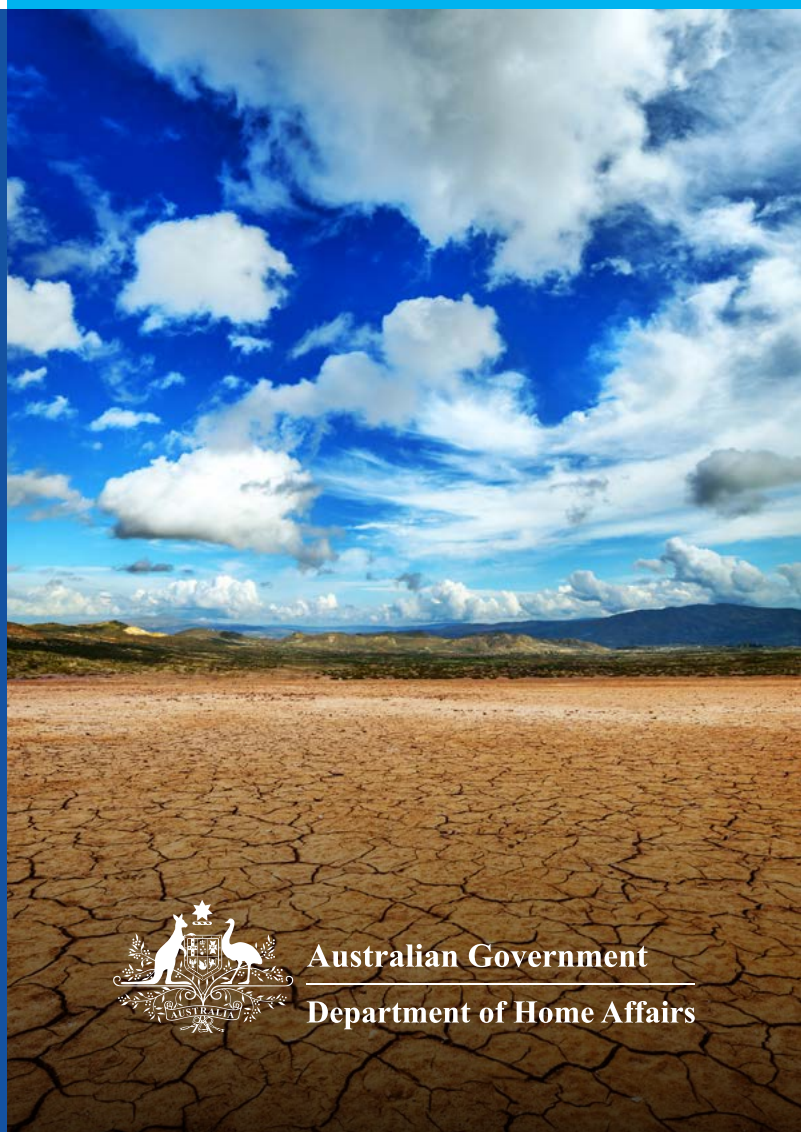
Australian Institute for
Disaster Resilience

Major Incidents Report



Australian Government
Department of Home Affairs

2017-18

Australian Institute for Disaster Resilience

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Department of Home Affairs

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Introduction

This report provides an overview of major incidents that have involved the fire and emergency services sector during the 2017-18 financial year.

The intent of this report is to highlight significant incidents that have been of impact or consequence for fire and emergency services, as identified by the sector; providing background information about the incident and the corresponding response. The report is not intended as a comprehensive account of all major incidents over the period.

This report includes key insights (where identified) in relation to each incident and information on multi-agency collaboration and recovery operations where relevant.

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

Robert Cameron OAM
Director-General
Emergency Management Australia

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South Australia, May 2017

Coral poisoning

Just after 2.00am on Tuesday 2 May 2017, the South Australian Country Fire Service (SACFS), the control agency for hazardous materials incidents, responded to an incident involving the release of a palytoxin in a residence at Aldinga, 42 kilometres south of Adelaide. The toxin had been released from a zoanthid coral after an adult occupant of the home cleaned a fish tank and the coral items it contained.

The coral had been removed from the tank at about 5.00pm on 1 May and cleaned in the home's living area with cold water, a hard-bristled brush and metal scrapers. This treatment released non-airborne palytoxins from the coral. At about 7.00pm, exposed coral was left on the floor and benches in the living area for further cleaning the following day.

At about 9.00pm, the adult and four children who had been in the living area while the coral was being cleaned began to experience vomiting, shaking and difficulty breathing – symptoms consistent with palytoxin poisoning. A second adult who had been outside the home while the coral was being cleaned showed no symptoms of poisoning.

Multiple ambulances, South Australia Police (SAPOL) and SACFS hazardous material units responded following a telephone call from the home to the SA Ambulance Service (SAAS) just before 2.00am the following morning.

First on-scene, SAPOL officers were advised by SACFS not to enter the contaminated home. The occupants self-evacuated and were transported by SAAS to hospital for treatment. They were quarantined for 48 hours and later released from hospital.

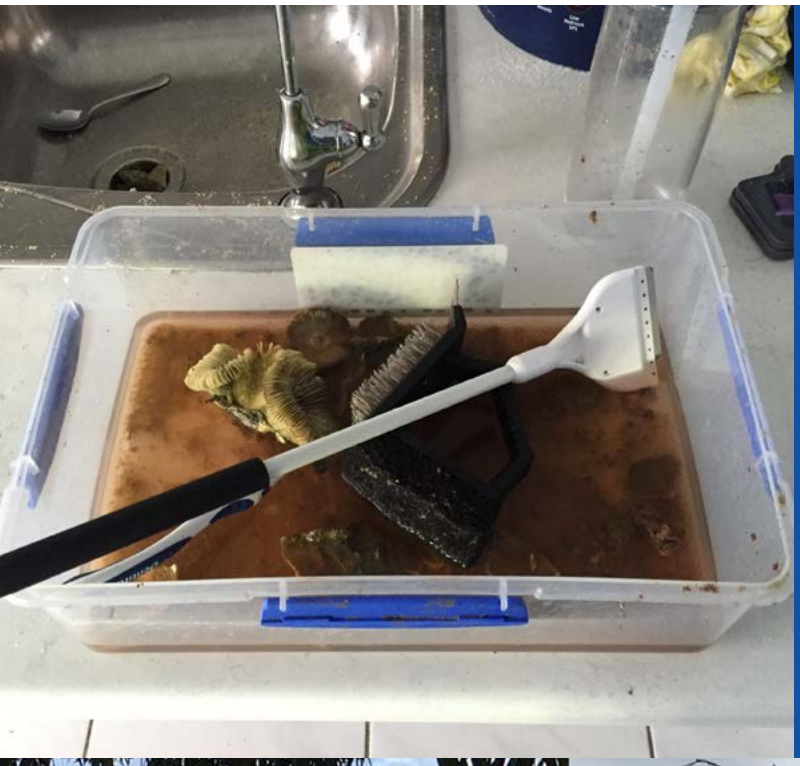
SACFS, and a Technical Advice Coordinator (TAC) engaged to provide specialist scientific advice, initially found only limited information on palytoxin features, neutralising agents and site clean-up. However, by 2.00pm that afternoon, the SACFS, TAC and Department of Health officials agreed on a three-stage site clean-up:

- vacuuming of all soft furnishings in affected and adjacent areas with a high efficiency particulate air (HEPA) filtered vacuum cleaner
- application of a neutralising agent to all hard surfaces in affected and adjacent areas, allowed to sit for at least 30 minutes (undiluted Domestos was used as it contained the necessary neutralising chemicals)
- dilution and clean-up of the neutralising solution with fresh water, with frequent emptying of buckets and rinsing of cleaning implements.

The clean-up commenced at 5.45pm and was completed within 90 minutes; the team wore liquid-tight suits and self-contained breathing apparatus. On-site management of the incident concluded at 7.45pm when remaining units left the scene.

Acknowledgments

South Australian Country Fire Service



Insights

- Information disseminated to the general public, aquarium owners, pet shop proprietors, health care providers and emergency services personnel about the safe handling of zoanthid coral and the dangers of palytoxin poisoning, its symptoms and treatment will minimise future palytoxin poisoning and its impacts.
- Appropriate, tested, inter-agency standard operating procedures will support expeditious management of future incidents of biological poisoning (in a non-terrorism context).

Images: South Australian Country Fire Service

Victoria, July 2017

Coolaroo recycling plant fire

At about 9.00am on Thursday 13 July 2017, Metropolitan Fire Brigade firefighters were called to the SKM Industries recycling plant in Coolaroo, in Melbourne's north. Over 130 firefighters worked to bring a blaze in stockpiled paper and plastics under control – the fourth fire at the site in 2017. This fire was made worse by unfavourable strong northerly winds.

Victoria's Country Fire Authority and fire agencies from South Australia, New South Wales and the Australian Capital Territory deployed support in the form of firefighters, bulk water tankers equipped with compressed air foam systems (CAFS), and a turbine-aided firefighting robot.

Due to air quality concerns, evacuation advice was issued for approximately 115 Dallas properties to the south of the plant; 22 people evacuated. A number of businesses were also evacuated in addition to the SKM plant workers. Forty-one people attended the community relief centre established in nearby Broadmeadows. Eight people were treated for breathing difficulties; five were hospitalised. By late afternoon the following day, residents were advised that it was safe to return to their homes.

As the fire continued to burn over the following days, low oxygen levels in nearby waterways killed dozens of fish, and an *E. coli* warning was issued.

The fire took three weeks to extinguish. In that time, an estimated 140 million litres of water contaminated by run-off from the site was pumped from a nearby creek into the sewerage system, and 30,000 tonnes of fire- and water-contaminated waste was removed to an Environment Protection Authority (EPA)-licensed landfill at Bulla.

The fire raised questions around appropriate land zoning, given the growth of population and residential housing in proximity to industrial areas. The event also caused significant frustration in the community; a class action suit is progressing to seek damages in relation to health, financial and other impacts.

The EPA had been scheduled to visit the SKM Coolaroo site on the day the fire started. The EPA continued to monitor air quality in Coolaroo and Dallas for several days after the fire.

SKM welcomed the establishment of a government taskforce to seek solutions to the issue of stockpiling materials. The company said it had been storing materials against standard practice due to lost capacity from a fire earlier in the year.

Acknowledgments

Metropolitan Fire and Emergency Services Board; Environment Protection Authority Victoria; ABC News

Insights

- To avoid conflicting messages to the community about an emergency, messages must be delivered from a single source.
- Important community messages must be delivered through major media channels, including television (TV), radio and social media. Delivery of timely messages often requires knowledge of TV and radio news deadlines.
- Separating meetings with the general public from meetings with affected businesses enables relevant information to be targeted and delivered more effectively.
- All government agencies and non-government organisations responding to an emergency need to share intelligence that will help in mitigating risk and controlling the incident quickly and safely.
- Publicising the incident controller's intent will enable all agencies involved in an emergency to focus on control priorities.
- Embedding a local business leader into an incident management team to help manage business continuity will gain the confidence of affected businesses and assist their transition to recovery.

