute for Disaster Resilience. This edition provides an authoritative overview of major incidents in Australia from July 2018 through to June 2019 as identified by emergency services.

Nineteen noteworthy and instructive incidents are included in this report, some of which have been combined to reflect either recurring and protracted events, like regular storms in the same place, or similar incidents which have occurred on a number of occasions, like building construction related incidents.

The inclusion in this report of key observations assists the emergency management and disaster resilience sector in identifying and analysing recurring and emerging themes at a national level across hazards, sectors and jurisdictions. In a climate of increasing severity, complexity and occurrence of disasters across Australia and globally, ongoing reflection and learning is critical in building national disaster resilience and further reducing disaster risk.

The Australian Institute for Disaster Resilience (AIDR) acknowledges the contribution of Damien Killalea Consulting in the production of this report. AIDR also thanks all contributing agencies and organisations; including the Bureau of Meteorology, who reviewed meteorological input, and its key partners: the Australian Government Department of Home Affairs, AFAC, the Bushfire and Natural Hazards Cooperative Research Centre, and Australian Red Cross.

**Robert Cameron OAM**

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# Introduction

**This report provides an overview of major incidents as identified by emergency services during the 2018–19 financial year and summarises key observations at a national level to identify and analyse recurring and emerging insights across hazards, sectors and jurisdictions.**

The report is not intended as a comprehensive account of all major incidents over the period. The intent is to highlight significant incidents that have been of impact or consequence for emergency services and communities, providing background information about the incident and the corresponding response and recovery activity where relevant.

This report harnesses the lessons management capability of the sector and presents key observations in relation to each incident (where identified) and information on multi-agency collaboration, community engagement and recovery operations where relevant. These observations give agencies opportunities to learn from others' experiences, implementing learnings across a variety of hazards and emergency management elements. We accept there are limitations on analysis due to the limited time to reflect on particular events.

In addition to the incidents detailed in this report, other incidents which occurred during 2018–19 include drought and heat-related incidents. Emergency services' resources were once again deployed interstate and internationally, and Victoria recognised the 10-year anniversary of the Black Saturday bushfires. Emergency incidents involving building construction issues and fires involving combustible building cladding were also notable events, not all of which have been included in this report.

Themes observed from the incidents summarised in this report include:

- the impact of climate change including the increasing frequency and protracted nature of weather-related emergencies and disasters
- community information, awareness raising and education
- public information and warnings
- social media and information management
- multi-agency and multi-hazard technical experts
- strategic and operational relationship building prior to disasters
- connection between response and recovery agencies
- spontaneous volunteers
- displaced people and evacuation centres
- resource mobilisation and staff registers
- integration and capability of night-time aerial fire bombing operations
- use of predictive models and intelligence
- wellbeing of emergency services personnel
- communications and innovative technology
- use of the Australasian Inter-service Incident Management System
- cost of emergency response and recovery
- liaison with the Australian Defence Force
- liaison and engagement with Indigenous Elders and communities
- consideration of tourists and visitors
- multi-jurisdictional incidents and simultaneous incidents in close proximity
- interagency communication and collaboration
- aerial surveillance, weather prediction products and mapping tools
- local government MOUs.



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# A national perspective

From a national perspective, the 2018-19 severe weather season was significant. In addition to the front-line emergency and disaster recovery services provided by state and territory agencies, consecutive natural hazard impacts and their compounding effects drew on a very broad range of services and capabilities from Australian Government agencies.

Several deployments to international incidents exacerbated the draw on domestic capability and capacity. Emergency management systems across the country were stretched but, on balance, held up.

The 2018-19 severe weather season saw:

- Australia's hottest summer on record
- Queensland rainforest burning with intensity similar to fire in eucalypt forest
- monsoonal floods impacting more than 50% of Queensland's land mass
  - 39 local government areas impacted
  - over 100,000 people identified as experiencing hardship, many displaced and requiring emergency accommodation
  - 500,000 head of cattle destroyed
  - Townsville impacted by 2000mm rainfall and Richmond 498 mm in 1 week
- the driest September on record
- the highest daily maximum temperature on record
- the hottest December day on record (followed by 5 consecutive days with national average over 40°C)


- the hottest January on record (3.37°C higher than average)
- unprecedented scale and duration of heatwaves
- two Category 4 tropical cyclones concurrently making landfall
- 4,059,380 telephone warnings (via Emergency Alert) sent across Australia between 1 July 2018 to 1 July 2019
  - 3,164,223 sent in Queensland alone, and
- significant negative economic implications.

## Australian Government activity

During the course of 2018-19, the Australian Government Crisis Coordination Centre (CCC) notified stakeholders of, and coordinated whole-of-Commonwealth responses to, a number of significant incidents, including:

- the Indonesian tsunami
- the Bourke Street terrorism incident
- bushfires and heatwave in Queensland
- bushfires in Tasmania
- floods in Queensland
- bushfires in Victoria
- the terrorist attack in Christchurch, New Zealand
- the maritime incident in the Solomon Islands
- tropical cyclone *Trevor*
- tropical cyclone *Veronica*

The Australian Government Crisis Committee met on nine occasions with the National Crisis Committee convened once. In the period January to June 2019, the Australian Government Disaster Response Plan (COMDISPLAN) was activated on six occasions and the Australian Government Overseas Assistance Plan (AUSASSISTPLAN) was activated on three occasions.



The CCC distributed over 2,000 notifications to key stakeholders in Australian and jurisdictional agencies. The CCC's Crisis Coordination Team was activated for 57 days across concurrent incidents, deploying liaison officers for 70 days in support for operations domestically and overseas. The Department of Home Affairs' Crisis Communications Media team supported CCC operations through the development and distribution of 75 sets of Talking Points and 80 media releases.

The National Security Hotline (NSH) received over 10,000 contacts, assisting state and territory law enforcement and intelligence agencies. In March 2019, following the Christchurch Terrorist Incident, the NSH experienced a 165% spike in contacts compared to the previous month.

The Australian Defence Force significantly contributed to all states and territories providing direct and indirect support such as heavy air lift, air base access to support aerial firefighting operations, tents for evacuees, defence bases for emergency services staging and accommodation, support to fuel and fodder supply chains, and planning for carcass removal.

In 2018-19, jointly funded Commonwealth-State assistance under the Disaster Recovery Funding Arrangements (DRFA) was activated in response to 48 domestic disaster events (24 in New South Wales, seven in Victoria, 11 in Queensland, four in Western Australia, one in Tasmania and one in the Northern Territory). Disaster recovery funding assistance was activated in over 240 local government areas and over 100 DRFA notifications were issued from states and territories to the Australian Government as further support for recovery was provided to affected communities.

The Prime Minister approved 12 requests under the DRFA for extraordinary disaster recovery assistance (compared to 5 requests in the previous financial year), including a \$242 million long-term recovery package to support communities devastated by the Queensland floods. Disaster Recovery Branch within Emergency Management Australia (EMA) worked closely with relevant Australian Government departments and agencies to ensure that this additional recovery funding complemented existing programs and national priorities.

In addition to the recovery assistance under the DRFA, in 2018-19 the Australian Government provided over \$120 million directly to individuals and families through the Australian Government Disaster Recovery Payment and Disaster Recovery Allowances following major events in Queensland, New South Wales and Tasmania. This was in contrast to 2017-18, during which neither of these payments was activated. The extraordinary requests were expedited by the Commonwealth, ensuring disaster recovery assistance was available to affected communities rapidly. This was achieved by early engagement and close collaboration between the requesting jurisdiction and EMA.

During 2018-19, the Australian Government also made advance recovery payments under the DRFA totalling \$232 million to ensure that that recovery assistance could flow to communities devastated by the Queensland floods.

# National overview

This map is a depiction of the 19 incidents described in this report which occurred in Australia during 2018-19.

For more information on disasters in Australia, please go to the disasters page on the Knowledge Hub:  
[www.knowledge.aidr.org.au/disasters](http://www.knowledge.aidr.org.au/disasters)





# Lessons management

This report harnesses the lessons management capability of the emergency services sector to provide observations related to each incident or related hazard response. There are limitations in these observations given the time of publication of this report so soon after the events in some instances.

## What is lessons management?

Lessons management is a cycle of collecting, analysing, disseminating and applying learning experiences from events, exercises, programs and reviews. The goal of this activity is ongoing improvement by organisations and the people who work for them. Organisational growth and continuous improvement are particularly relevant where preservation of life is the primary goal.

## Why is lessons management important?

A consistent approach to lessons management is an essential component of an organisation that has a culture of learning. Lessons management can facilitate learning and improvement resulting in more efficient and effective practices, improved safety, and improved capture and mobilisation of knowledge. Organisations are seen to be learning when their structures, processes and culture are able to evolve based on learning acquired from experience.

Interoperability of lessons management processes across agencies, sectors and jurisdictions will facilitate information sharing and analysis. A common language and methods (such as agreed coding of data) can help aggregate information so that it is accessible and can be analysed and interpreted. This will support the horizontal and vertical exchange of information between agencies, sectors, and jurisdictions – all of which will improve and promote cross-agency analysis.

## The OILL process (observation, insight, lessons identified, lessons learned)

The OILL process is one approach to synthesising observations, analysing for insights and identifying lessons. This approach is widely used by many emergency management agencies as well as military and private sector organisations. A description of each step in the OILL process is provided below:

**Observation:** a record of a noteworthy fact or occurrence that someone has heard, seen, noticed or experienced as an opportunity for improvement or an example of good practice.

**Insight:** A deduction drawn from the evidence collected (observations), which needs to be further considered. An insight defines the issue, not the solution.

**Lesson identified:** a conclusion with a determined root cause based on the analysis of one or more insights and a viable course of action that can either sustain a positive action or address an area for improvement.

**Lesson learned:** A lesson is only learned once the approved change is implemented and embedded in the organisation. Depending on the changes required, it may take several years for the change to be institutionalised across the organisation.

For more detailed information and guidance on lessons management, refer to the *Lessons Management Handbook* on the Australian Disaster Resilience Knowledge Hub: [www.knowledge.aidr.org.au/resources/lessons-management-handbook/](http://www.knowledge.aidr.org.au/resources/lessons-management-handbook/)

# Bushfire

New South Wales, August 2018

**In August 2018, below average rainfall was recorded throughout much of New South Wales (NSW) including the NSW south coast, and mean maximum temperatures were generally above average.**

August rainfall totals for NSW as a whole were 57 per cent below normal, the lowest since 2013. This continued a run of eight consecutive months of below-average rainfall for the state, resulting in the driest January to August period since 1965. All of NSW was either in drought or drought-affected.

There were a number of bushfires burning across the state during the second week of August, and some 870 firefighters and 270 fire trucks supported by 33 water bombing aircraft were tackling the blazes. On 15 August, the NSW Rural Fire Service (RFS) Commissioner declared a bushfire emergency, and a total fire ban was declared for the Sydney, Illawarra and Hunter Valley regions. This was the earliest total fire ban on record for NSW.

The Kingiman bushfire started near Croobyar Road on Saturday 11 August some 10 kilometres west of Ulladulla on the NSW south coast. Crews from NSW RFS and the National Parks and Wildlife Service, supported by water bombing aircraft, fought the fire over the following days, containing it to 100 hectares.