Images: Metropolitan Fire and Emergency Services Board

British Columbia, July 2017

Canadian deployment

In July 2017, a record number of fires were burning across the Canadian province of British Columbia. Faced with an escalating situation, the Canadian Government declared a state of emergency for the province; it would become the region's longest state of emergency, extending more than two months.

Following a request from Canadian authorities, Australia initiated its most significant deployment to date of firefighting personnel to North America. Two hundred and thirty five Australians were deployed to support British Columbia crews; a mix of incident management, aviation and firefighting specialists, representing agencies from every Australian state and territory.

The deployment spanned 68 days and included three separate placements during July and August. The first placement departed Australia on 16 July and the last arrived home on 26 September.

Australian agencies have regularly shared firefighting resources with Canada and the United States since 2001. However, this deployment was the first managed by the National Resource Sharing Centre (NRSC), a national Australian coordinating body, on behalf of the states and territories. Established in 2016 by AFAC's Commissioners and Chief Officers Strategic Committee (CCOSC), the NRSC operates out of AFAC's Melbourne office.

The NRSC was developed in response to an identified need to support emergency services in coordinating national and international deployments; personnel are seconded from fire and emergency services agencies to staff the NRSC as needed.

In the months before the Canadian deployment, the NRSC had established an arrangement with the Canadian Interagency Forest Fire Centre (CIFFC) for the sharing of wildfire management resources between Australia and Canada. A similar arrangement was established between Australia and the United States. These formal arrangements provide a crucial capability and an unparalleled opportunity for learning and development.

For this deployment, the NRSC operated from hubs established at the New South Wales Rural Fire Service and Emergency Management Victoria respectively. Staff in these hubs managed and coordinated personnel deployed from individual states and territories.

Three senior officers seconded to the NRSC maintained oversight of the deployment; making key decisions, managing NRSC duty officers and maintaining contact with CIFFC.

Australian agency representatives (AREPs) in British Columbia maintained contact with crews deployed in the field to oversee their welfare. Keeping track of these crews was often challenging due to the number of people involved, the scale of operations, regular reassignments and irregular telephone communications.

A comprehensive debriefing process followed the conclusion of the deployment. Overall, it was considered successful; feedback indicated support for a similar approach for future international deployments. CIFFC also expressed strong support and a preference for the NRSC approach. As this was the first significant overseas deployment managed by NRSC, some opportunities for improvement were also identified.

Acknowledgments

AFAC: National Resource Sharing Centre

British Columbia 2017 wildfire season: quick facts

1,263 fires
1,216,351 hectares burned
300 buildings destroyed
39,000 people evacuated
700 firefighters and support personnel deployed at the height of the fires

Insights

- Improved pre-deployment packs and packing lists will ensure deployed personnel are physically better prepared before departure and have realistic expectations about working and rest conditions, remuneration and demobilisation.
- Clarification of the role of AREPs will ensure that deployed personnel, and the AREPs themselves, are supported more effectively.
- Clarification of roles between the NRSC and operational hubs will improve administration and communication and reduce duplication.
- A standardised dress code for deployed personnel will help build a national brand for international deployments and increase the sense of team pride.

Images: AFAC

Western Australia, 2017-18

Tropical cyclones and lows

Between late December 2017 and mid-February 2018, the Shire of Broome in Western Australia was impacted by three tropical cyclones and a tropical low. These events brought strong winds and torrential rain to Broome and other parts of the state's north-west. The event represents an opportunity to share learnings with other disaster-prone communities.

Broome's dry season spans April to November, with most days clear and maximum temperatures of around 30 degrees Celsius. The wet season spans December to March, with maximum temperatures of around 35 degrees Celsius, irregular tropical downpours and high humidity. Broome's annual average rainfall is 615 millimetres, 75 per cent of which falls between January and March.

Tropical cyclone *Hilda* started as a tropical low on 26 December. The system reached cyclone strength near Broome in the late afternoon of the following day; it briefly reached Category 2 strength before making landfall 90 kilometres south-west of Broome. *Hilda* weakened to a tropical low by 2.00pm on 28 December before tracking into Central Australia.

Minor vegetation damage and fallen trees were reported in Broome, with heavy rainfall along the track of the cyclone causing localised flooding. The rain caused disruption to roads across the western Kimberley, eastern Pilbara, and the Interior district. *Hilda* was deemed eligible for disaster relief funding on 16 January, under the Western Australia Natural Disaster Relief and Recovery Arrangements (WANDRRA).

Tropical cyclone *Joyce* formed north of Broome on 11 January, before tracking south and making landfall in the far south-west Kimberley the following day. *Joyce* weakened to a tropical low on 13 January, moving through the Pilbara and Gascoyne regions and then offshore. The tropical low produced heavy rainfall that impacted several communities in the Kimberley, Pilbara and Gascoyne; some locations recorded their highest daily or monthly rainfall on record for January.

On 23 January, *Joyce* was proclaimed eligible for disaster relief funding under the WANDRRA.

A tropical low developed in the Gulf of Carpentaria on 20 January and travelled across the Northern Territory and

Acknowledgments

Bureau of Meteorology: Monthly Weather Review (Dec 2017, Jan 2018, Feb 2018); ABC News; The Guardian; Department of Fire and Emergency Services, Western Australia

the Kimberley in Western Australia over the second half of the month. Combined with a vigorous monsoonal flow, the low brought heavy rainfall, damaging winds and flooding across northern parts of Western Australia. Broome Airport reported multiple rainfall records for 1-day, 5-day and January monthly totals during the event, and experienced Australia's wettest day for January 2018 with a 439.4 millimetre downpour.

There were over 80 calls for assistance in Broome; several communities in the western Kimberley were isolated due to flooded roads. On 9 February, the event was proclaimed eligible for disaster relief funding under the WANDRRA.

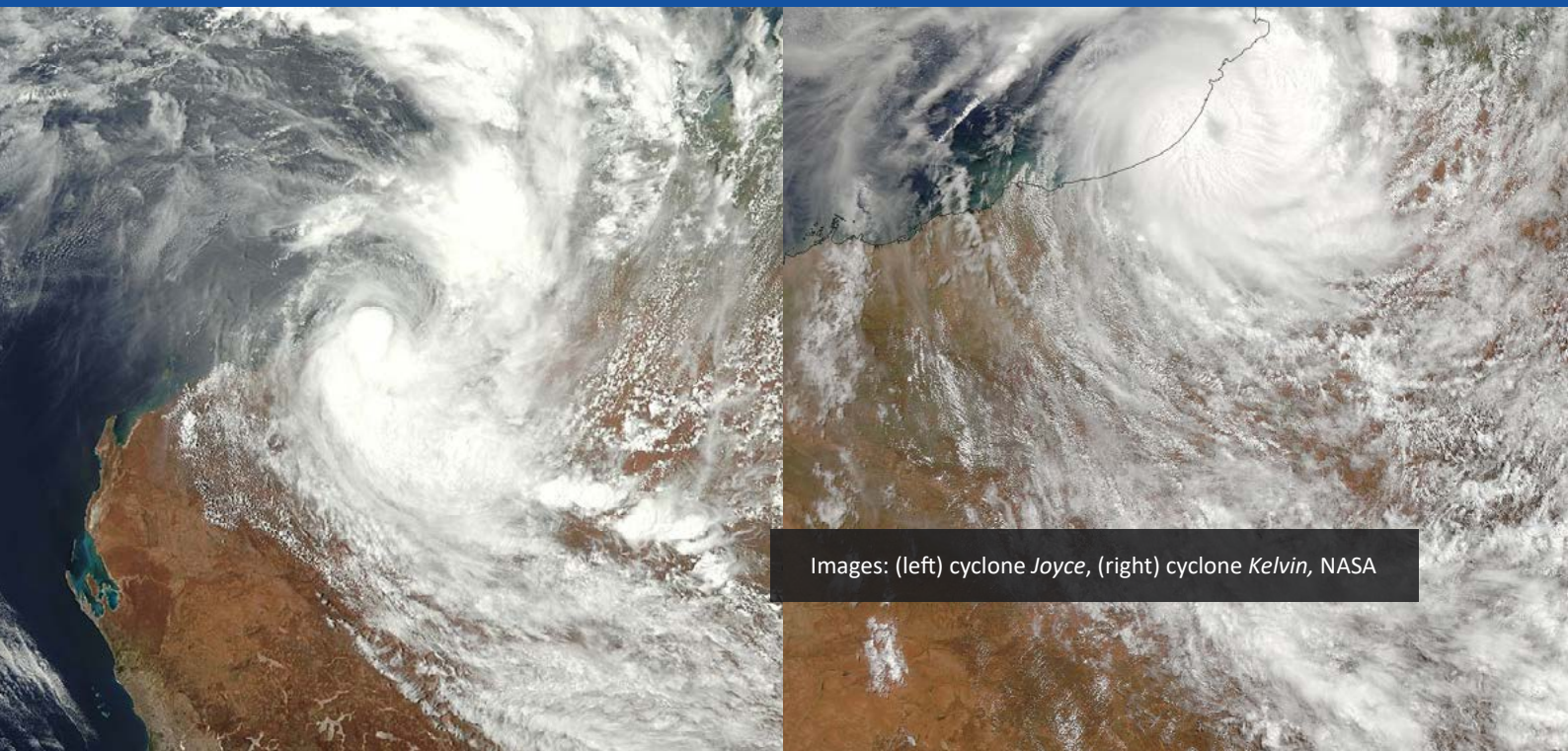
Tropical cyclone *Kelvin* was the third tropical cyclone to make landfall on the Australian mainland in the 2017-18 cyclone season, and the third to impact Broome. *Kelvin* crossed the coast on 18 February as a Category 2 cyclone, 70 kilometres south-south-west of Broome. *Kelvin* moved inland over east Pilbara and was downgraded to a tropical low the following day.

Heavy rainfall occurred over parts of the Kimberley, Pilbara and North Interior district. Broome Airport recorded over 500 millimetres of rain over 16-19 February, which contributed to the January-February rainfall exceeding 1,550 millimetres – the highest recorded annual rainfall at Broome in 128 years. On 17 February, Broome Airport recorded its highest ever February daily rainfall of 376.8 millimetres.

Widespread road flooding occurred throughout Broome. The Great Northern Highway sustained significant flood damage, with some sections closed for an extended period. On 9 March, *Kelvin* was proclaimed eligible for disaster relief funding under the WANDRRA.

Insights

- Routine experience with disasters prepares agencies and communities to manage these events.
- Remote communities tend to be resilient as they foster self-reliance and mutual support.
- Strong, collegial local emergency management committees support community resilience.
- Despite community resilience, community preparedness for disasters may be limited by the capacity of emergency services to participate in community preparedness programs.
- Local response and recovery operations are enhanced by appropriate jurisdiction-level support.



Images: (left) cyclone *Joyce*, (right) cyclone *Kelvin,* NASA

South Australia, January 2018

Abattoir fire

More than 20 fire appliances ultimately responded to the Thomas Foods International abattoir near Murray Bridge, 76 kilometres south-east of Adelaide, after a fire reported just before 7.00pm on Wednesday 3 January spread rapidly through the building.

There were hundreds of employees working in the 8,000 square metre building at the time; all were evacuated safely, as well as all livestock in the facility.

At the fire's peak, 100 firefighters from 13 South Australian Metropolitan Fire Service (SAMFS) and 11 South Australian Country Fire Service (SACFS) units were involved. Hazards faced included complex construction elements, ammonia leaks, other toxic gases and large-scale structural collapse. As the incident progressed over several days, 6,000 decomposing beef and lamb carcasses added to the hazard.

SAMFS was the control agency for the incident, supported by SACFS; South Australia Police (SAPOL), who provided traffic and crowd control; SA Ambulance Service (SAAS) paramedics, who monitored firefighters' health; and the South Australian State Emergency Service (SA SES), who provided lighting and pollution control. The Salvation Army provided meals to emergency responders and employees during the fire's early stages.

The fire destroyed the abattoir's boning room, recently part of a multi-million-dollar upgrade, and much of its storage area. However, the fire was prevented from spreading to the slaughter floors, stock loading areas, nearby administration buildings and the ammonia and rendering plants; enabling limited production to continue.

While the fire was controlled within eight hours, it was 15 days before emergency managers completed work at the scene due to emerging risks and the need for extra control measures. No-one was killed or injured in the fire, which was started accidentally by a worker welding outside the building.

Founded in 1988, Thomas Foods is Australia's largest family-owned food processing company and the largest multi-species abattoir in the world, with annual revenue of more than $2 billion. It is one of South Australia's biggest employers, processing lamb, beef, mutton and goat. Its major Australian clients include Woolworths, Coles, ALDI, McDonalds, IGA and Drake Supermarkets. The company also exports to more than 80 countries across North America, Europe and the Middle East.

Thomas Foods employs more than 3,000 people in its processing and distribution facilities in Australia and overseas. Thomas Foods is the largest employer in Murray Bridge, employing more than 1,400 people; a mix of locals and migrants on skilled worker visas.

Given the economic importance of the plant, the South Australian Government immediately created a multi-agency taskforce under the control of the Department of Primary Industries and Regions to work with Thomas Foods, to help the company recover and support affected workers.

Within weeks of the fire, almost every permanent employee had been redeployed; some to the company's smaller abattoirs at Lobethal, South Australia, and Tamworth, New South Wales, and some within other industries. The transfer of employees to the company's other two plants enabled lamb and sheep processing to be largely unaffected. However, production of beef goods was impacted despite arrangements with a Victorian abattoir to process additional cattle.

While damage was estimated at tens of millions of dollars, the company hopes to offer employment to all its permanent employees at a new plant within two years.

Acknowledgments

South Australian Metropolitan Fire Service; South Australian Country Fire Service; The Advertiser; Murray Valley Standard; Stock Journal

Insights

- Early identification of resource needs and their timely dispatch minimises loss and supports the achievement of other incident objectives.
- Up-to-date mutual aid plans support effective management of multi-agency incidents.
- Arrangements for the engagement of external contractors in support roles should be reviewed and tested periodically.
- The establishment or maintenance of an incident management team to manage recovery supports recovery objectives.
- The achievement of overall objectives for a protracted incident may be enhanced if the original control agency, subject to supporting legislation, maintains control for the incident's duration.

Images: South Australian Metropolitan Fire Service

Northern Territory, January 2018

Daly River flood

For nine days to 31 January 2018, an active monsoon trough delivered high rainfall across the Northern Territory's Top End, causing telephone outages and power blackouts, and sweeping cars off roads. On Sunday 28 January, some locations in the territory had their highest January daily rainfall on record, and major flooding occurred in the Daly River catchment.

On 29 January, the Bureau of Meteorology (the Bureau) issued a major flood warning for the Daly River; the Northern Territory Emergency Management Committee declared an emergency. The Daly River community of Nauiyu, 220 kilometres south of Darwin, was under particular threat. Nauiyu residents had been on standby to evacuate since 26 January; following the warning, some residents arrived late on 29 January at an evacuation centre established at the Foskey Pavilion in Darwin.

The following day, 23 helicopters were used to evacuate almost all the remaining 343 residents from Nauiyu to the nearby town of Batchelor. From there they were transported by bus to the evacuation centre in Darwin, where most remained for the following two weeks. The Daly River peaked at 14.58 metres at 4.10pm that afternoon.

More than half (54 per cent) of the houses in Nauiyu were damaged by the floodwaters. Damage was less than in similar, previous floods as early flood warnings from the Bureau had enabled ample time for emergency response planning, and for residents to place whitegoods and other assets above the expected flood level.

Rescue and recovery operations were led by the Northern Territory Police, Fire and Emergency Services (NTPFES) and the Department of the Chief Minister (DCM). Territory Families and the Australian Red Cross managed the evacuation centre, ensuring the care and welfare of nearly 350 people, including children. A range of other Northern Territory Government agencies and NGOs provided support.

Ongoing collaboration between NTPFES, DCM and the Bureau regarding flood recession supported the early development of plans to return residents to Nauiyu. Evacuees were housed at the evacuation centre until 12 February before returning to Nauiyu, where clean-up operations by local contractors had been underway for several days.

On 1 February, Commonwealth Minister for Law Enforcement and Cybersecurity Angus Taylor and Northern Territory Chief Minister Michael Gunner announced that the Northern Territory would be eligible for financial assistance under the Natural Disaster Relief and Recovery Arrangements (NDRRA), to support affected residents, the evacuation, clean-up operations and repairs to essential public assets.

During the flood event across the Top End, there was a sharp rise in melioidosis cases, a potentially deadly soil-borne disease. The condition can lead to severe pneumonia and blood poisoning; 10-15 per cent of cases are fatal.

No fatalities were reported as a result of the Daly River Flood.

Acknowledgments

Bureau of Meteorology: Monthly Weather Review, March 2018; ABC News; Northern Territory Fire, Rescue and Emergency Services; Northern Territory Department of Treasury and Finance; Katherine Times

Insights

- Practical community-level plans that are consistent with local emergency management plans should be developed and widely promoted.
- Local emergency management plans and community plans that include flood inundation mapping will inform the issue of emergency warnings, as well as self-initiated action by community members.
- Following disasters, emergency services should re-assess the instruments that govern disaster response and ensure that strategic and operational functions are separated appropriately.
- Following disasters, emergency services should re-assess the triggers for evacuation to ensure responses from affected community members are appropriate, timely and effective.

Images: Paul Terawsky

Australian Capital Territory, February 2018

Flash flood

During the morning of Sunday 25 February, thunderstorms produced heavy rainfall and flash flooding in the Australian Capital Territory (ACT).

Canberra Airport recorded more than 60 millimetres in less than five hours, more than the station's monthly long-term average of 51.2 millimetres. Southwell Park, to the north of the central business district, received 124 millimetres in six hours. In the three hours to 10.45am, the Bureau of Meteorology (the Bureau) recorded 66.2 millimetres at Woolshed Creek, 43 millimetres at Oaks Estate and 39.2 millimetres at the boat harbour on Lake Burley Griffin. Sixty millimetres of rain were recorded in just an hour at Sullivan's Creek, and the 24-hour total to 9.00am on 26 February was 97 millimetres.

The Bureau issued a severe thunderstorm warning at approximately 9.15am on the Sunday and cancelled it at approximately 1.20pm that afternoon.

The rainfall, described by the Bureau as an extreme weather event, caused flash flooding in parts of the city and forced several road closures. Just to the east of the city, rainfall at Woolshed Creek produced a one-in-a-100-year weather event. The city's north was hit particularly hard, with apartments and homes flooded in O'Connor. In the inner north of the city, buses were diverted for much of the day, with Northbourne Avenue and surrounding streets closed for several hours. Bus services had returned to normal by 4.00pm.

The ACT State Emergency Service (ACT SES) received more than 250 requests for assistance from Canberrans hit by the deluge. All ACT SES teams were deployed across the territory to help with the ongoing clean-up, mainly dealing with localised flooding and a few calls about roof damage. SES teams were supported by ACT Fire and Rescue, ACT Rural Fire Service, the New South Wales State Emergency Service, the Australian Federal Police, Transport Canberra and City Services, and the Access Canberra Call Centre.

On Sunday evening, ACT SES advised of several locations that had been re-opened to the public. However, the Australian National University (ANU) experienced significant flooding and power interruptions across the campus and cancelled all classes and events scheduled for the Monday. The lower level of the Chifley Library, the biggest and busiest of the ANU's five libraries, was flooded by half a metre of water. The flooding wiped out the library's electrical, air conditioning and ventilation systems and IT infrastructure, and caused significant damage to microfilm collections, books, serials and journals relating to history, philosophy and politics. ANU's inundation was most likely caused by changes to water flow from major construction works on the campus.

A number of outside events on the final day of the Royal Canberra Show, in the northern suburb of Mitchell, were postponed and restarted after the rain eased during the afternoon.

Canberra residents heeded warnings to keep clear of floodwaters; no injuries or fatalities were reported as a result of the floods.

The rain that produced the flooding was described by the Bureau as a one-in-a-100-year weather event.

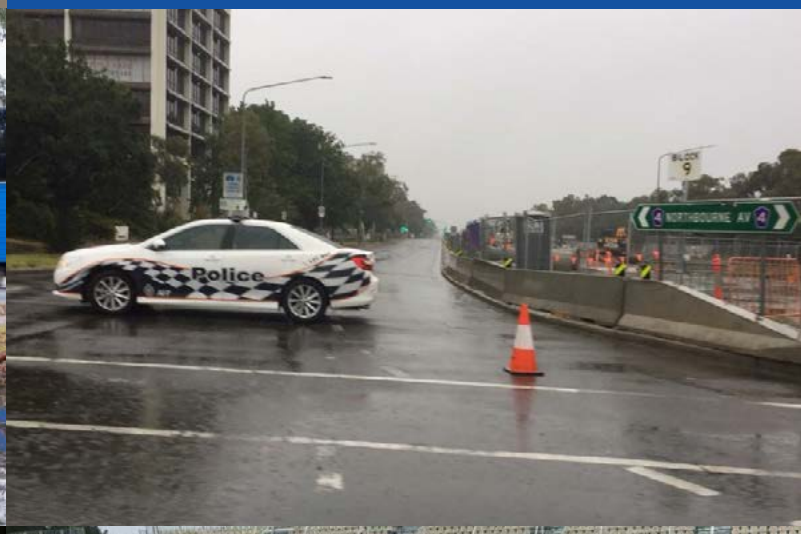
A January 2018 report by the ACT Auditor-General found that new suburbs and multi-story developments in existing Canberra suburbs were putting extra pressure on the city's stormwater system. The report indicated that stormwater infrastructure in many parts of Canberra would be unable to cope with major rain events.

Acknowledgments

Bureau of Meteorology: Monthly Weather Review, February 2018; Australian Capital Territory State Emergency Service; ABC News; The Canberra Times

Insights

- A review of flood warning systems is likely to improve public safety outcomes.
- Some emergency service resources may be unable to respond during severe weather events and this should be anticipated and planned for.
- Very localised, rapid impact events create extra challenges for emergency services. Systems are needed that:
  - deliver appropriate, targeted and timely warnings to impacted communities
  - enable off-duty personnel to be contacted to respond rapidly
  - facilitate communication between incident management teams and jurisdiction-level support.