However, early on 15 August the fire flared out of control and under the influence of strong north-westerly winds, spread rapidly to the south-east, crossed Woodstock Road and impacted properties west of Burrill Lake. An emergency warning was issued to residents around Woodstock as firefighters fought to bring the fire under control.

A local emergency operations centre was established in Nowra by the local emergency operations controller to support firefighting efforts and coordinate support to affected communities, and an evacuation centre was opened at the Ulladulla Civic Centre.

By 17 August, the fire had grown to 1,700 hectares and a number of water bombing helicopters were operating on the fire. At about 2.00pm one of the helicopters, which had been operating since early morning with a Bambi bucket suspended beneath it, crashed after the bucket became entangled in trees.

Despite on-scene firefighters providing immediate aid, the experienced pilot and sole occupant of the aircraft was unable to be revived.

Other pilots in the vicinity at the time reported south-easterly winds between 10 and 20 knots, with visibility limited to three kilometres due to the smoke.

The helicopter was a 1994 Kawasaki BK117 that had been registered to Sydney Helicopters since May 2015. It was destroyed in the crash. Immediately after the crash, NSW RFS grounded all other aircraft fighting the fire.

Australian Transport Safety Bureau staff and NSW Police attended the scene and commenced a formal investigation. As at 30 June, the final report into the incident was yet to be handed down.

Acknowledgements: NSW Rural Fire Service; Australian Transport Safety Bureau; ABC News; Sydney Morning Herald; The Guardian.



# Observations

- The impact of climate change on weather-related emergencies and disasters occurring outside of traditional cyclone, storm, flood and bushfire seasons necessitates year-round:
  - agency readiness to respond and issue information and warnings
  - community awareness of potential threats, warnings and limitations (e.g. total fire bans).





# Warehouse fires

Victoria, August 2018 and April 2019

## On Thursday 30 August 2018, a fire broke out in a large warehouse in West Footscray, an inner-western suburb of Melbourne.

The fire emitted a large plume of toxic black smoke, visible across Melbourne and from as far away as Geelong and took the Metropolitan Fire Brigade (MFB) 14 hours to bring under control and several days to extinguish.

The MFB was alerted to the fire in Somerville Road at around 5.00am and arrived within six minutes. By then, the 100 x 200 metre warehouse was fully alight. Initially, 80 firefighters and 20 fire appliances attended, with the number of firefighters later rising to more than 140. Firefighters' ability to reach the seat of the fire was hampered by walls of shipping containers and 200 litre drums stacked inside the building.

Soon after the fire began, authorities issued a 'watch and act' community advice message for ten nearby suburbs; anyone within 500 metres of the plume was advised to remain indoors. During the afternoon, the community advice was extended to include 20 suburbs.

Despite the efforts of firefighters and support agencies to contain contaminated runoff, dead fish, eels, birds and other wildlife washed up on the banks of nearby Stony Creek within 24 hours of the fire starting. The Environment Protection Authority (EPA) warned people not to eat fish from the creek or the lower Yarra River and not to enter or allow dogs to enter the creek.

To reduce the risk of exposure to children, some school principals and early learning centre operators in the neighbouring suburbs of Yarraville, Kingsville, Braybrook, Altona, Brooklyn and Seaholme closed their facilities temporarily.

At the request of the MFB, a coronial investigation into the fire was opened and Victoria Police arson squad detectives began preparing a brief for the State Coroner.

On Friday 5 April 2019, the MFB was called to a similar fire in another warehouse, this time in Thornycroft Street, Campbellfield.

Approximately 175 firefighters attended, preventing the fire spreading beyond the warehouse and bringing it under control within hours. But like the West Footscray fire, it took several days to completely extinguish.

Both fires presented similar challenges for firefighters:

- the lack of adequate fire suppression systems in the buildings enabled the fires to grow rapidly before firefighters arrived
- the large volumes of combustible products stored made the fires difficult for firefighters to extinguish
- the fires' proximity to residential areas and sensitive ecosystems made the containment of contaminated runoff a priority.

Despite these challenges, both fires were controlled relatively quickly in accordance with established emergency management priorities. There were no deaths (but serious burn injuries to a worker at the Campbellfield warehouse), no loss of infrastructure and other assets adjacent to the warehouses, and limited disruption to communities and businesses outside the immediate environs of the fires.

After the West Footscray fire, WorkSafe Victoria and the Local Government Authority confirmed that the warehouse was not registered to store dangerous chemicals. This prompted the establishment of a state government taskforce, led by WorkSafe Victoria, which commenced the inspection of other industrial properties across Victoria to assess compliance with the Dangerous Goods Act. The taskforce found that many others didn't comply, including the Campbellfield warehouse, which was last inspected on the day before it caught fire.

While it was a registered dangerous goods site, the Campbellfield warehouse's licence had been suspended by the EPA on 15 March and a clean-up notice issued after it found 450,000 litres of chemicals, 300,000 litres above its licensed limit, stored there. The day before the fire, the EPA discovered that 300,000 litres, double its limit, were still there.

At the MFB's request, a coronial investigation into this fire was also commenced. The Victorian Premier announced that the government was prepared to make regulatory changes if an investigation into the fire revealed shortcomings.

Acknowledgements: Metropolitan Fire and Emergency Services Board; ABC News; The Age.

# Observations

- Appropriate training and skills maintenance at all levels will facilitate critical event logging and recording of other key incident information.
- The rigorous application of agreed protocols for issuing community information and warnings will ensure the delivery, by the designated incident control agency, of accurate, comprehensive, relevant, timely and consistent messages.
- Appropriate processes and responsibilities established at multiple levels will help ensure information critical to incident management is available to the incident controller.
- Processes to manage emergency incidents that are scalable upwards and downwards, tested to ensure they are adaptable to changing incident size and complexity, will enhance emergency management outcomes.





# Bushfire

Australian Capital Territory, November 2018

**New South Wales (NSW) and Australian Capital Territory (ACT) experienced a heatwave over the last few days of October 2018 that continued into early November. During the early evening of Thursday 1 November, a burnt-out car sparked a fire at Pierces Creek a few kilometres to the west of Canberra's urban fringe.**

A total fire ban was declared for the following day. Twenty-three firefighting appliances from the ACT Rural Fire Service (RFS), supported by six helicopters, three bulldozers, two graders and an excavator battled the fire that day in warm, dry and windy conditions.

Due to its rapid and erratic spread, the fire initially posed a risk to rural settlements in the south of the ACT. About 150 students from Miles Franklin Primary School, who had been at the Birrigai Outdoor School at Tidbinbilla, were evacuated safely on Friday morning. Galilee School in Kambah was also evacuated that morning. All other ACT schools remained open.

Tidbinbilla Nature Reserve was closed to the public and staffing at the NASA tracking station was reduced to key personnel. The tracking station disabled their tracking dishes, allowing the aircraft exclusion zone to be temporarily lifted and providing firefighting aircraft greater access to the fire. Two water drops by a large airtanker were used to protect a communication tower and slow the fire's spread.

Several roads were closed, including parts of Paddy's River Road, Tidbinbilla Road and Kambah Pool Road. Kambah Pool, Camp Cottermouth, Bullen Range Nature Reserve and Pierces Creek Forest were also closed.

On the Friday afternoon, ACT Emergency Services Agency (ESA) personnel from ACT RFS, ACT State Emergency Service (SES), and ACT Fire and Rescue (F&R), including ACT F&R community fire unit members, door-knocked 1,440 homes in suburbs from Kambah to Gordon. Residents were reminded what the alert levels meant, what they should do to prepare for the approaching fire season, and to be prepared to enact their bushfire survival plans. ESA personnel also set up information booths at a major shopping centre nearby and provided

members of the public with advice on current fire conditions and how to prepare.

Without being prompted by the authorities, horse owners activated their fire plans and moved horses to various safe locations around the Canberra region.

A thunderstorm that afternoon dropped light rain over the fire ground, causing the humidity to rise and the temperature to fall. These milder conditions enabled firefighters to slow the fire's spread and strengthen containment lines. However, the thunderstorm caused significant damage elsewhere, with 150 calls for assistance to the SES, mainly to deal with fallen trees in the ACT's Tuggeranong area.

Two additional helicopters joined firefighting efforts on Saturday morning, with crews working in very rugged and steep terrain. The fire, now causing no immediate threat to life or property, grew to 200 hectares by Saturday afternoon and burned to within seven kilometres of the nearest Canberra suburb of Kambah.

Easing conditions that day helped firefighters extinguish spot fires while bulldozers removed hazardous trees and strengthened containment lines. Favourable conditions continued overnight, with RFS crews mopping up most remaining hot spots and delivering an improved outlook for Sunday.

The fire remained at 'advice' level on Sunday, burning in country largely sheltered from the wind and not experiencing the same hot and windy conditions as nearby Canberra. Several roads remained closed on Monday.

For many Canberra residents, the fire triggered memories of the 2003 ACT bushfires that killed four people and destroyed nearly 500 homes.

Acknowledgements: ACT Emergency Services Agency; Bureau of Meteorology; ABC News; Canberra Times.

# Observations

- Well implemented community education programs work, evidenced by the preparation of plans, and homes, for the bushfire threat.
- Door-knocking and the provision of information at pop-up information booths helps increase community awareness of emergency events and improves community response.
- A record number of hits on emergency services' websites and social media platforms reinforces the value of these mediums for the provision of current and accurate information.
- Incident management teams that include expertise across multiple hazards enable the increasing occurrence of multi-hazard events to be managed by a single team.





# Bushfires

Queensland, November and December 2018

## Extreme heat affected much of the east coast of Queensland in the last week of November 2018, with record-breaking temperatures at many locations.

The extended heatwave resulted in some locations reporting their highest November mean daily maximum temperature on record, and a number of sites, including Cairns, Mackay and Proserpine, had their highest November mean temperature on record.

As the high temperatures, dry conditions and strong westerly winds elevated the fire danger, catastrophic fire danger ratings occurred in Queensland for the first time. More than 2,300 fires were attended to across the state, with more than 180 fires burning concurrently at the height of the emergency. Most occurred in central eastern Queensland, with the most significant fires around Gladstone, Rockhampton and Mackay.

Thirty-five communities in eight local government areas were severely impacted by the fires. Over 50 emergency alerts were issued over multiple days for several locations in eastern Queensland on 28 November. More than 700,000 emergency alert text messages were sent to residents in an area stretching 700 kilometres north from Hervey Bay to Bowen and more than 300 kilometres west to Carnarvon and Clermont. More than 570 bushfire emergency warnings were issued between 24 November and 7 December.

On 29 and 30 November, a slow moving fire travelled from Eungella National Park in a south-westerly direction towards Broken River west of Mackay and evacuation warnings were issued to communities including Finch Hatton, Eungella, Dalrymple Heights and Carmila. Numerous evacuation centres were set up to provide shelter for people fleeing bushfire-affected areas. Around 8,000 people were forced to evacuate their homes at Gracemere, near Rockhampton, due to nearby fires.