Images: ACT State Emergency Service

Victoria, February 2018

Night firebombing trial

The Night Fire Suppression Operations trial was initiated in 2016 by Emergency Management Victoria (EMV) in partnership with the Department of Environment, Land, Water and Planning, the Country Fire Authority, the National Aerial Firefighting Centre and the Civil Aviation Safety Authority (CASA), to develop capability to attack bush and grass fires at night using helicopters.

A milestone was reached near Ballarat in February 2018 when a Sikorsky S-61 helicopter successfully hover-filled from a dam and dropped water on strategically-lit fires – the first time this has occurred in Australia at night-time. Infrared photography captured from an accompanying Sikorsky S-76 helicopter showed that fires were successfully identified and targeted. A Bell 412 helicopter was also trialled successfully; further trials will be undertaken with other aircraft.

The trial also successfully tested the effectiveness of night vision imaging systems, including infrared systems and night vision goggles. Helicopters used in the trial were fitted with stronger searchlights, and cockpit instrumentation was modified where necessary to ensure night vision googles were not compromised.

Following the trial, two Australian aircraft operators, Kestrel Aviation and Coulson Aviation, gained CASA approval to conduct commercial night-time firebombing operations during the 2018-19 summer.

EMV and its Victorian emergency management partners, on behalf of other states and territories, will continue to develop night-time firefighting capability using aircraft, in preparation for the 2018-19 bushfire season. EMV and its partners will continue to develop and test operational procedures to ensure that firebombing aircraft and firefighting crews on the ground work together safely and effectively.

The ability to operate aircraft at night will significantly improve firefighting capability and effectiveness. Fighting fires at night, when they are usually less intense, will enable emergency services to contain fires more quickly, particularly in remote locations where access by road may be difficult.

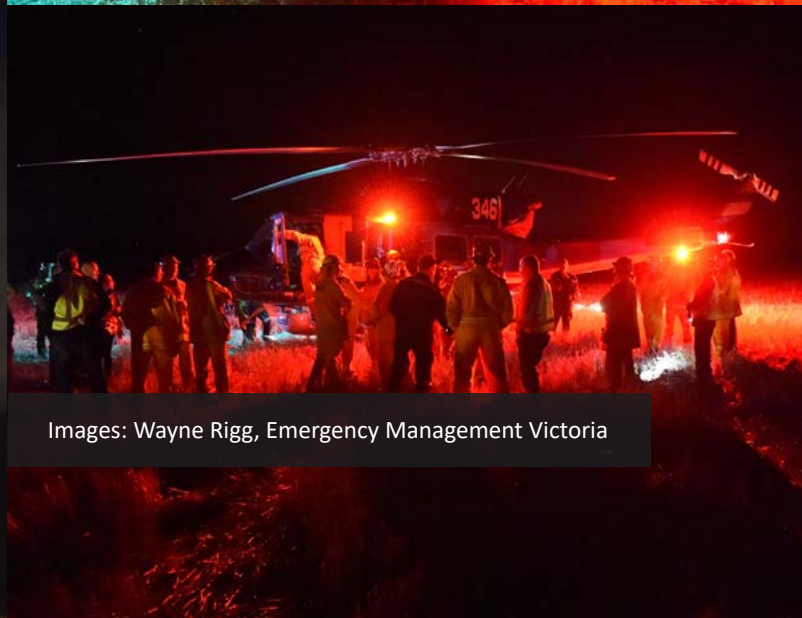
CASA approval for night-time firefighting with aircraft will influence future approvals sought by other aircraft operators in Australia and may influence approvals sought from overseas air regulators by approved Australian operators seeking to apply night-time firebombing capability overseas.

Acknowledgments

Emergency Management Victoria; Country Fire Authority; Australian Aviation

Insights

- Night-time hover-filling of rotary-winged aircraft and the dropping of water on controlled fire targets is feasible, effective and repeatable.
- Identification of hazards in daylight by water-bombing aircrews, and detailed mapping of hazards to aircraft, is fundamental to safe night-time operations. Consequently, water-bombing at night as a first attack strategy may be unlikely until systems are tested operationally and the capability matures.
- Daytime processes for integrating air operations with ground crews work well at night and ensure ground crews are not at risk from water drops. Ground crews identified no negative issues with coordination and bombing processes.
- Ground crews are generally visible to aircrews, including via infrared imagery in the accompanying aircraft.
- Night vision imaging systems equipment proved reliable and the capability of night vision goggles continues to improve. Crews did not report any limitations on visibility under various moonlight conditions or as other celestial lighting changed.
- Fatigue management will likely result in maximum night-time operations of four to five hours.



Images: Wayne Rigg, Emergency Management Victoria

Northern Territory, March 2018

Tropical cyclone *Marcus*

On 15 March 2018, a tropical low formed in the Arafura Sea north of the Northern Territory; the Bureau of Meteorology issued a cyclone watch for Darwin, the Tiwi Islands and parts of the north-west Top End.

Drifting east-south-east, north of the Tiwi Islands, the low developed into a Category 1 tropical cyclone early on 16 March and was named tropical cyclone *Marcus*. *Marcus* reached Category 2 status in the hours before it crossed the Northern Territory coastline on Saturday 17 March; it passed directly over Darwin just before midday, an hour earlier than originally estimated. Wind gusts of 130 kilometres per hour were recorded in Darwin, and a new March record of 126 kilometres per hour was recorded at Darwin Airport.

With winds easing, the city's cyclone shelters closed by about 8.00pm and residents were sent home. That evening however, Northern Territory Emergency Service (NTES) staff worked through around 400 incidents across the region.

Marcus eased to a Category 1 cyclone; by the evening of the following day, heavy rain over the Top End started to abate.

However, as it passed over Western Australia's northern Kimberley, *Marcus* again intensified to Category 2. People in or near coastal and island communities from Wyndham to Mitchell Plateau, Beagle Bay and Cockatoo Island were warned to prepare for the approaching storm.

Marcus intensified rapidly after it passed over the northern Kimberley and moved west into open waters, reaching Category 5 over the Indian Ocean on 21 March – the most intense tropical cyclone in the Australian region since severe tropical cyclone *Monica* in 2006. *Marcus* then weakened rapidly as it moved south and transitioned into an extratropical cyclone by 25 March.

Marcus was the strongest tropical cyclone to hit Darwin since severe tropical cyclone *Tracy* (Category 4) in December 1974. *Marcus* caused the cancellation of major events and all flights in and out of Darwin. Approximately 26,000 homes were affected by electricity outages due to destructive winds, in areas as far south as Batchelor and Adelaide River. Thousands of residents in the greater Darwin area were warned to boil water before drinking it. Thousands of trees were destroyed across Darwin, including many shallow-rooted African mahoganies planted after *Tracy*.

Public schools and non-essential public service agencies were closed, some for several days, while clean-up efforts

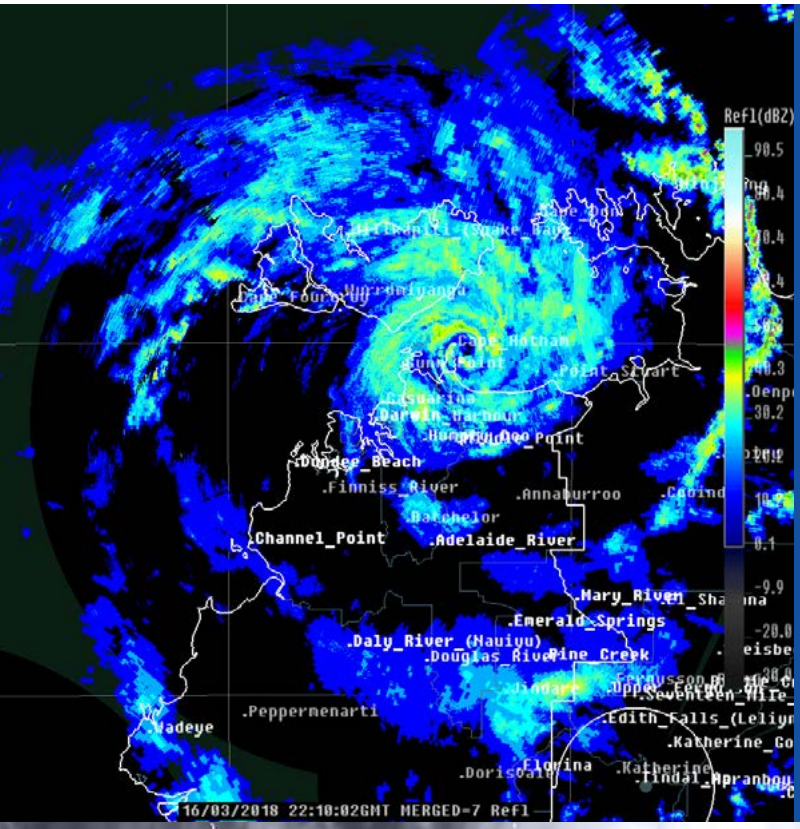
Acknowledgments

Bureau of Meteorology: Monthly Weather Review, March 2018; Northern Territory Emergency Service; Northern Territory Department of Education; Daily Telegraph; NT News; Sydney Morning Herald; Global Catastrophe: Recap April 2018; National Insurance Brokers Association: Insurance and Risk.

continued. Removing downed trees and power lines from roads was a priority. The city's water supply was affected; residents were urged for nearly 48 hours to boil tap water before using it. The Health Department issued a warning for melioidosis, a life-threatening disease spread by contact with soil, mud and surface water.