Over 3,500 firefighters from Queensland Fire and Emergency Services and Queensland Parks and Wildlife Service fought the fires together with 1,200 firefighters from all other Australian states and territories. The first of the interstate firefighters arrived on 26 November and the last departed ten days later on

5 December. Queensland State Emergency Service personnel and Australian Defence Force personnel also provided support. Due to the extreme weather conditions, several firefighters suffered severe heat stress.

Fifty-nine aircraft were sourced through the National Aerial Firefighting Centre and elsewhere, dropping 12 million litres of water and fire retardant on the fires. On the busiest day, 47 aircraft were deployed. The Royal Australian Air Force Base Amberley was used by many of the aircraft over six days.

From 22 November to 6 December, 1.4 million hectares of land burned across Queensland and a young man was killed on 30 November by a falling tree while protecting his family property in the Rolleston area. In total, 9 homes were destroyed, 17 homes were damaged alongside numerous sheds and vehicles, and significant damage occurred to crops and pastures.

Many schools were closed for several days, and the impact of the fires on communities, agriculture, tourism and the environment was significant.

Joint Commonwealth–State disaster recovery funding was made available for impacted communities in six local government areas including Bundaberg, Gladstone, Isaac, Livingstone, Mackay and Rockhampton.

On 6 December, the Queensland Minister for Fire and Emergency Services commissioned a report on the effectiveness of the disaster management preparations for, and response to, the heatwave and subsequent bushfires. Queensland's Inspector-General Emergency Management delivered his report, the *2018 Queensland Bushfires Review*, to the Minister on 31 May 2019.

On 3 April, the *Central Queensland Bushfires Recovery Plan* was released jointly by the Queensland Premier and the Minister for State Development, Manufacturing, Infrastructure and Planning.

Acknowledgements: Queensland Fire and Emergency Services; Queensland Inspector-General Emergency Management; Bureau of Meteorology; Brisbane Times.







# Tropical cyclones

Queensland, December 2018

**A tropical low developed into tropical cyclone *Owen* over the Coral Sea on Sunday 2 December 2018 but was downgraded to a tropical low while still well off the north Queensland coast two days later.**

Tropical cyclone *Owen* then moved west towards northern Queensland and crossed the coast near Port Douglas at around 3.00am on 10 December, bringing rainfall between 250–350 millimetres to the northern tropical coast.

*Owen* continued westward across Cape York Peninsula and redeveloped into a tropical cyclone in the Gulf of Carpentaria on 11 December, reaching category 2 strength the following day.

*Owen* continued to intensify into a severe tropical cyclone (category 3) near the Gulf's south-west coast before turning east and again heading for Cape York Peninsula. An emergency alert was issued on 13 December for the western Cape community of Pormpuraaw; four more emergency alerts were issued for Pormpuraaw and Kowanyama communities the following day.

Queensland Fire and Emergency Services (QFES) deployed 60 extra staff, including emergency management coordinators, swift water rescue and air operations specialists, State Emergency Service (SES) crews and two drones to areas likely to be impacted. Police and SES crews door-knocked in remote Cape communities to ensure all were aware of *Owen*'s approach. While communities were reportedly well prepared, the SES received 233 requests for assistance on the night of 14 December (its busiest), and more than 690 requests for assistance for the period of 10 to 20 December.

*Owen* made landfall near the small Aboriginal community of Kowanyama (1,400 residents) on the western side of the Cape early on 15 December with wind gusts of up to 170 kilometres per hour. Damage in the town was minimal after the cyclone track turned south and missed the settlement.

*Owen* again weakened to a tropical low as it tracked across the northern tropics, reaching the Cape's east coast the following day. As *Owen* headed down Queensland's east coast, the Bureau of Meteorology (BOM) issued a severe weather warning and multiple flood warnings and flood watches for several river catchments across northern and central Queensland.

Floodwaters closed a number of roads north of Ingham and motorists were advised to avoid using the Bruce Highway between Cairns and Townsville. More than 900 homes just south of Townsville were without power for several hours that day. Surf lifesavers performed multiple rescues of swimmers in rough seas as far south as the Sunshine Coast, including five children who were rescued by jet ski.

*Owen* produced steady heavy rainfall on its second pass, resulting in well above average rainfall for eastern Queensland for December, and localised flash flooding. There were daily totals over 300 millimetres near Ingham, including 678 millimetres at Halifax, a new December daily rainfall record for Australia.

Cyclone- and flood-affected communities in six local government areas including Carpentaria, Cassowary Coast, Douglas, Hinchinbrook, Townsville and Wujal became eligible for joint Commonwealth–State disaster recovery funding.

In late December, another tropical low developed in the Coral Sea and headed west over the Cape York Peninsula south of Lockhart River on Sunday 30 December. The low tracked back east and reached tropical cyclone (category 1) strength over the north-west Gulf of Carpentaria on the morning of 1 January 2019. Named tropical cyclone *Penny*, the system again made landfall on the Cape south of Weipa that afternoon, uprooting trees and flooding roads before weakening to a tropical low.

For the period 29 December 2018 to 6 January 2019 the SES received more than 50 requests for assistance from the public.

As the system re-entered the Coral Sea, it re-intensified into a category 2 system then turned west, back towards north Queensland, weakening again as it approached the coast.

*Penny* remained active over the Coral Sea and Queensland's tropical east coast until 9 January. BOM issued severe weather warnings and flood warnings as *Penny* approached the coast on 9 January, producing moderate to locally heavy falls along Queensland's central and Capricornia coasts on 9 and 10 January.

The Burdekin area received significant rainfall overnight on 9 January, with 108 millimetres falling at Groper Creek between midnight and 3.00am, and Strathbogie, south of Ayr, recorded 360 millimetres in 24 hours.



# Observations

- When managing the evacuation of communities under threat, planners should be realistic when estimating the time needed to complete the withdrawal phase.
- Reflecting on the management of emergencies and disasters enhances the management of future events. In particular, improving communications within and between emergency management agencies, and with communities, will deliver better emergency management outcomes.
- Good disaster management includes supporting and enabling government and non-government organisations that deliver a broad range of support services that augment disaster management and improve community recovery.
- Early engagement with those focused on community recovery improves emergency and disaster management outcomes.

*Penny* brought much needed rain to the Townsville area. A few kilometres north of the city, Pallarenda recorded 45 millimetres in the 24 hours to 10 January while North Ward, Alligator Creek and South Townsville recorded 43, 26 and 31 millimetres respectively over the same period.

Not all of the rain was welcome, and flood-affected communities in ten local government areas including Cook, Douglas, Hope Vale, Mapoon, Northern Peninsula, Pormpuraaw, Torres, Torres Strait Island, Whitsunday and Wujal became eligible for joint Commonwealth–State disaster recovery funding as a result of *Penny* and the tropical low that followed.

Acknowledgements: Queensland Fire and Emergency Services; Bureau of Meteorology; ABC News; Courier Mail; Townsville Bulletin.



Image: Queensland Fire and Emergency Services



# Severe thunderstorms

New South Wales, December 2018

**On Thursday 13 December 2018, a slow moving low pressure system developed over south-east Australia, causing severe thunderstorms across eastern New South Wales (NSW) lasting several days.**

As a result of these storms, the NSW State Emergency Service (SES) received over 5,300 requests for assistance from impacted communities and natural disaster declarations were made in 14 NSW local government areas. The most significant damage was reported across the Greater Sydney region.

During the afternoon and evening of Thursday 20 December, another slow moving low pressure system produced more severe thunderstorms across central, eastern and northern NSW. Areas impacted stretched from Grafton, Tamworth and Moree in the north, to Nowra and Batemans Bay in the south and Dubbo in the west.

These severe thunderstorms produced more than 30,000 lightning strikes, large hailstones, destructive winds and intense rainfall and flash flooding across Sydney, the Blue Mountains and Central Coast regions. Hailstones up to eight centimetres in diameter were reported in the Greater Sydney region, which suffered extensive property damage. Many of the areas impacted had suffered damage during the previous week's storms.

At Sydney Airport's domestic terminal, flights were delayed for up to 90 minutes and three-hour delays were experienced at the international terminal. Sixty-two flights were cancelled and seven were diverted.

Multiple rail lines in Sydney's inner west, airport precinct and outer suburbs as well as intercity links experienced stoppages or delays after lightning struck power supplies and other infrastructure. Endeavour Energy and Ausgrid reported tens of thousands of customers across their electricity networks were without power due to lightning strikes and toppled power lines.

NSW SES received an additional 6,314 requests for assistance and 9,837 calls to the state operations centre as a result of the 20 December thunderstorms, and deployed more than 500 SES volunteers. Additional support was provided by the NSW

Rural Fire Service, Fire and Rescue NSW, NSW Volunteer Rescue Association, Ambulance NSW, NSW Police Force and the ACT SES.

The worst impacted community was Berowra, 27 kilometres north of the Sydney CBD, although most metropolitan local government areas were impacted to some degree.

NSW SES established a pop-up public information point in Berowra on the morning of 21 December. Tarpaulins and sandbags were made available to residents, as well as information about the response and recovery process, services available and how to carry out repairs.

A larger disaster assistance point was set up later that day, providing a central location for advice and assistance from welfare providers, insurance companies, the local council and NSW SES. The SES also coordinated approximately 200 spontaneous volunteers seeking to support response and recovery efforts in the Berowra area.

As at 17 July 2019, the insured loss caused by the NSW December thunderstorms was an estimated \$1.313 billion, with 125,600 domestic insurance claims and 12,195 commercial claims. While one of the costliest events in Australia in 2018, impacts were significantly less than the April 1999 hailstorm that impacted Sydney. In today's dollars, insurance claims for that event approached \$5.6 billion.

The majority of insurance claims for the 2018 event were for motor vehicle damage but significant damage also occurred to buildings. Car windshields and roofs were damaged by hail, and cars, homes and commercial properties were impacted by rain and flash flooding.

On 20 December, the Insurance Council of Australia declared the thunderstorms a catastrophe, enabling insurance claims to be prioritised.

Following the storms, joint Commonwealth–State disaster recovery assistance was made available to affected communities in up to 32 NSW local government areas.

Acknowledgements: NSW State Emergency Service; Bureau of Meteorology; Insurance Council of Australia; ABC News; The Guardian.

# Observations

- The establishment and maintenance of strong strategic and operational relationships between emergency response agencies prior to disasters enables early, coordinated and effective disaster response.
- Improved connections and interactions between emergency response agencies and recovery agencies facilitates the provision of timely information and assistance to affected communities during emergencies and disasters, and enhances community recovery.
- Spontaneous volunteers provide a valuable resource to communities and response and recovery agencies during and after incidents. Coordinating the efforts of spontaneous volunteers can, however, be time and resource intensive. The development and delivery of frameworks and training packages that focus on managing these volunteers during emergencies and disasters will deliver improved community recovery outcomes.







# Storms and floods

Victoria, December 2018

## **A low pressure system developed over central Victoria early on Thursday 13 December 2018, prompting a severe weather warning for heavy rain to be issued for most of the state.**

The low drifted north-west into New South Wales by late the following day, then turned to move slowly southwards close to the South Australia–Victoria border on 15 December, gradually weakening during the day.

The low pressure system generated severe thunderstorms in Victoria's north-west, with a month's worth of rain falling over parts of northern Victoria during the 48 hours to 9.00am on 14 December. The small Mallee township of Birchip recorded 130 millimetres of rain during the 24 hours to 9.00am that day, with flash flooding affecting around 20 homes.

Flood warnings were issued 300 km to the east for Wangaratta, Byawatha, Peechelba, Markwood, Everton, Carboor, Moyhu and surrounding areas, including the Hume Highway. Flash flooding of the Hume Highway near Wangaratta caused approximately 50 vehicles to become trapped in floodwaters, with many drivers and passengers being winched to safety by emergency service helicopters. The highway and many other local roads in the north-east remained closed by floodwaters for several hours.

Relief centres for those evacuating flood-affected properties in the area were opened in Wangaratta, Chiltern and Wodonga.

Later that day, 41.2 millimetres of rain fell in Melbourne, most of it in a 20-minute period after 5.00pm. The State Emergency Service (SES) was called to rescue 25 people whose vehicles became trapped in flood waters during the city's peak hour. Train lines in the eastern suburbs were seriously disrupted by flash flooding and thousands of train commuters were left stranded after several train services were suspended.

The most building damage occurred to homes in inner eastern and south-eastern suburbs. More than 6,000 homes in Melbourne's south-western suburbs, including in Werribee, Hoppers Crossing and Truganina, were left without power as the storm swept through the city. Almost 3,000 homes in bayside suburbs also experienced outages.

Severe thunderstorm warnings remained in place that night for Melbourne as well as central and western Victoria, including Ballarat, Daylesford and Hamilton.

The SES received 1,736 requests for assistance, and 73 rescues were performed over 13–16 December, working with emergency management partners to support impacted communities. The SES received more than 400 calls for help in the Melbourne metropolitan area on the evening of 14 December.

Many sites in Victoria had their highest December daily rainfall on record over 13–14 December, or their highest total December rainfall on record. Eldorado, 15 km east of Wangaratta, was the wettest place in Victoria in December, recording 215.4 millimetres during the month, more than four-times its December average.

The rain and associated flooding caused significant damage to residential and commercial properties and public infrastructure across Victoria. Joint Commonwealth–State disaster recovery assistance was subsequently made available to facilitate community recovery and ensure damaged public infrastructure was restored as soon as possible in nine local government areas across northern Victoria.

Acknowledgements: Victoria State Emergency Service; Emergency Management Victoria; Bureau of Meteorology; ABC News; The Age; The Guardian.



# Tower apartment block failure

New South Wales, December 2018

Opal Tower is a \$128 million dollar high-rise residential building in Sydney Olympic Park, New South Wales (NSW). The triangular-shaped 117 metre tower consists of 36 levels above ground and three levels of underground car parking. The building can accommodate 3,000 residents and includes retail shops and a childcare centre for 80 children.

During its construction, the tower was considered a state significant site that did not require council approval. The tower was signed off by private certifiers and was completed in August 2018. Occupation of the 392 residential apartments commenced soon afterwards.

On Monday 24 December 2018, loud cracking noises were heard by tower residents and many experienced increasing difficulty opening doors as door frames warped. Several cracks were observed in concrete panels on level 10, sparking fears that the tower might collapse and prompting several residents to evacuate.

After receiving several Triple Zero calls at about 3.00pm, Fire and Rescue NSW (FRNSW), NSW Police (NSWP) and Ambulance NSW attended the scene, with NSWP responsible overall for incident management. Evacuation of the tower was completed, and a 300 metre exclusion zone was established.

As the tower had only recently been completed, it was unclear initially how many people occupied it and whether all had evacuated. Many evacuees left behind pets, medication, passports and other important documentation. In all, 1,700 people from Opal Tower and other nearby buildings were displaced. A temporary evacuation centre was established nearby at the Sydney Showground.

Due to its proximity to the tower, Sydney Olympic Park railway station and associated underground rail lines were temporarily closed.

NSW Public Works engineers, FRNSW urban search and rescue specialists and a representative of the building designers inspected the tower, concluding that it was not in danger of collapse, allowing most residents to re-occupy the building the following day. However, residents in 51 of the units were only able to return briefly to retrieve pets, medications and essential personal items. On 27 December, all residents were evacuated again while a more thorough engineering analysis was conducted.

Following more detailed inspection, the worst damage was found on levels 4 and 10, with levels 3, 9, 16 and 26 and basement level 3 also subject to potential structural damage. Structural failings occurred above and below the 'garden slots'; recesses in the tower's facade where precast concrete panels joined structural columns. Bracing was installed as a precautionary measure to reinforce these areas while further major work to fix damage on level 4 and level 10 continued.

In the meantime, residents were housed in hotel accommodation with the builder paying their food and accommodation costs until their units were declared habitable by the body corporate's engineers. Seventy-four units in the tower were declared habitable in late January, four weeks after cracks first appeared in the tower, but many residents refused to return until all rectification works were completed. The builder refused to continue paying costs for any residents not returning to habitable units. A further 97 units were deemed habitable in early February.

The NSW Government initiated an independent investigation into the cause of damage to the tower, how the damage could be rectified and sought recommendations that would assist in avoiding problems with future high-rise construction in NSW. The final report was delivered to the NSW Minister for Planning and Housing on 19 February 2019.

Among other things, the report found that some building elements were under-designed and that construction and material deficiencies were likely to have precipitated the failure of these elements. Furthermore, the report found that the building could be repaired with significant and appropriate



# Observations

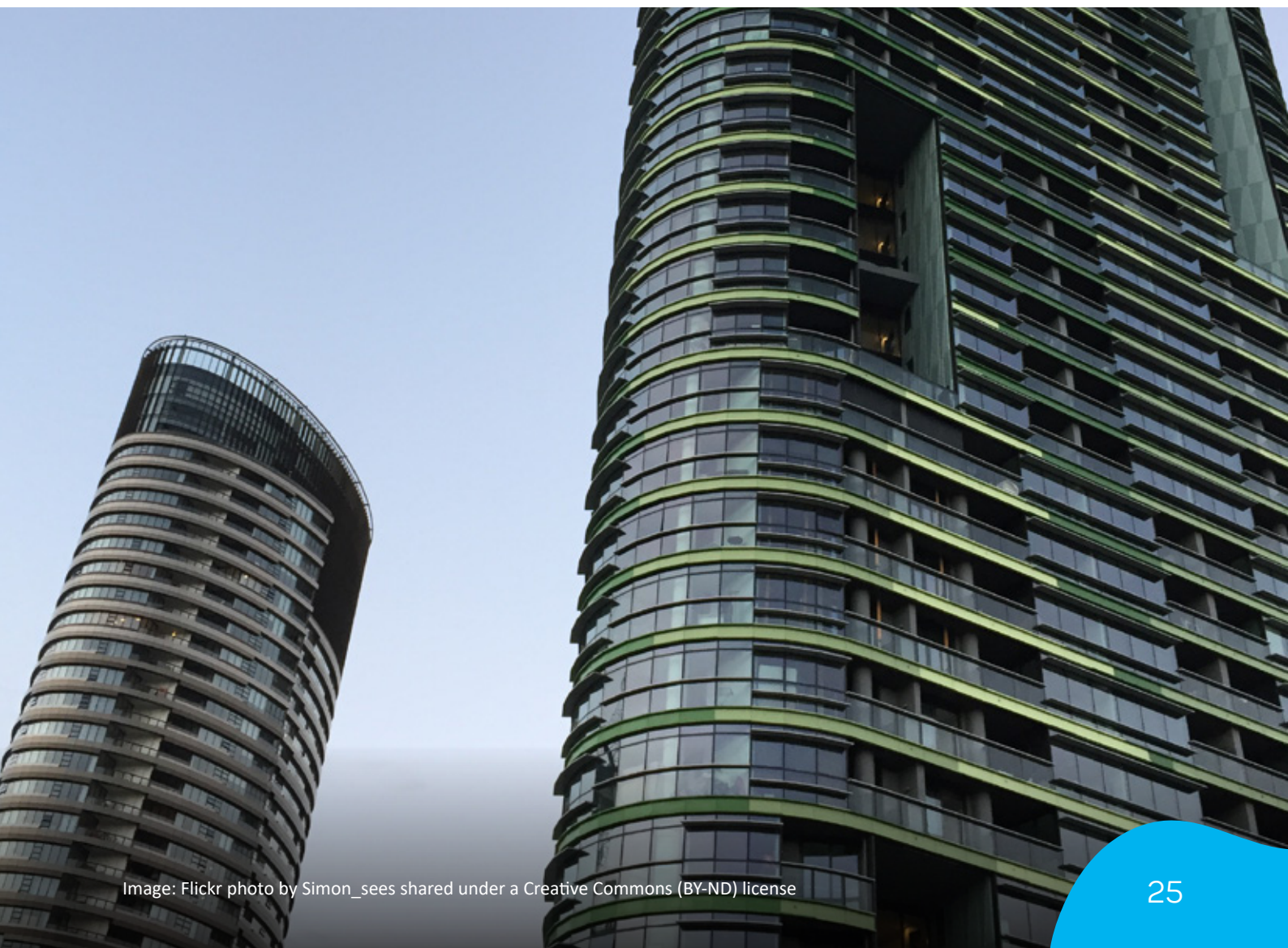
- The early establishment of a forward command point and a joint emergency operations centre facilitates coordinated multi-agency incident management.
- Critical decision making is enhanced when appropriate technical experts are readily available to the incident management team.
- Early attention to the needs of people displaced by incidents enables the impact on them to be minimised.

This includes but is not limited to well publicised, relevant, frequent and regular briefings.

- The early identification of suitable evacuation centres in reasonable proximity to incidents facilitates evacuation management.
- Emergency services should avoid getting involved in public debate on issues outside their legislated role.

rectification works, and that these should be completed and independently assessed before the building was re-occupied. Finally, the report included recommendations to improve the robustness of structural designs, the implementation of those designs during construction and the transparency and public accountability of the regulatory systems relating to building.

Acknowledgements: Fire and Rescue New South Wales; The Guardian; Sydney Morning Herald; The Urban Developer; Unisearch.



# Bushfires

Tasmania, December 2018 - March 2019

**In western Tasmania, rainfall was well below average during spring 2018 and Tasmania's mean temperature in December was the warmest on record.**

On Friday 28 December 2018, several bushfires were discovered following lightning in western Tasmania on 27 December, with many being brought under control over following days. However, a fire near the Gell River in the Tasmanian Wilderness World Heritage Area (TWWHA) was unable to be controlled and spread some 40 kilometres to the south-east over the next several weeks.

January 2019 was Tasmania's warmest and driest on record. On 4 January, many residents evacuated from the township of Maydena and other settlements in the Tyenna Valley when thick smoke from the Gell River fire, 20 kilometres to the north-west, blanketed the area. Many roads were closed, and 400 campers were forced to leave the popular Mt Field National Park when it came under threat. Milder conditions over subsequent days slowed the fire's spread, enabling residents and tourists to return.