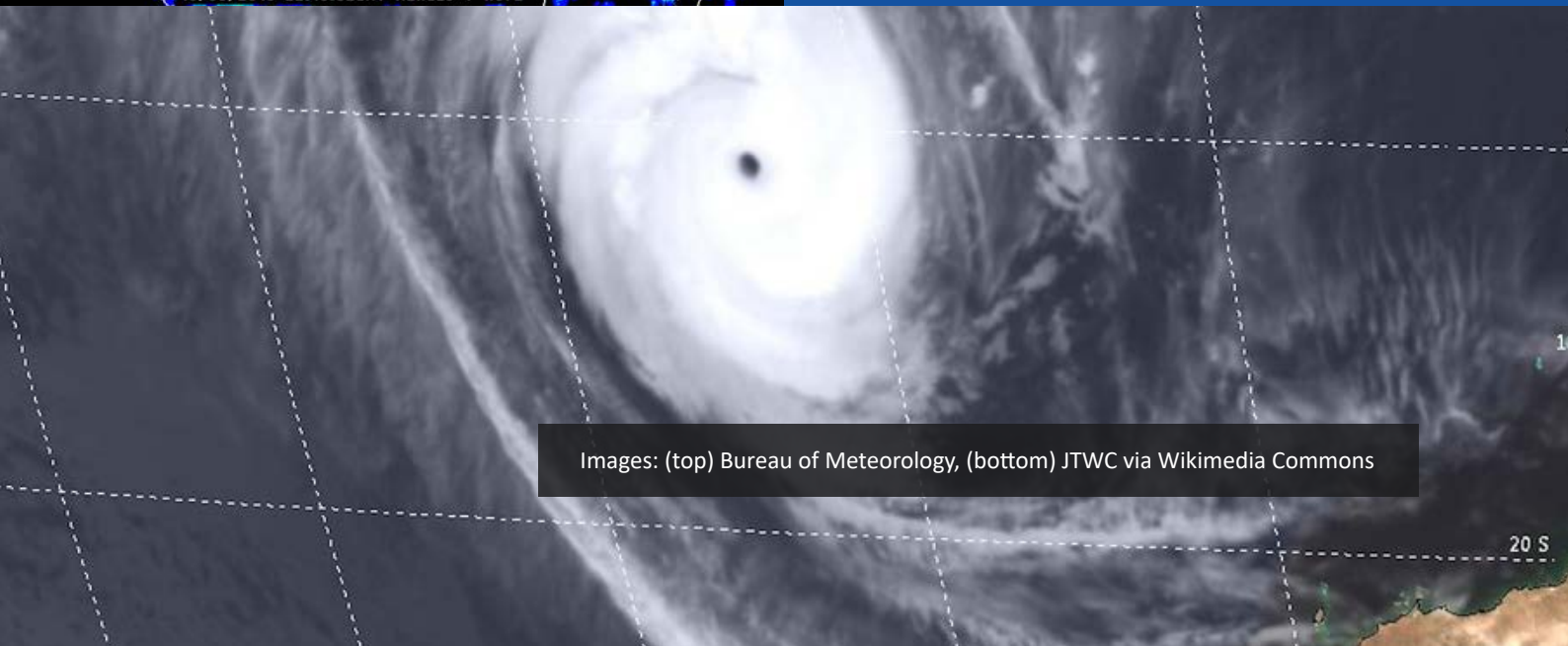
The clean-up in Darwin was coordinated by the NTES and included more than 200 City of Darwin staff. Through Defence Assistance to Civil Community (DACC) arrangements, One Brigade Emergency Response Force assisted with tree clearance in public premises and an Australian Defence Force Joint Task Force assisted with general street clearance. The defence deployment included United States Marine Corps troops based in Darwin.

While there were over 6,400 insurance claims, and insurance costs topped A$75 million, *Marcus* caused no fatalities. And unlike *Tracy*, *Marcus* caused relatively little structural damage; in part due to less severe winds as well as improved building codes for cyclone conditions established after *Tracy*. The Insurance Council of Australia reported that most claims were for damage caused by falling trees.



Insights

- Government and non-government enterprises should be encouraged to develop business continuity plans to enhance their disaster preparedness.
- Following disasters, emergency services should re-assess the effectiveness of their community engagement programs and emergency warnings, to maximise community preparedness for and response to disasters.
- Community engagement programs should include initiatives that encourage community members to heed warnings; for example, to evacuate when necessary, and to shelter when necessary.



Images: (top) Bureau of Meteorology, (bottom) JTWC via Wikimedia Commons

Queensland, March 2018

Tropical cyclone *Nora*

On Friday 23 March, tropical cyclone *Nora* developed over the Arafura Sea then tracked south-east towards the Gulf of Carpentaria.

Before the cyclone made landfall, swift water rescue technicians and emergency management coordinators from Queensland Fire and Emergency Services, as well as additional police officers, were strategically deployed to Gulf communities in readiness for response and recovery coordination. The State Disaster Coordination Centre was activated at 6.00pm on Saturday 24 March and remained operational until Friday 6 April 2018.

Nora made landfall at 11.25pm on 24 March between Pormpuraaw and Kowanyama on Cape York Peninsula's west coast as a Category 3 severe tropical cyclone. Very destructive wind gusts of 195 kilometres per hour were experienced at the cyclone's core, impacting a number of Indigenous communities, and damaging critical infrastructure and local agribusiness. Emergency Alert campaigns supplemented early warnings from local governments to people expected to be affected by the cyclone.

Thirty people from Pormpuraaw and Kowanyama, including 21 with health issues, were evacuated to Cairns and returned to their communities later that week.

Significant flooding and wind damage occurred in Kowanyama, which experienced 128 millimetres of rain in the 24 hours to 9:00am on the Sunday. Severe winds also downed many trees and powerlines, cutting electricity supply to over 220 homes and businesses in Pormpuraaw and 20 more in Mapoon. Heavy rain and strong winds initially delayed efforts to restore power and progress recovery in these remote communities.

Nora was downgraded to a Category 2 cyclone at 4.00am on Sunday 25 March. Kowanyama Airport experienced a peak wind gust of 100 kilometres per hour that day; warnings of heavy rainfall, and storm and gale force winds, remained in place for far north inland Queensland. *Nora* was downgraded to a Category 1 cyclone at about 1.00pm.

Nora continued to travel south along the Gulf Country coast before moving inland and weakening to a tropical low late that evening. The following day, schools at Pormpuraaw, Kowanyama, Karumba and Burketown remained closed while clean-up efforts commenced.

Over the next two days, the tropical low and a monsoon trough stretching to its east and west produced moderate to heavy rainfall to the northern Top End and eastern parts of the Northern Territory, and across the northern, western, central and east coasts of Queensland. Very heavy falls and flooding were recorded in the Cape York Peninsula coasts and Gulf Country. Several locations across northern Queensland recorded their wettest March day on 26-27 March including Port Douglas, which received 593 millietres of rainfall in 24 hours.

Bureau of Meteorology forecasters issued flood warnings to communities from Cape Tribulation to Townsville, as the

Acknowledgments

Bureau of Meteorology: Monthly Weather Review, March 2018; Queensland Fire and Emergency Services; Cairns Post

low-pressure system was expected to cause flash flooding across northern towns including Cairns, Innisfail, Port Douglas and Mossman. A thunderstorm warning was issued for Cairns and Port Douglas.

Major flooding was experienced in the Barron, Herbert, Tully, Johnstone and Murray Rivers and in the Mulgrave and Russell River catchments. Flash flooding occurred around Cairns on 26 March, requiring more than 40 swift water rescues, and 42 people were evacuated from two caravan parks in the early hours of 27 March. Areas around Cairns and Mossman experienced rainfall totals between 150 and 200 millimetres and the township of Ingham was inundated by floodwaters for the second time that month.

The Australian Government made relief funds available to communities affected by the cyclone through the Natural Disaster Relief and Recovery Arrangements (NDRRA).

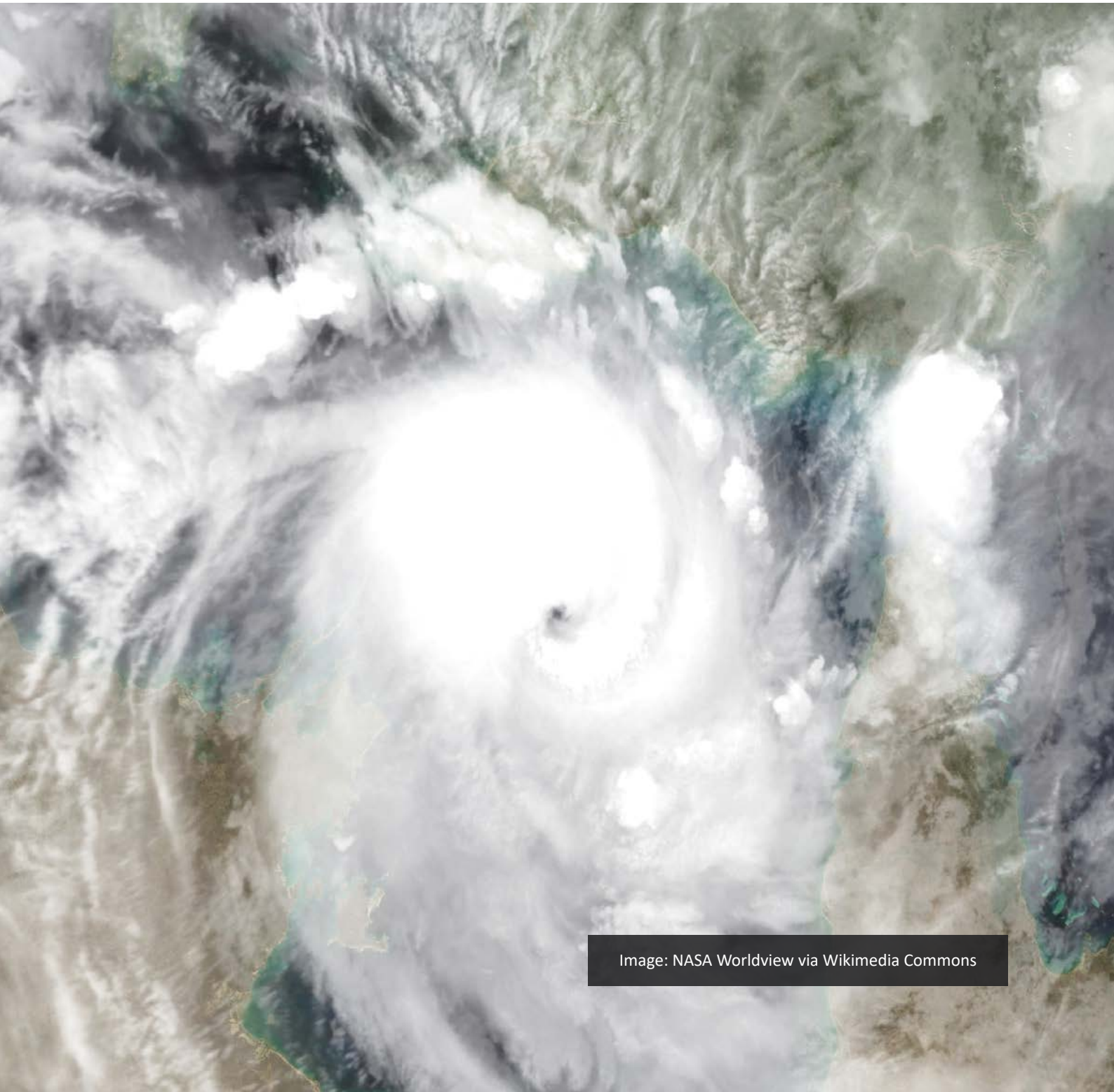


Image: NASA Worldview via Wikimedia Commons

Victoria, March-May 2018

South-west complex fires

Following an extremely dry 2017-18 summer, the Bureau of Meteorology forecast high temperatures and strong winds across south-west Victoria for the weekend of 17-18 March and a total fire ban was declared.

Hot, dry and gusty northerly winds ahead of a strong cold front subsequently produced some of Victoria's worst bushfire conditions of the season. Fifty-three fires broke out between 8.00pm Saturday 17 March and 9.00am Sunday 18 March; four considered significant broke out near Gazette, Garvoc, Terang and Camperdown. Several of the fires, particularly in the Camperdown-Cobden area, moved subsequently underground into peat, creating complex challenges until early May.

In response to the fires, four Evacuate messages, 34 Emergency Warnings, 95 Warnings (Watch and Act) messages, 109 Advice messages, 34 Community Information messages and one All Clear were issued between 17 March and 8 May.