Lightning strikes on 15 January ignited some 60 additional fires, mainly in Tasmania's west and central highlands. Many were controlled or self extinguished over subsequent days, but several burning in remote and rugged terrain continued to spread. A fire near Riveaux Road in the Huon Valley and another near Great Pine Tier in the central highlands spread rapidly and threatened several small settlements in their path.

Geeveston and several other small Huon Valley settlements were threatened for several days in January and February. An evacuation centre opened in Huonville on 24 January for almost two weeks. By 27 January, 360 residents whose homes were threatened by the Riveaux Road fire were staying there, with many remaining several days until safe access to their communities was re-established. For the first two weeks of the new school year, four schools affected by the fire remained closed, with students relocated to other nearby schools.

Action by tanker-based firefighters limited house losses in the Huon Valley to five, but a wood veneer mill remained closed for several months following damage to key buildings, power infrastructure and its timber supply.

The Great Pine Tier fire threatened shack settlements at Little Pine Lagoon, Miena and Reynolds Neck, with firefighters limiting structural losses to three dwellings. Many of the estimated 30–40 evacuees from affected settlements gathered at an evacuation centre established in the town of Bothwell.

Additional firefighters and support personnel from the Australian Capital Territory, New South Wales, Queensland, South Australia, Western Australia and New Zealand (NZ), including many remote area specialist firefighters, and support personnel from Victoria for the base camp, joined fire crews from the Tasmania Fire Service, Parks & Wildlife Service and Sustainable Timber Tasmania to fight the fires. In all, more than 700 firefighters battled the blazes at their height, including 159 from interstate and NZ. Firefighters were supported by up to 44 aircraft, many supplied through National Aerial Firefighting Centre arrangements.

Over the following weeks, dozens of fires continued to spread, many merging with one another. Ultimately, the four largest fires included Riveaux Road (64,000 hectares), Great Pine Tier (51,000 hectares), Moore's Valley (36,000 hectares) and Gell River (35,000 hectares). These four fires had a combined perimeter exceeding 2,520 kilometres.

The fires were eventually brought under control, with the last of the firefighters leaving the Gell River fire in the final week of March 2019. In total, more than 200,000 hectares had burned, representing 2.9 per cent of Tasmania's land area. However, only relatively small proportions of fire sensitive plant communities in the TWWHA were fire-affected.

Despite that most fire damage occurred away from inhabited areas, impacts on many families, communities and small businesses were significant. By early February, the Tasmanian Premier had established a Bushfire Recovery Taskforce and announced that recovery and restoration grants would be available to eligible persons through joint Commonwealth–State disaster recovery funding arrangements.



# Observations

- Notwithstanding sound local preparations and shared resourcing arrangements for emergencies and disasters at the jurisdictional level, the increasing frequency and increasingly protracted nature of weather related events necessitates growing reliance on national and international resource sharing arrangements.
- A pre-prepared register of state service employees from the broader public sector able to undertake generalist roles in state and regional operations centres and incident management teams supports resourcing of incidents during protracted emergencies and disasters.
- The increasing size and complexity of weather-related emergencies and disasters necessitates an increased number of resources for specialist roles including, for example, firefighters able to operate effectively in remote places for extended periods, and helicopters capable of supporting them.

On 30 March, the Premier released the terms of reference for an independent review into the 2018–19 bushfires, with the review expected to be delivered to government in July 2019.

By early May, the estimated cost to bring the bushfires under control exceeded \$60 million.

Acknowledgements: Tasmania Fire Service; Fire Centre Research Hub; Department of Premier and Cabinet; Bureau of Meteorology; ABC News; The Examiner.



Image: Warren Frey, Tasmania Fire Service

# Bushfires; night-time aerial fire bombing

Victoria, January 2019

**On Friday 4 January 2019, with temperatures above 40°C across much of Victoria and a total fire ban in place, strong, hot northerly winds ahead of a cold front saw more than 220 fires break out. Underlying soil dryness and heavy fuel loads led to rapidly developing and intense fires, including one near Rosedale in Gippsland that burned for several days.**

The Rosedale fire started just before 1.00pm but it was the south-westerly wind change later that evening that led to a significant increase in fire activity. Emergency warnings were issued, urging residents to take shelter after the wind change pushed the fire towards the town of Willung and nearby settlements. An evacuation centre was established in Sale to support affected residents.

At its height, approximately 215 Country Fire Authority firefighters equipped with 30 tankers, a number of command vehicles, various plant and machinery and 13 aircraft worked to contain the blaze. They were supported by firefighters from Forest Fire Management Victoria, with additional support from Emergency Management Victoria, the State Emergency Service, Victoria Police and Ambulance Victoria.

At this fire, night-time aerial water bombing was deployed to a bushfire for the first time in Australia following successful trials in 2018. This new capability enables aircraft equipped with night vision imaging systems (NVIS) or night vision goggles (NVG) to assist ground crews on fires for longer and when fire behaviour is typically less intense.

Two water bombing helicopters and a supervision and reconnaissance helicopter began operating on the Rosedale fire on the evening of 4 January when it had burned some 2,000 hectares. Reconnaissance flights were conducted in daylight to gather information about terrain, obstacles, hazards and suitable water supplies before the aircraft returned to the Latrobe Valley airbase for final mission planning before darkness fell.

At 11.00pm, the two aircraft left the airbase and soon after commenced water bombing operations on the fire. One of the aircraft carried out about 40 water drops; the other aircraft about 15, in part due to different water pickup locations and flight times to the target.

As weather conditions moderated and smoke cleared, parts of the fire boundary obscured during daylight emerged. However, fire bombing was not undertaken in any areas where crews had not had an opportunity to carry out daylight reconnaissance.

Water bombing operations ceased at about 1.00am on 5 January and the aircraft returned to the airbase to refuel. The reconnaissance aircraft was then dispatched to map the fire boundary using an on-board infrared camera to map fire boundaries. Fire boundary maps were sent from the aircraft to the incident command centre and to sector commanders on the ground.

Firefighters on the ground, supported by tankers and heavy machinery, continued efforts day and night to contain the fire using traditional methods.

Over the following three nights, aerial fire bombing operations continued between about 10.00pm and 2.00am the following morning. Finally, just before 3.00am on Wednesday 9 January, one of the aircraft completed a reconnaissance flight and confirmed that there were no more hotspots requiring attention. The fire, which had an 85 kilometre perimeter, was contained on 9 January after it had burned more than 11,500 hectares.

In all, Victoria's two night-time fire bombing helicopters operated on 33 nights at 13 fires across Victoria in early 2019. The teams gained valuable experience in different terrain and fuel types, including on the urban–rural interface at a fire at Grantville.

Acknowledgements: Country Fire Authority; Emergency Management Victoria; Bureau of Meteorology; ABC News; Herald Sun



## Observations

- Night-time aerial fire bombing operations readily integrate with existing Australasian Inter-service incident management system structures and on-ground firefighting operations.
- NVG equipped aircraft are capable of safely operating at night to effectively target bushfires when fire behaviour moderates.
- NVG equipped aircraft are capable of attacking fires effectively in a range of fuel types and terrain and on the urban–rural fringe.



## Learning processes

Victoria is conducting an Australasian Fire and Emergency Service Authorities Council (AFAC) peer review process to learn from the 2019 East Victorian fires including the Rosedale bushfire. The process involves:

- collation of debriefing outcomes undertaken by agencies
- analysis of data utilising the Victorian EM-LEARN lessons management framework
- validation of insights and lessons with subject matter experts and agencies
- development and presentation of a final report identifying lessons and suggested next steps for consideration
- development of an implementation plan and dissemination of the final report.



# Underground toxic waste fire

New South Wales, January 2019

**On Saturday 5 January 2019, a large bushfire was reported on Ash Island in the Hunter River estuary in New South Wales (NSW). The 100 hectare fire was quickly brought under control by Fire and Rescue NSW (FRNSW) and Rural Fire Service crews.**

Ash Island includes the Kooragang Island Waste Emplacement Facility (KIWEF), approximately seven kilometres north of Newcastle. Originally operated by BHP as a waste landfill facility to hold materials from the former Newcastle Steelworks, the site contains inert coal wash rejects, hydrocarbons and other waste including asbestos and lead contaminated dust. The site has significant environmental interest as it is adjacent to Kooragang Conservation Reserve, which provides a habitat for the green and golden bell frog.

On 28 January, researchers at the KIWEF site noticed flames and a resulting odour. Representatives from FRNSW and the Hunter and Central Coast Development Corporation (HCCDC) investigated and confirmed fires were burning underground in seven of the ten KIWEF waste emplacement pits and concluded that the fire had smouldered since the 5 January bushfire.

Advice on how to manage the fires was sought from numerous stakeholders including NSW Treasury, NSW Environment Protection Authority (EPA), NSW Public Works, NSW Health, NSW Port Authority, the Office of Environment and Heritage (OEH) and industry experts in subterranean fire management.

A multi-agency incident management team led by FRNSW was established. Major considerations in managing the response to the fire included the development of methods to extinguish the fire, the delivery of necessary resources, the health and safety of firefighters and community members, air and water quality, the protection of endangered species and the minimisation of disruption to nearby rail and port infrastructure.

NSW EPA and OEH were tasked with environmental monitoring of the site using existing HCCDC air and groundwater monitors. Monitoring thresholds and alert protocols established, with monitoring pods located within the site and in local communities. Monitoring began on 28 February.

A dual approach was developed to address two different subterranean fire types: extensive and intensive fires in some pits, and isolated hotspots in others.

An initial test on less intense fires was conducted on 22 March, with 17,000 litres of water applied successfully to a hotspot. For more extensive and intense areas of fire, a series of small bunds were built so that these areas could be covered with soil before being flooded with water.

Specialised firefighting equipment and facilities were used, including:

- the Hytrans bulk water relay system that pumped water one kilometre from the Hunter River
- a remotely-controlled firefighting robot that used a turbine fan and water delivery system to attack spot fires without needing to place firefighters in downwind positions
- remotely piloted aircraft systems that captured high resolution imagery in the visible light and infrared spectrums, enabling water to be delivered to hotspots efficiently and for results to be closely monitored
- a well equipped mobile command and communications centre.

Firefighting operations were carried out between 2 April and 16 April with over 11.6 million litres of water pumped over the fires. Over this period, more than 40 thermal analysis reports were produced to map and track the fires.

Thermal analysis was undertaken and test holes were dug to confirm there were no significant subterranean fires and on 17 April, all fires were determined to be out and the site was handed back to its occupants.

Acknowledgements: Fire and Rescue New South Wales; NSW Environment Protection Authority; Newcastle Herald; Hunter and Central Coast Development Corporation.



# Observations

- The early adoption of innovative technologies for new and complex emergency events often leads to better incident management outcomes.
- The establishment of an incident management team that includes representation from all relevant agencies and subject matter experts facilitates safe and effective management of emergency events.
- How to prevent and manage fires in subterranean waste facilities should be addressed in bushfire risk management plans.





# Storms and floods

Queensland, January – February 2019

## **An active monsoon trough and a slow moving low pressure system over the northern tropics produced extremely heavy rainfall in tropical Queensland from late January 2019 into early February.**

In and around Townsville, the accumulated totals from consecutive days of heavy rainfall set many new records. In the ten days to 8 February, Townsville Aero recorded 1259.8 millimetres, far exceeding the January 1953 record of 925.5 millimetres. Roads around Townsville were cut and ferry services on the Herbert and Lower Burdekin Rivers were interrupted, leaving many communities and farms isolated.

There were several sites in nearby elevated areas that reported 12-day rainfall totals of more than 2,000 millimetres. Flash flooding and swift water rescues occurred around Black River and Bluewater Creek to the north-west of Townsville, which experienced rainfall totals of more than 200 mm in three hours. Queensland Fire and Emergency Services (QFES) crews were called 95 times to help people to safety in Bluewater.

In north-west Queensland, record-breaking rainfall also occurred in previously drought-affected regions, including at Julia Creek and Richmond.

Moderate to major flooding occurred in coastal communities between Daintree and Mackay, nearly 700 km to the southeast. The Daintree River reached record levels after 500 mm of rain fell in just 48 hours.

As early as 30 January, the Queensland Premier announced that disaster assistance would be available for communities in far north Queensland through joint Commonwealth–State Disaster Recovery Funding Arrangements.

The Premier ordered all public schools and childcare centres in Townsville to close on Friday 1 February as the floods continued, with the Bureau of Meteorology predicting heavy rainfall to continue into the weekend. Many schools were closed for several days due to the floods; 12 schools in the Townsville region reopened on 6 February.

The Ross River Dam, about 20 kilometres south-west of Townsville's centre, reached 178 per cent capacity before the

spillway gates were opened on 3 February to ease downstream flooding. Water released from the dam exceeded what was usually allowed under Townsville's emergency action plan but authorities had little choice, with more days of torrential rain forecast.

Flood warnings were issued to residents below the dam and by 5 February, over 1000 people had evacuated the floodplain and thousands of homes were inundated. About 11,300 homes were without power after it was cut to protect the safety of Townsville residents in the rising waters. Many residents attended evacuation centres, with Australian Red Cross providing support.

QFES used multiple communication mediums to disseminate community messaging. The State Disaster Coordination Centre disseminated 78 emergency alert campaigns between 26 January and 11 February, delivering warning messages across broad areas of northern and far northern Queensland. From 25 January to 21 February, the State Emergency Service received 4,900 requests for assistance from the public.

Despite the widespread flooding, food supplies continued to reach affected communities, with suppliers' trucks using inland routes to take regular loads from Charters Towers to Townsville and further north.

The search for two men missing in Townsville ended on 5 February when their bodies were found in the suburb of Aitkenvale.

To speed up the processing of insurance claims, the Insurance Council of Australia (ICA) declared the floods a catastrophe. ICA later received more than 6,500 claims, totalling around \$80 million, from flood-affected residents of Townsville alone. Insured losses across parts of Queensland affected by the floods totalled \$1.237 billion as at 12 June 2019.

Acknowledgements: Queensland Fire and Emergency Services; Australian Red Cross; Bureau of Meteorology; Floodlist; ABC News.



## Observations

- The use of predictive data and intelligence plays an increasing role in preparedness for and management of disaster events and recovery.
- There is an ongoing deep reliance on the passion and goodwill of emergency services personnel in the response and recovery phases of emergency management. This presents ongoing challenges to the wellbeing of emergency responders.
- Ongoing enhancement of communications technology is vital for the effective management of emergencies and disasters, and the safety of emergency responders.
- An increased level of exercising across agencies and hazard types and simultaneous disaster events will enhance clarity of role for all agencies that play primary and secondary roles in emergency management.
- Information distributed to the community during disasters and emergency events needs further refinement. Message clarity, simplicity of action required, timeliness and the use of multiple mediums must be considered.
- The use of the Australasian Inter-service Incident Management System as a national framework for incident management must continue to evolve in an all-hazards environment given the nature, severity, frequency and the likely concurrency of future events.
- Agencies and government will continue to be challenged by the cost of emergency and disaster response and recovery. Understanding the real costs of response enables public value to be assessed, and more efficient management of future events.





# Bushfires

Western Australia, January – March 2019

**The summer of 2018–19 was very hot and dry in Western Australia (WA). The state's mean maximum summer temperature was the highest on record and rainfall was below average for most of the state. It was WA's fifth driest summer on record, the driest since 2004–05.**

February's mean maximum temperature was the third highest on record, and in the state's south-west, rainfall was 79 per cent below average, making it the driest February there since 2013. These conditions continued into autumn, with March's mean temperature also the highest on record, exceeding the previous March record by a large margin.

Throughout late January and February, several dry thunderstorms crossed the Goldfields–Esperance region in WA's south-west, with associated lightning starting numerous bushfires. Twelve of the most significant fires were managed by the Department of Fire and Emergency Services (DFES) as the Esperance complex bushfires. Numerous smaller bushfires in the region were managed by landowners, local government and the Parks and Wildlife Service. The large number and vast size of some of the fires, several in National Parks or in remote locations or difficult terrain, put significant strain on all firefighting agencies.

By Friday 22 February, as firefighters were experiencing extreme fire behaviour due to high temperatures and variable winds, a multi-agency incident management team had been established in Esperance to manage the fires in partnership with local fire brigades.

Weather conditions at the Esperance complex bushfires deteriorated and significant additional resources from across WA were mobilised to assist firefighting efforts. On 25 February, an out-of-control fire threatened lives and homes in parts of Boyatup and Howick, about 100 kilometres east of Esperance.

On 28 February, temperatures were unusually hot in parts of the region and Kalgoorlie in the north experienced 44.9°C, its hottest February temperature on record. Nine large fires were still burning out of control in the Goldfields–Esperance region, four of them close to Esperance and the highways leading to the town.

Significant Aboriginal heritage sites were threatened by several of the fires. Where safe to do so, Indigenous Elders helped protect these sites from damage by walking in front of earthmoving equipment, conducting tracking and mitigation operations.

The long weekend of 2–4 March saw an influx of tourists to the area. Increasing concerns about public safety led to a number of national parks and camping sites in the region closed. Information on these closures was broadcast widely through various media channels, as well as through accommodation facilities, local residents' networks and electronic roadside signs.

The influx of visitors also caused a scarcity of accommodation for firefighters. The Australian Defence Force responded, erecting temporary accommodation in Esperance for up to 300 people working on the fires.

In all, over 300 personnel from DFES, the Bush Fire Brigades, the Parks and Wildlife Service, the State Emergency Service, the Department of Biodiversity, Conservation and Attractions and local governments were actively involved in fighting the fires. Numerous other personnel assisted in the incident management team and in the regional and state operations centres.

By the time they were extinguished in March, the Esperance complex bushfires had burned approximately 315,000 hectares and had a total perimeter of 1,500 kilometres. Despite the extent of the fires, no lives were lost, and buildings destroyed by the fires were limited to outbuildings and sheds.

Acknowledgements: Department of Fire and Emergency Services, Western Australia; Bureau of Meteorology; ABC News.



# Observations

- When planning to engage the Australian Defence Force to provide, for example, temporary accommodation, early liaison allows sufficient time for planning, approval processes and logistical coordination.
- Engaging with Indigenous Elders to protect and map Aboriginal heritage sites strengthens the relationship between emergency management agencies and the Indigenous community.
- Open, honest and valued interagency communication provides greater understanding of specific agency needs, enabling timely and accurate decision making.
- Closing national parks and campsites at risk from bushfires, storms and floods can significantly reduce the number of people at risk during these events, particularly in remote areas where the receipt of public warnings is often problematic.



# Bushfire

New South Wales, February 2019

January 2019 was the warmest month on record for New South Wales (NSW) as a whole and state-wide rainfall was below average, particularly in the north-east and southern inland regions. The state remained warm and dry in early February, continuing a run of 22 consecutive months of warmer than average daytime temperatures. Inverell recorded its highest February mean daily maximum temperature.

February rainfall was 60 per cent below the long-term average for NSW as a whole and some sites in north-western NSW and the northern tablelands experienced their lowest total February rainfall on record.

At around noon on Sunday 10 February, NSW Rural Fire Service (RFS) and National Parks and Wildlife Service (NPWS) crews were alerted to and responded to a smoke sighting about 15 kilometres south-southwest of Inverell. The Tingha Plateau fire had started in inaccessible terrain approximately four kilometres east of Lake Copeton the previous night following dry lightning.

Two days later on 12 February, a bushfire emergency and a state-wide total fire ban was declared as 33 bush and grass fires, nine of them not yet contained, burned across NSW. During that morning, the Tingha Plateau fire spread rapidly east, pushed by strong, gusty westerly winds. Several roads were closed to protect the public and assist firefighting efforts.

Firefighters and water bombing aircraft worked to slow the fire's progress but by 10.50am, it had grown to approximately 340 hectares and 'watch and act' alerts were issued to nearby communities.

By 2.00pm, the fire had crossed Thunderbolts Way and emergency warnings were issued to residents in the Lake Copeton and Tingha areas, encouraging them to seek shelter as the fire front arrived. NSW RFS crews focussed on protecting people and properties as the fire spread rapidly south-east.

By 7.00pm, evacuation centres for those fleeing the fire had been established at Inverell High School, Guyra Showground,

Tingha Primary School, the Tingha Sports and Recreation Club, and at the Bundarra School of Arts.

By late morning the following day, the fire had increased to 5,600 hectares and emergency warnings were issued for several isolated communities as fire activity increased during the day.

The fire remained at emergency warning level on 14 February as the fire's northern edge became more active and residents there were advised to seek shelter as the fire approached. Firefighters from RFS, Fire & Rescue NSW (FRNSW), the NPWS and Forestry Corporation NSW continued to fight the fire, assisted by water bombing aircraft and heavy machinery.

Following reports of property damage, NSW RFS deployed building impact assessment teams and FRNSW drone operators to assess losses. RFS also worked with the NSW Office of Emergency Management's state recovery controller on formal recovery arrangements, including assessment of utility damage and stock losses.

On the same day, the fire was declared a disaster, making disaster assistance available to affected communities in the Inverell local government area through joint Commonwealth–State disaster recovery funding arrangements.

The fire continued to present challenges for firefighters over the following days as containment lines were strengthened. However, by the evening of 16 February, all roads closed by the fire had been re-opened. Schools that had been closed for a number of days also reopened as the threat to the community eased.

The fire was contained on 17 February. On 20 February, the bushfire emergency was revoked and the Tingha Plateau fire was officially declared out on 6 March.

Despite firefighters' efforts, the fire had destroyed 14 homes and more than 40 outbuildings. Nineteen other homes and outbuildings had been damaged and 23,528 hectares had been burned. However, no lives were lost during the fire and more than 440 homes and outbuildings had been saved.

Acknowledgements: NSW Rural Fire Service; Bureau of Meteorology; ABC News; Inverell Times.



## Observations

- The early establishment of incident management teams enables incident resourcing and management to be scaled up as incidents grow and complexity increases.
- The early identification of at-risk areas and trigger points for warnings enables the targeted and timely delivery of warnings.
- For multiple emergencies and disasters involving significant community impact, the appointment of a senior incident management team member focussed on public information and warnings helps ensure public safety.
- Emergency management outcomes are enhanced when agencies managing an emergency or disaster take early steps to liaise and integrate with those managing community recovery.