At least 26 agencies were involved at the incident level, including interstate support. There were 86 dispatches of aircraft between 18 March and 4 May. Remote piloted aerial systems also operated over a 41-day period between 23 March and 2 May.

Ten relief centres were established and attended by more than 800 people on 17 and 18 March. Drawing on lessons from previous events, including the Hazelwood Mine Fire, key fire management objectives in addition to fire suppression included community engagement, air quality, community health, consequence management, and relief and recovery. Health assessments for responders and the community were conducted over a 43-day period with a total of 1,332 assessments undertaken.

By the time the fires were extinguished, 26 residences and 66 outbuildings had been destroyed, with 2,995 livestock lost. The total area burnt by the fires included 9,725 hectares in Terang, 3,666 hectares in Gazette, 4,031 hectares in Garvoc, 6,725 hectares in Camperdown, 79 hectares in Cobrico Swamp and 28 hectares in Lake Elingamite.

The Insurance Council of Australia declared the south-west bushfires a catastrophe, ensuring that related insurance claims were treated as a priority.

The jointly funded Commonwealth and Victorian Natural Disaster Relief and Recovery Arrangements (NDRRA) – Category A and Category B were activated in recognition of the significant impact of the fires on the community. On 20 April 2018, Acting Prime Minister Michael McCormack also activated NDRRA Category C Primary Producer Grants to a maximum of $10,000 for affected primary producers, to assist with recovery.

Acknowledgments

Bureau of Meteorology: Monthly Weather Review, March 2018; Emergency Management Victoria

Capturing insights

The process for identifying lessons from the south-west complex fires commenced with a formal debrief plan to collect learnings from community members, emergency management agencies, departments and local councils involved in the response and recovery. This process was designed to capture learnings in a coordinated way from the community, incident, region and state, and included 16 operational debriefs and community drop-in sessions. The data collected is undergoing analysis using the nationally and internationally recognised OIL (Observation, Insight, Lesson) methodology.

The five state themes that are being explored in subsequent documents and processes across the state are:

- intelligence and information sharing
- community engagement/connection
- safety and fatigue management
- capability and resource management
- managing concurrent emergencies/phases.

Images: Emergency Management Victoria

New South Wales, March 2018

Tathra bushfire

On Sunday 18 March 2018, a bushfire swept into the town of Tathra (population 1,622) on the New South Wales south coast. The fire destroyed 65 homes and buildings, damaged a further 39, and destroyed 70 caravans/cabins. No deaths or significant injuries were reported.

The maximum temperature at Bega that day, 14 kilometres to the north-west, was 38.6 degrees Celsius. The maximum wind gust, recorded at 1.37pm, was 76 kilometres per hour from the north-west. Fanned by these strong winds and high temperatures, the fire burned through some 1,250 hectares of bushland. It started at Reedy Swamp and crossed the Bega River, before reaching Tathra on the coast, to the south-east, at about 3.30pm.

Although the New South Wales Rural Fire Service issued warnings, many people did not get a text alert before the fire's arrival due to poor telephone reception. A mobile phone tower failed during the blaze, further impacting reception.

As the fire reached the town, many residents took refuge on the beach; others headed for an evacuation centre in Bega. Eventually, several hundred Tathra residents gathered at the centre, with some 300 staying overnight on the Sunday. Local Australian Red Cross volunteers helped staff at the centre.

At its height, about 150 firefighters battled the blaze, saving an estimated 810 homes threatened by the fire. The fire's spread slowed late in the afternoon with the arrival of a southerly change. The following day, four local schools were closed due to the number of students and staff affected by the fire.

Following the fire, New South Wales Family and Community Services provided a range of temporary housing support options and other support services, and the Bega Valley Shire Council established a Mayoral Appeal Fund. On 19 March, a recovery coordinator was appointed.

On 29 March, the Australian Government declared the bushfire a disaster, making disaster relief funds available for those affected. The Insurance Council of Australia declared the fire a catastrophe, ensuring claims by those affected were given priority. Insurance claims are expected to exceed $36 million.

Thirty of the homes destroyed in the fire contained asbestos. The New South Wales Government committed up to $10 million to remove asbestos-contaminated material and to help residents clean up their properties, with the clean-up coordinated by New South Wales Public Works.

On 21 March, the state government announced an independent review headed by former Australian Federal Police Commissioner Mick Keelty AO APM, with terms of reference to report on the adequacy of the fire services' response to the fire, and to review the call-taking and dispatch arrangements of both Fire and Rescue New South Wales and the Rural Fire Service. At the same time, a Coronial Inquest was confirmed to formally establish the cause and origin of the fire. Keelty's report and the government's response – which supports all 12 of Keelty's recommendations – were completed in June 2018.

Acknowledgments

Bureau of Meteorology: Monthly Weather Review, March 2018; New South Wales Rural Fire Service; ABC News; The Guardian; The Sydney Morning Herald; The Daily Telegraph; Keelty Report: Bega Valley Fires

Insights

- There is often a mismatch between expected and observed fire behaviour and its impacts that requires recalibration of existing fire danger ratings.
- The speedy return of residents following early property assessments helps reduce the social impact of disasters.
- Keeping media outlets well-informed during disasters may reduce adverse media coverage and consequent negative community perceptions of incident management.
- For effective dissemination and receipt of information and warnings, agencies and the community should avoid over-reliance on technology that may be vulnerable in a disaster.
- Emergency services, local government, affected communities and the media working collaboratively post-disaster reinforces the value of positive relationships.

Image: Caleb Keeney, Timberline Helicopters

New South Wales, April 2018

Holsworthy bushfire

In mid-April 2018, a bushfire near Holsworthy in Sydney's south-west spread quickly in warmer than usual autumn conditions, threatening hundreds of homes.

April was another warm month for Australia; the second-warmest April on record in terms of mean temperature, and a new record for national mean maximum temperature. Numerous station records for highest April mean maximum temperature were set in Victoria, New South Wales, South Australia, Western Australia and the Northern Territory. Minimum temperatures were in the warmest ten per cent of historical observations for April for a large area extending from South Australia to most of New South Wales, south-west Queensland and the far south of the Northern Territory. These conditions reflected a persistent heatwave over much of Australia for the first half of April.

Australia's rainfall for April was the eighth-driest on record; it was the driest April since 1997. Rainfall across southern Australia was well below average, with the mainland south-east particularly dry. Rainfall for southern Australia was the fourth-lowest on record for April.

For New South Wales as a whole, the mean temperature was 3.30 degrees Celsius warmer than average, exceeding the previous April record of +3.20 degrees Celsius, set in 2005. Rainfall was the lowest on record at a number of stations in the state.

The fire broke out on Saturday 14 April on the banks of the Georges River, near the Casula railway station, at about the time the temperature in nearby Holsworthy peaked at 31.2 degrees Celsius. By the following day, more than 500 firefighters from the New South Wales Rural Fire Service (NSW RFS) and Fire and Rescue New South Wales and personnel from the Australian Defence Force were battling the blaze, with almost 100 fire trucks and 15 aircraft. Fanned by strong north-west winds, the fire soon threatened the Holsworthy military base to the south-east. Three thousand, eight hundred hectares had burnt before the fire was brought under control several days later.

Emergency warnings were issued for several suburbs adjacent to the fire, and all but essential staff at both the Holsworthy military base and the Lucas Heights nuclear reactor were evacuated as the fire approached. However, no structures were reported damaged at either facility.

During and after the fire, NSW RFS building impact assessment teams surveyed affected suburbs around the bushfire's perimeter. Firefighters and residents saved 888 homes, six facilities and one outbuilding from destruction. Only five properties were reported damaged, including one by wind. No lives were lost in the fire.

The New South Wales Police Force established Taskforce Capri to determine the cause of the fire, which is believed to have been deliberately lit.

Acknowledgments

Bureau of Meteorology: Monthly Weather Review, April 2018 and Special Climate Statement 65 – *Persistent summer-like heat sets many April records*; New South Wales Rural Fire Service; Illawarra Mercury

Insights

- Changing seasonal weather patterns may require the renegotiation of contracts for water-bombing aircraft.
- Relatively minor incidents in or adjacent to built-up areas can create immediate and strong demand for information and warnings.
- The demand for information and warnings when incidents and disasters occur outside traditional seasons puts pressure on information channels not geared to operate at full capacity at that time of year.

Images: (top) Bidgee via Wikimedia Commons, (bottom) Retartist via Wikimedia Commons

Queensland, April 2018

Commonwealth Games

Across 11 days of competition in April, the Gold Coast 2018 Commonwealth Games (the Games) attracted 6,600 athletes from 70 nations and territories who competed in 23 different sports and an integrated para-sports program.

In addition, 1,000 Games officials, a 1,500 strong workforce and 15,000 volunteers were involved. The Games attracted 523,000 visitors directly interested in the event.

Queensland Fire and Emergency Services (QFES) was heavily involved in preparations ahead of the Games, to ensure its readiness to respond to any emergency across venues on the Gold Coast and in Brisbane, Cairns and Townsville.

As part of Operation Paratus, QFES planned for the deployment of up to 400 paid employees and 450 volunteers during the Games. QFES personnel were deployed in command positions, firefighting, urban search and rescue roles and support positions. QFES prepared for fire, natural hazards, disasters and hazardous materials incidents impacting the Games, as well as support for counter terrorism operations. Preparations for Operation Paratus included the development of a Concept of Operations, a business continuity plan and a number of other operational planning documents by the QFES Commonwealth Games Office.

QFES was also prepared to support local government disaster management groups in accordance with Local Disaster Management Plans; for example, the City of Gold Coast.

QFES capability included 35 staff in an Integrated Response Capability unit, which maintained readiness to respond to isolated or constrained emergencies; with two helicopters based in the Gold Coast hinterland for the duration of the Games.

During the planning process, QFES collaborated with numerous state government departments including the Office of Commonwealth Games, Queensland Police Service (QPS), Queensland Health and the Department of Transport and Main Roads. QFES liaised extensively with the New South Wales Rural Fire Service, Fire and Rescue Service and State Emergency Service to strengthen cross-border arrangements for emergency response during the Games.

QFES was actively involved in multi-agency exercises and training leading up to the Games, to test its capability and that of other Queensland and Australian Government agencies. Two 48-hour, real-time exercises were conducted to test event operations and response to a catastrophic event. Participants included special tactical units from Australian Government agencies, QPS, QFES firefighters, Queensland Ambulance Service paramedics, and staff from Gold Coast City Council and the Department of Transport and Main Roads.

The Australian Defence Force assisted QPS with security at the Games, deploying some 1,000 personnel to help with the effort. The Australian Federal Police and Australian Border Force also supported the QPS security arrangements.

Acknowledgments

Queensland Government; Queensland Fire and Emergency Services; City of Gold Coast

During the Games

QFES personnel carried out 3,421 paid and 817 volunteer shifts.

The busiest day for QFES was Tuesday 10 April, when 396 people were on shift – almost half the total QFES deployment for the Games.

QFES volunteers contributed 11,000 hours across 13 operational and event support tasks.