# Bruxner Highway fire

New South Wales, February 2019

**January 2019 was the warmest month on record for New South Wales (NSW) as a whole, and state-wide rainfall was below average, particularly in the north-east and southern inland regions. The state was again very warm and dry in February, continuing a run of 22 consecutive months of warmer than average daytime temperatures.**

February rainfall was 60 per cent below the long-term average for NSW as a whole and some sites in north-western NSW and the northern tablelands experienced their lowest total February rainfall on record.

On Tuesday 12 February 2019, a state-wide total fire ban was declared as 33 bush and grass fires, nine of them not yet contained, burned across NSW. A bushfire broke out near the Bruxner Highway about four kilometres west of Tabulam, and the highway was closed between Bruxner Road and Tabulam Road, 11 kilometres to the east. The NSW Rural Fire Service (RFS) Commissioner declared a bushfire emergency.

Strong gusty north-west winds pushed the fire across the Timbarra River to the south-west of Tabulam. Firefighters, supported by water bombing aircraft, worked to protect properties in the area as emergency alerts were sent to local residents. Tabulam Public School and Drake Public School were closed the following day to ensure the safety of students and teachers.

Evacuation centres were established at the Tenterfield Memorial Hall and the Bonalbo Bowling Club to provide refuge for residents who evacuated from their homes, and NSW RFS building impact assessment teams were deployed to assess property loss and damage. A recovery centre was set up at the Tabulam Hall to enable residents affected by the fire to access a range of welfare services.

An RFS Aboriginal liaison officer worked closely with Jubullum Local Aboriginal Land Council, and local representatives met NSW RFS crews to assess damage to the Jubullum Aboriginal settlement near Tabulam.

The fire continued to spread, and at around mid-morning on 15 February, several emergency warnings were issued to residents in forested areas under threat west of Tabulam, as water bombing helicopters and three large airtankers continued to assist firefighters control the fire.

Over the following days, conditions eased and road closures put in place during the fire were lifted.

On 1 March, the bushfire emergency was revoked and the fire was officially declared out on 4 March. Eighteen houses and more than 50 outbuildings had been destroyed, a further 18 homes and 20 outbuildings had been damaged and 7,552 hectares had been burned. Despite the losses, more than 300 homes and other buildings had been saved.

A woman was charged with starting the fire after setting rubbish alight in her backyard during the total fire ban. After discovering the fire had escaped, the woman rang Triple Zero and unsuccessfully attempted to extinguish the flames with a backyard hose.

The Bruxner Highway fire was declared a disaster, making disaster assistance available to affected communities in the Tenterfield local government area through jointly funded Commonwealth–State disaster recovery funding arrangements.

Acknowledgements: NSW Rural Fire Service; Bureau of Meteorology.



## Observations

- The early activation of field liaison arrangements for Indigenous communities facilitates their recovery.
- Establishing centralised control for incidents crossing multiple jurisdictional boundaries facilitates effective and efficient incident management.
- The management of simultaneous incidents in close proximity can be improved through the rapid deployment of several mobile communication repeaters to handle increased radio and telecommunications traffic.





# Bushfire

Western Australia, February 2019

The summer of 2018–19 was very hot and dry in Western Australia (WA). For the state as a whole, the mean maximum temperature was the highest on record (3.08°C above average), and rainfall was below average for most of the state. It was WA's fifth driest summer on record, the driest since 2004–05. These conditions continued in February when the month's mean maximum temperature was the third highest on record, and rainfall was at its lowest since 2007.

In WA's south-west, rainfall was 79 per cent below average, making it the driest February since 2013.

A fire, thought to have been sparked by machinery, started at around 2.30pm on Tuesday 19 February in a pine plantation off Radiata Road near Southampton in the Shire of Donnybrook-Balingup. It was escalated to an emergency alert just after 7.00pm as it spread initially to the west-northwest in Donnybrook-Balingup and Nannup shires in WA's south-west, 215 kilometres south of Perth.

By that evening, more than 100 firefighters from the Department of Fire and Emergency Services, Bush Fire Brigades, the Parks and Wildlife Service and Forest Products Commission WA were fighting the fire, supported by water bombing aircraft. Firefighters worked throughout the night to contain the fire. Several homes were saved and the fire was later downgraded to a 'watch and act'.

An evacuation centre was set up at the Nannup Recreation Centre for anyone fleeing the fire, which threatened many homes, holiday accommodation and farms. A number of roads were closed.

Further emergency warnings and 'watch and act' messages were issued early on the afternoon of the following day, as the fire continued to spread and threaten small isolated settlements up to 10 kilometres north-west of the fire's ignition point.

By 21 February, weather conditions had moderated, enabling up to 200 firefighters, who continued to be supported by aircraft, to establish containment lines. However, Balingup Primary School was preemptively closed on 21 February due to the ongoing threat.

In total, the fire burnt 3,336 hectares including 1,765 hectares of pine plantation estate. Four timber harvesting machines were destroyed, as well as five outbuildings.

In mid-March, the Forest Products Commission WA announced that recovery operations would commence to salvage up to 390,000 tonnes of pine trees damaged by the fire. Salvage operations and replanting of harvested areas were expected to continue until August 2019.

Acknowledgements: Department of Fire and Emergency Services, Western Australia; Forest Products Commission WA; Bureau of Meteorology; ABC News.

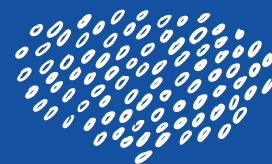
# Observations

- The early notification and mobilisation of physical and human resources enables the timely mitigation of existing and emerging issues by incident management teams and related networks.
- The impact of emergencies and disasters is mitigated when all key stakeholders including emergency services, land managers, local government and communities work collaboratively.
- Open, honest and valued inter-agency communication provides greater understanding of specific agency needs, enabling timely and accurate decision making.
- Situational analysis and awareness, and hence the management of emergencies and disasters, is significantly improved through the use of contemporary trend analysis platforms, mapping tools, aerial surveillance and weather prediction products.



# Bushfires

Victoria, February – March 2019



**The summer of 2018–19 was Victoria's hottest on record, contributing to significant bushfire activity during February and March 2019. Lightning strikes occurred across eastern Victoria overnight on 28 February and 1 March and by 9.00am that morning, 17 fires had ignited. The warm dry weather continued and by 2.00pm on 4 March, more than 290 grass, scrub and bushfires had been reported.**

During the first week in March, bushfires threatened communities in the shires of Baw Baw, Cardinia, Latrobe, South Gippsland and Wellington.

A fire in the Bunyip State Park about 65 kilometres east of Melbourne burned more than 15,000 hectares after several smaller fires merged. This fire destroyed 29 homes around Bunyip North, Garfield North and Tonimbuk, as well as 67 outbuildings and sheds.

Two more homes were destroyed in the Yinnar South–Budgeree East fire, about 75 kilometres to the south-east.

Evacuation centres were set up in Pakenham and Koo Wee Rup for affected residents as the Bunyip State Park fire spread towards the townships of Bunyip, Longwarry and Nar Nar Goon. Another evacuation centre was established in Morwell for the Yinnar South–Budgeree East fire, which also threatened nearby townships. Twenty-three schools were closed due to the fire risk and up to 1,200 people attended evacuation and relief centres during the fires.

Other major fires occurred near Licola and Dargo. The Licola fire burned more than 80,000 hectares and the Mt Darling–Cynthia Range Track fire, about 20 kilometres north-west of Dargo, burned more than 28,000 hectares.

A cool change moving east over fire-affected areas on the night of 5–6 March enabled firefighters to establish containment lines and slow the fires' spread.

Around 2,000 firefighters were deployed to fight the fires, as well as more than 55 aircraft including 2 helicopters with night-time firefighting capability. Seven hundred and fifty personnel from other Australian states and New Zealand supported Victorian firefighters, filling firefighting, incident management, air operations and fire behaviour prediction roles.

Social media and emergency management applications played an important role in disseminating information during the fires. In the four day period between 1–4 March:

- there were 590,000 users of the VicEmergency website, who viewed 3.6 million VicEmergency website pages
- there was an increase of 13,000 VicEmergency Facebook followers, and the 276 Facebook posts over the period were seen 7.9 million times
- 1,500 new followers joined VicEmergency Twitter.

On 8 March, the Federal Minister for Emergency Management announced that recovery assistance would be provided to fire-affected communities through jointly funded Commonwealth–State Disaster Recovery Funding Arrangements.

Ongoing support was also provided across impacted communities by Australian Red Cross and other support organisations.

On 8 March, those with insured losses were urged to lodge insurance claims as soon as possible after the Insurance Council of Australia declared the Bunyip State Park and Yinnar South–Budgeree East fires a catastrophe to speed up the processing of claims. By mid-April, insured losses for the Bunyip State Park bushfire alone had approached \$32 million.

By 18 March the fires had burnt around 125,000 hectares, with 17 fires yet to be brought under control. On 21 March, seven fires were still burning in Victoria, including the four major fires in the east.



# Learning processes

Victoria is conducting an Australasian Fire and Emergency Service Authorities Council (AFAC) peer review process to learn from the 2019 East Victorian fires. The process involves the:

- collation of debriefing outcomes undertaken by agencies
- analysis of data utilising the Victorian EM-LEARN lessons management framework

- validation of insights and lessons with subject matter experts and agencies
- development and presentation of a final report identifying lessons and suggested next steps for consideration
- development of an implementation plan and dissemination of the final report.

Between 1 March and 21 March, more than 800 community warnings had been issued, including 62 emergency warnings and four recommendations to evacuate. Over the month of March, there were 1.2 million users of the VicEmergency website; the largest number of the website's users in any month and more than twice February's total.

Smoke from the fires continued to impact parts of Victoria into late March. However, by early April 2019 all of the fires were declared controlled.

No lives were lost as a result of the fires.

Acknowledgements: Country Fire Authority; Department of Environment, Land, Water and Planning; Emergency Management Victoria; Bureau of Meteorology; Insurance Council of Australia; ABC News; The Guardian; Herald Sun.



# Severe tropical cyclone *Trevor*

Queensland and Northern Territory, March 2019

**On Monday 18 March 2019, a tropical low in the Coral Sea tracked towards Queensland's eastern Cape York Peninsula and quickly intensified into tropical cyclone *Trevor*.**

*Trevor* made landfall just south of Lockhart River at 5.00pm the following afternoon as a severe tropical cyclone (category 3). With winds exceeding 200 kilometres per hour, *Trevor* tracked across the far north of Cape York Peninsula and generated heavy rainfall in the region and along Queensland's north tropical coast.

Crossing the Cape, *Trevor* left behind a trail of damage, uprooting trees, causing flooding and roof damage, closing schools and roads and knocking out power supplies.

Queensland's State Disaster Coordination Centre disseminated seven Emergency Alert campaigns between 19 and 23 March, delivering warning messages across far northern Queensland, including to Aurukun, Lockhart River, Weipa, Karumba and Pormpuraaw, warning of the potential for waterspouts and destructive winds. Queensland's State Emergency Service received more than 30 requests for assistance from the public during *Trevor's* passage.

*Trevor* then weakened to a category 1 cyclone and tracked south-west across the Gulf of Carpentaria.

*Trevor* re-intensified to a category 4 system on 22 March and made landfall about 100 kilometres south of the Northern Territory's Port McArthur between 10.00am and 11.00am on 23 March. By then, the weather system was almost the size of New South Wales, generating sustained winds of 175 kilometres per hour, gusts up to 250 kilometres per hour and heavy rainfall. Because the system was so large, gale force winds were experienced up to 250 kilometres from its centre. Mornington Island, 200 km from cyclone's centre, recorded gusts of 105 kilometres per hour.

Some Northern Territory sites had their highest March daily rainfall on record or highest total March rainfall for at least 30 years. Nearly 250 millimetres of rain fell at Merlin Mine during the event and massive storm surges were reported along the Carpentaria coast, including one of 1.5 metres at Mornington Island.

Around 2,100 people from communities in *Trevor's* path, including Borroloola, Numbulwar and Groote Eylandt, were moved to evacuation centres in Katherine, Tennant Creek, Darwin and Nhulunbuy. It was the largest evacuation effort in the Northern Territory since cyclone *Tracy* hit Darwin in 1974.

Three Royal Australian Air Force (RAAF) Hercules transport aircraft evacuated more than 950 residents from Borroloola and Groote Eylandt over 22–24 March, while other Australian Defence Force personnel helped with the establishment of the evacuation centres in Katherine and Darwin. In the three days following the cyclone, RAAF aircraft transported 451 residents back to their local communities.

Many others self-evacuated and made their own shelter and return arrangements.

On 25 March, the Northern Territory Education Department established pop-up schools in Darwin and Katherine for children who had been evacuated from affected communities.

Several highways, including the Roper, Carpentaria and Tablelands Highways were closed by floodwaters, as well as many minor roads.

By the following day, *Trevor* had weakened to a tropical low and continued to track south through the east of the Northern Territory, producing widespread moderate to locally heavy falls there and in western and central Queensland.

As the remnants of *Trevor* tracked east-southeast over central Queensland from 27 March, widespread moderate falls continued to occur from western Queensland through to the central highlands, extending into southern and south-eastern parts of the state. Some Queensland sites had their highest March daily rainfall on record or their highest total March rainfall on record.

Joint Commonwealth, state and territory disaster recovery funding was made available in both the Northern Territory and Queensland for communities impacted by *Trevor*.

No deaths or significant injuries were reported as a result of severe tropical cyclone *Trevor*.

Acknowledgements: Queensland Fire and Emergency Services; Bureau of Meteorology; ABC News; The Guardian.



# Observations

- When managing the evacuation of communities under threat, planners should be realistic when estimating the time needed to complete the withdrawal phase.
- Reflecting on the management of emergencies and disasters enhances the management of future events. In particular, improving communications within and between emergency management agencies, and with communities, will deliver better emergency management outcomes.
- Good disaster management includes supporting and enabling government and non-government organisations that deliver a broad range of support services that augment disaster management and improve community recovery.
- Early engagement with those focussed on community recovery improves emergency and disaster management outcomes.





# Severe tropical cyclone *Veronica*

Western Australia, March 2019

**A tropical low developed into tropical cyclone *Veronica* to the north-west of Broome in the early morning of Wednesday 20 March 2019 and intensified rapidly to become a severe tropical cyclone (category 4) the following day.**

Severe tropical cyclone *Veronica* tracked southerly towards the Pilbara coast and was located about 50 kilometres north of the coastline to the west of Port Hedland as a category 3 system on 24 March.

The Bureau of Meteorology warned that the slow-moving system would pose the highest risk the region had experienced from a cyclone in the past decade. Damaging winds near the core of *Veronica* were expected to impact communities from Port Hedland to Karratha, 200 kilometres to the west, for much longer than expected from a typical cyclone.

*Veronica* remained almost motionless for the next 24 hours and the coastal and adjacent inland areas between Port Hedland and Karratha experienced a prolonged period of destructive winds and very heavy rainfall. Maximum sustained winds were 195 kilometres per hour, with a peak wind gust of 275 kilometres per hour.

*Veronica* brought very destructive gusts of more than 200 kilometres per hour as it tracked westward along the coast towards Karratha before weakening to a category 2 system the following day. The cyclone continued westward and was finally downgraded to a tropical low to the west of Karratha on the 26 March and passed Exmouth on 27 March.

*Veronica* produced rainfall totals along the Pilbara coast and adjacent inland areas between Port Hedland and Karratha that were five to seven times the March average. A number of sites had their wettest March on record or wettest March since 1988.

Port Hedland Airport and Carlindie recorded daily rainfall of 179.4 millimetres on 24 March and 176 millimetres on 26 March; a new March record. Many streams and waterways in the De Grey River catchment reached minor flood level, and significant flooding occurred and many homes were evacuated in the Port Hedland area. The Coongan River at Marble Bar Road peaked at close to 5.2 metres and the Shaw River at Marble Bar Rd peaked at around 4.7 metres. Parts of the North-West Coastal Highway and Great

Northern Highway, as well as several other major arterial roads, were closed until floodwaters receded.

Emergency services responded to more than 114 calls for assistance during the cyclone, with the Department of Fire and Emergency Services and WA Police supporting an incident management team until the threat from the cyclone and associated flooding eased.

Evacuation centres were opened in South Hedland and Karratha for people seeking shelter from the cyclone or escaping floodwaters.

The 60,000 people who live in the iron ore mining region most affected by *Veronica* are generally well prepared for cyclones and associated floods that affect the Pilbara frequently. A red alert issued on the afternoon of 23 March for people in or near Port Hedland, South Hedland, Whim Creek, Point Samson, Wickham, Roebourne, Karratha and Dampier urged them to stay indoors, away from doors and windows. An alert was issued for people in parts of the inland Pilbara, and as far away as Pannawonica, 110 kilometres south-west of Karratha.

As a result of the community's preparedness, no deaths or significant injuries were reported.

However, the port of Port Hedland, one of the largest iron ore loading ports in the world, was closed for nearly 5 days from 22 March due to *Veronica*. BHP's iron ore production was reduced by an estimated 6–8 million tonnes, Rio Tinto's by approximately 14 million tonnes, and Fortescue Metals' production by an estimated 2 million tonnes.

On 9 April, disaster recovery assistance was announced for the local government areas (LGAs) of East Pilbara, Karratha and Port Hedland, enabling those affected by *Veronica* to receive financial assistance through jointly funded Commonwealth–State Disaster Recovery Funding Arrangements (DRFA).

Estimated DRFA claims for this event were \$36.7 million across the three LGAs, with the majority deriving from the Town of Port Hedland and City of Karratha for the restoration of essential public assets.

Acknowledgements: Department of Fire and Emergency Services, Western Australia; Bureau of Meteorology; ABC News

# Observations

- The clarification of roles and responsibilities between government and non-government agencies will align multiple capacities to deliver better disaster management outcomes.
- Memoranda of Understanding between neighbouring local governments will improve access to skilled resources, particularly for those that have a deficit in recovery skills and capability.
- Community-initiated response and emergency management organisations' response to disasters will benefit from improved internal and external communication.
- Additional investment in building community awareness of and preparedness for disasters will enhance community resilience.



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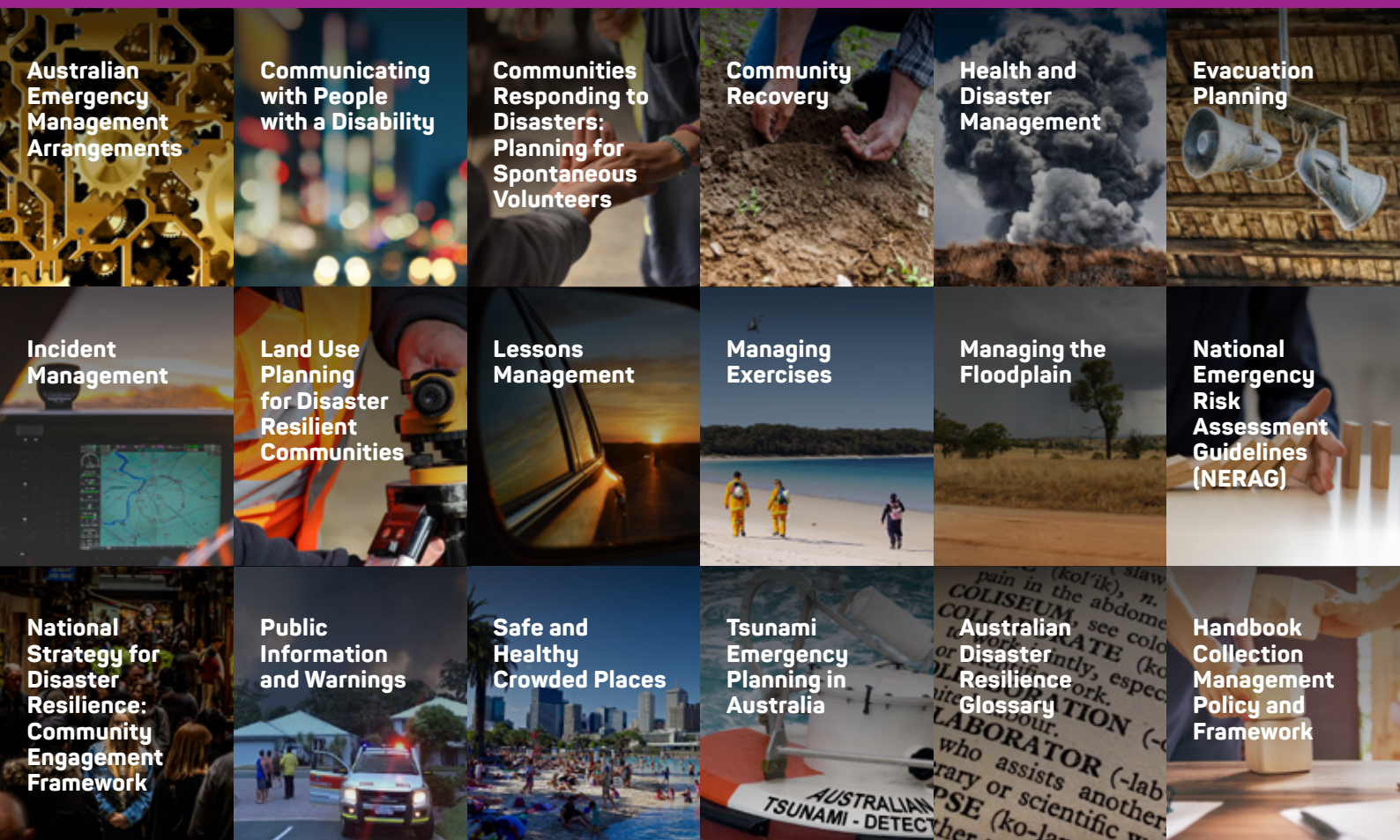
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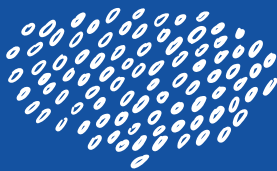
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