Insights

- For large-scale public events, collaborative working relationships between emergency service partners provide improved interoperability in the delivery of services. This presents legacy opportunities that should be pursued to support improved disaster management.
- Consultative (rather than merely informative) engagement with the wider organisation during planning for a major event will assist the wider organisation to understand and plan for the impact of the event across all its functions and responsibilities. A similar approach to disaster management is likely to benefit the organisation and deliver better community outcomes.

Image: Kgbo via Wikimedia Commons (CC BY-SA 4.0)

Australia-wide, May 2018

Triple Zero (000) outage

In Australia, the emergency Triple Zero (000) service is managed by Telstra under contract to the Australian Communications & Media Authority (ACMA).

On the evening of 3 May, Australian Capital Territory (ACT) Emergency Services Agency staff in the Triple Zero (000) Communications Centre in Canberra noted that a number of Triple Zero (000) calls requesting ambulance assistance were being directed to ACT Fire and Rescue operators co-located in the joint Triple Zero (000) facility. The cause of this anomaly was raised with the Telstra Triple Zero (000) centre that evening; at the time, Telstra advised that they were not aware of any issues.

By 2.00am on 4 May, significant disruptions to the Triple Zero (000) network were being experienced and by 5.30am, national media outlets were reporting a nationwide outage of the network. Ultimately, Triple Zero (000) calls to police, fire and ambulance services across Australia were affected.

The technical fault manifested in a number of ways including:

- the caller not being able to get through to the Telstra operator when Triple Zero (000) was dialled
- the Telstra operator not being able to present the Triple Zero (000) call to the emergency service organisation (ESO) requested by the caller, requiring redirection of the call to an alternate ESO.

For several hours, this caused delays in the response of emergency service organisations (ESOs) to a range of emergencies.

By 11.33am, Telstra had reported that the network had been repaired and services had returned to normal.

The outage has been attributed to a number of simultaneous network faults and the cutting of and fire damage to an optical fibre cable located near Orange in regional New South Wales. An investigation into how the cable was damaged was inconclusive.

ACMA and the Department of Communications and the Arts are carrying out separate investigations into the outage.

Following the outage, the National Emergency Communications Working Group Australia and New Zealand developed several recommendations that will form the basis of a national Triple Zero (000) Disruption Protocol. Telstra will present a draft of the protocol to all jurisdictions for discussion, with a final draft to be presented to the national Triple Zero (000) Coordination Committee, chaired by ACMA, for final approval.

Acknowledgments

Australian Capital Territory Emergency Services Agency; ABC News; The New Daily

Insights

- To minimise community risk, outages need to be identified and communicated quickly to ESOs, and regular updates provided.
- Business continuity plans prepared by Telstra and ESOs will enable appropriate responses to future outages. Plans should have contingencies for different levels of outage and should seek to return operations to normal as quickly as possible.
- Appropriate redundancy systems are needed, with planning and mitigation measures agreed by all jurisdictions.
- A communications plan will facilitate consistent and timely messaging to the media and the community.

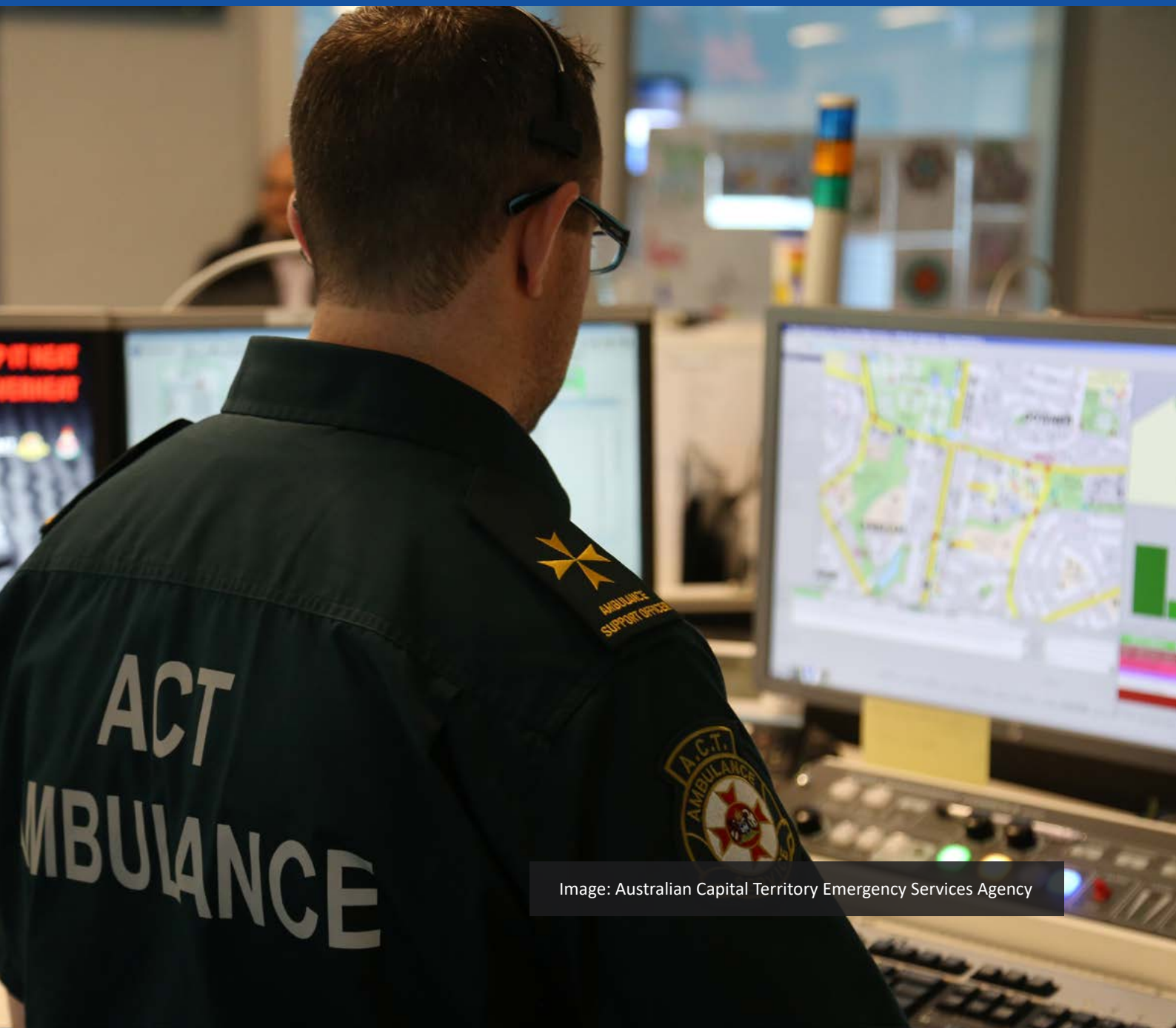


Image: Australian Capital Territory Emergency Services Agency

Tasmania, May 2018

Hobart flash flooding

A complex low-pressure system crossed Tasmania on Thursday 10 May, then deepened to the north-east the following day, bringing strong, gusty and moist southerly winds over the state.

Rain and thunderstorms brought exceptionally high rainfall to the south-east of Tasmania, in particular to Hobart and the nearby Wellington Range, where almost all recording sites reported their highest May daily rainfall on record (and in some cases their wettest day for any time of year) in the 24 hours to 9.00am on 11 May. The daily totals of 236.2 millimetres at kunanyi/Mount Wellington and 226.4 millimetres at Leslie Vale were second and third highest on the list of the top three highest May daily rainfalls ever recorded in Tasmania (behind 258 millimetres at Gray on 18 May 1986).

Much of the rain fell in about six hours on the Thursday evening, leading to flash flooding in many streams in south-east Tasmania. The very heavy rain was caused by a highly active line of thunderstorms that traversed Hobart over a number of hours, with each thunderstorm following a similar path as it moved in from the east.

Hobart recorded 128 millimetres, with a third of that falling in one hour between 10.00pm and 11.00pm on the Thursday evening. Flash flooding affected parts of Hobart's central business district, Salamanca, South Hobart, Sandy Bay, New Town, Blackmans Bay and Kingston. The Hobart Rivulet broke its banks, and several cars in adjacent streets in South Hobart and near the Hobart waterfront were swept away.

The event had an annual exceedance probability of less than one per cent and caused extensive damage to bridges, roads, buildings and other infrastructure.

More than 13,000 homes lost electricity, more than 30 schools were closed and a few homes in Sandy Bay lost their roofs as winds lashed the city. Emergency services received hundreds of calls for assistance, with State Emergency Service crews responding to more than 280 calls. Electricity supplies were re-established to most affected suburbs by late the following day.

Evacuation centres were established at Mathers House in the city and at Kingston for people requiring shelter, information and support.

Several roads were closed in the greater Hobart region overnight due to landslips, with council crews clearing rocks and dirt from roadways. While flights continued to operate out of Hobart Airport, there were some delays as ground staff were unable to get to work.

On 14 May, the Australian Government declared the floods a disaster, enabling relief funds to be available for those affected.

The Insurance Council of Australia (ICA) declared the floods a catastrophe, ensuring that claims by those affected were given priority. By late August, ICA reported that almost 8,800 claims had been lodged, with private property claims exceeding $99.7 million and public infrastructure claims exceeding $37 million – bringing the total damage bill to more than $137 million.

Hobart City's damage bill remained at $20 million, and Kingborough Council expected losses to exceed $2 million. The University of Tasmania's Sandy Bay campus suffered extensive flood damage, with the damage bill estimated at $15 million.

No fatalities occurred as a result of the floods.

Acknowledgments

Bureau of Meteorology: Monthly Weather Review, May 2018; Tasmania State Emergency Service; Insurance & Risk; ABC News; The Australian

Insights

- Data gathered during Rapid Impact Assessment informs community engagement and welfare checks.
- When used daily to share routine information, web-based whole-of-government information sharing platforms become a valuable and trusted tool for sharing critical information between state and local government authorities during emergencies and disasters.

Images: Tasmania State Emergency Service

Western Australia, May 2018

Albany escaped burns

In 2018, the south-west of Western Australia recorded the second lowest autumn rainfall on record; the lowest since 1914. This was consistent with a declining rainfall trend observed in this region over the past 40 years.

These dry conditions and an extended autumn season enabled private and public land owners and managers to use planned burning to reduce fuel loads and the summer bushfire risk. By early May, many local governments in the south-west perceived conditions as low risk and, consistent with usual practice, no longer required permits for planned burns. Consequently, there was a significant number of planned fires across the region, but the easing of restrictions limited authorities' knowledge about where fires were and who was burning.

During the first two weeks of May, the south-west experienced unseasonably warm and dry conditions. Early in the week commencing 21 May, the Bureau of Meteorology forecast the first strong cold front of the year for the western and southern parts of Western Australia. On 24-25 May, the front brought dry air and winds exceeding 100 kilometres per hour to the south-west. Although rain was forecast, no significant rainfall fell across the Great Southern Region of the state.

As the front passed, more than 150 fires were reported to the Department of Fire and Emergency Services (DFES) in the South West and Great Southern Regions. Parts of Albany and several small communities were threatened by the fires, and DFES issued several emergency warnings.

Despite the scale of fire across the south-west, only one house was lost and another damaged. However, several hundred sheep were killed, several kilometres of fencing burned, and the loss of crops, pasture and topsoil will have longer-term environmental and economic impacts on affected farmers.

Many of the fires were escaped burns originating on private property. About five per cent of the fires were planned burns being undertaken by state agencies, either on state-owned land or on private land on behalf of property owners.

The Western Australian Government requested the Office of Bushfire Risk Management undertake a review to examine what led to the escapes on 24-25 May and how the risk of these escapes could be effectively mitigated in future. The review will consider whether management actions leading up to the escape of the planned burns, and mechanisms to lessen the risk of escape of planned burns, are adequate.

The Fire and Emergency Services Commissioner is due to present the report to the state government in late September 2018.

Acknowledgments

Bureau of Meteorology: Monthly Weather Review, May 2018; Department of Fire and Emergency Services, Western Australia: Office of Bushfire Risk Management; ABC News

Insights

- Agreed and applied communication strategies between emergency services, local government agencies, paid and volunteer emergency service units, land managers and non-government organisations – tailored for regional circumstances – enable effective information-sharing and support strong relationships built on trust and mutual respect.
- Year-round registration of planned burns will provide local and state authorities greater awareness of active fires in the landscape and enable targeted notification prior to severe weather events.
- A state-level approach to risk-based resource allocation for prioritised planned burns and unplanned fire will deliver better public safety and land management outcomes.

Images: Ronel Shephard Photography, (bottom right) Kevin Haylock, Sandalwest

New South Wales, June 2018

Port Kembla ship fire

On Monday 18 June at 3.10am, a fire broke out aboard the Australian-flagged *Iron Chieftain* in the Port Kembla harbour.

It was almost a week before the fire was declared out by firefighters. Owned by CSL Group Inc, the 202 metre, 50,000 tonne *Iron Chieftain* is a self-discharging bulk carrier. Its cargo of 34,000 tonnes of dolomite, unloaded using an on-board system of conveyor belts and a discharge boom, is used in the manufacture of steel.

The fire started aft of the ship's cargo holds in a vertical discharge riser as dolomite was being unloaded. As a precaution, port operations were suspended from 4.00am until 11.30am and were back on schedule by 5.00pm that afternoon. The blaze had no impact on steelmaking at the nearby BlueScope Steel plant, and no port equipment was damaged.

In the fire's early stages, carbon monoxide was discharged into the ship's engine room to protect it, and all 22 members of the crew were evacuated without injury. Initially, Fire and Rescue New South Wales crews attacked the fire in the vertical riser and on the discharge boom and conveyor system. The fire on the main deck and discharge boom was extinguished on Monday afternoon, having been fought from the wharf using aerial appliances and from the ship's deck with fire hoses. Tugboats applied water to the hull to keep fuel tanks cool as part of a boundary cooling strategy.

However, a difficult-to-access fire continued to burn aft of hold 5 for several days. Up to 100 firefighters were placed on an around-the-clock roster to fight the fire, with local Illawarra firefighters supported by crews from Sydney.

Firefighting efforts focused on extinguishing smouldering masses of vertical and compressed layers of rubberised hold-lining and conveyor-belt material. The leak of some five tonnes of marine fuel oil per hour into the ship's hold was an obstacle for firefighters.

Remotely piloted aircraft provided live overhead imagery, and thermal imaging cameras were used to monitor heat levels below the main deck while firefighters continued to monitor the ship's stability. Monitoring, recording and assessing by-products of combustion including heat, carbon monoxide levels and explosive limits were critical in establishing the effectiveness of firefighting strategies.

The hold where the fire continued to burn was successfully flooded with high expansion foam on the Wednesday morning. Once the fire was confirmed extinguished on Sunday 24 June, the ship was handed over to its owners, New South Wales Police and the Port Authority.

The state's Environmental Protection Authority monitored environmental effects of the firefighting effort and firefighters monitored air quality. Impacts from firefighting are expected to be minimal as water and foam used to contain the fire was largely confined to the ship. Booms were placed around the ship as a precaution.

Early reports indicate that damage was caused to one hold and conveyor belts in its vicinity, a vertical riser, a discharge boom and to two tanks containing marine fuel. No structural damage to the ship was reported, nor any significant damage to its accommodation spaces. The Australian Transport Safety Bureau commenced an investigation into the incident and is expected to report by June 2019.

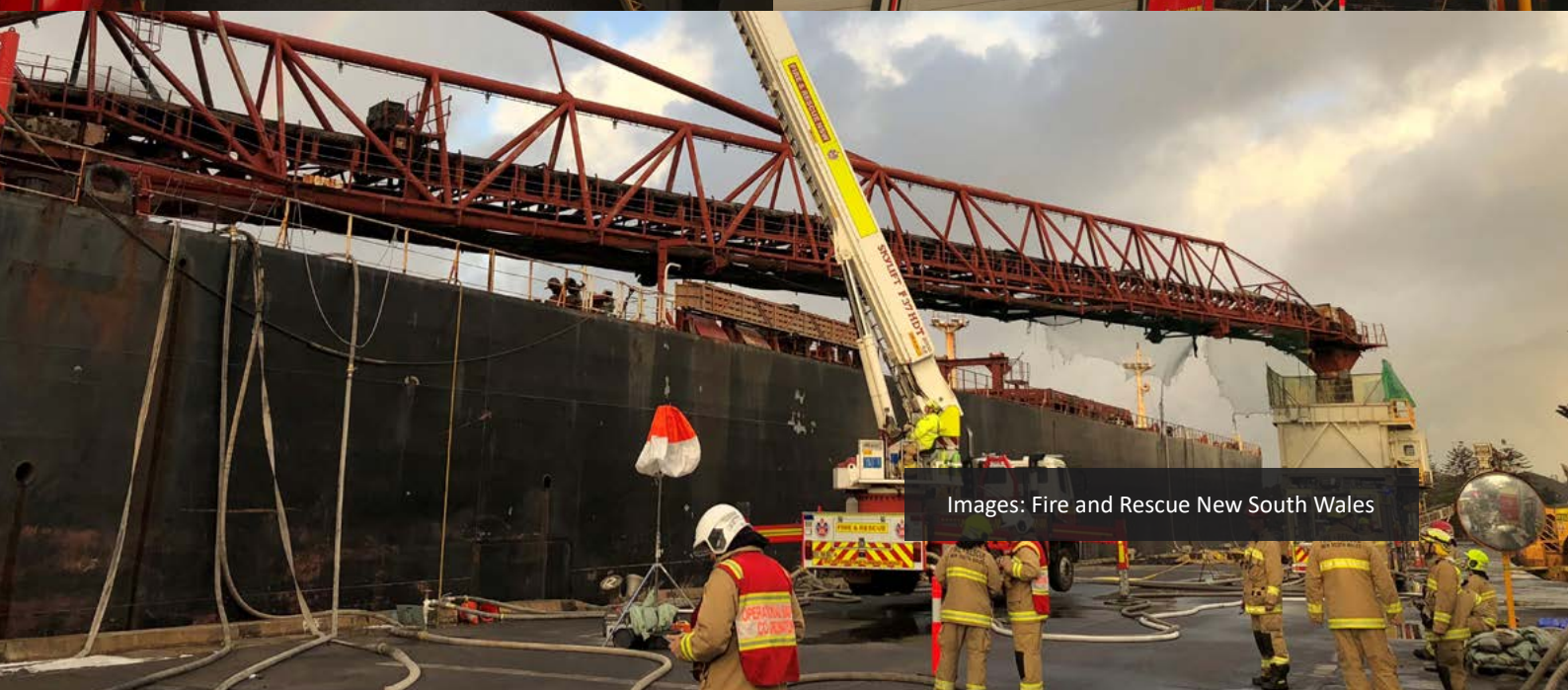
Due to a high volume of contaminated water remaining in the ship's hold, an investigation to determine the cause of the fire is yet to be completed.

Acknowledgments

Fire and Rescue New South Wales; New South Wales Ports; CSL (Australia) Ltd; Illawarra Mercury; Reuters; Australian Transport Safety Bureau

Insights

- Formation of a sound incident action plan (IAP) ensures all are working towards a specific objective, regardless of changes of command.
- Early and continued engagement with subject matter experts enables an IAP to be validated and tested regularly.
- The need for and use of large quantities of foam requires careful calculations, sourcing of appropriate type, appropriate application and close liaison with the Environmental Protection Authority.
- When an incident command centre is established remote from an incident, objectives must be communicated clearly to the forward command.
- An incident may be sectorised to clearly distinguish between different functional areas, commands or incident objectives, and to maintain safety.



Images: Fire and Rescue New South Wales

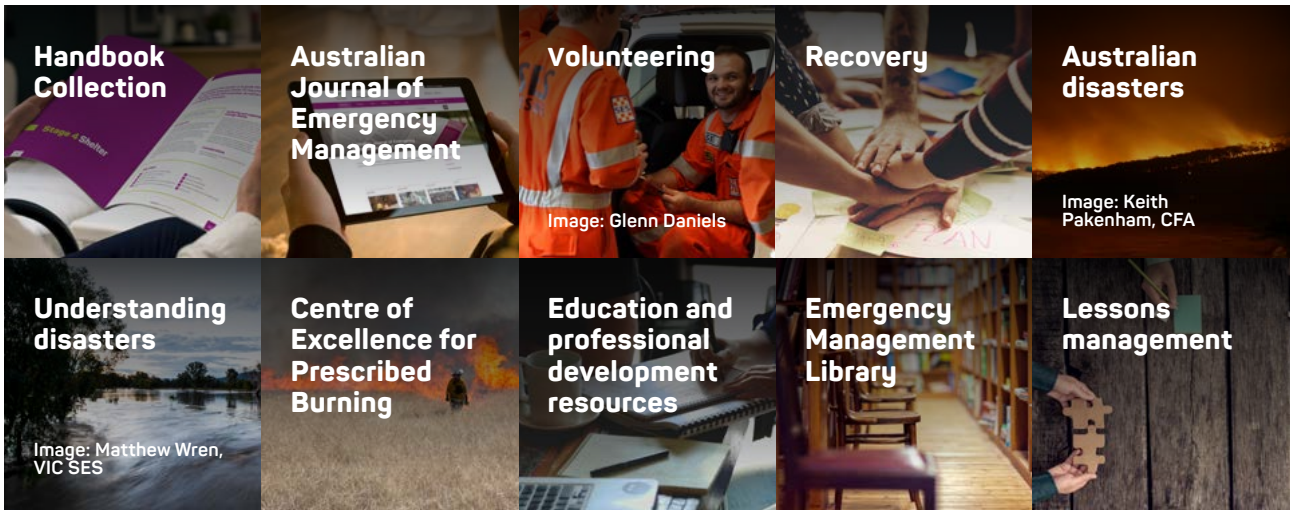
The Knowledge Hub

Explore national resources for disaster resilience

The Australian Disaster Resilience Knowledge Hub (the 'Knowledge Hub') is a national, open-source platform that supports and informs policy, planning, decision making and contemporary good practice in disaster resilience.

The Knowledge Hub highlights current and emerging themes in the resilience sector, linking national guidelines with research and fostering collaboration among leading agencies and organisations. The Knowledge Hub also houses information on historical Australian disasters.

The Knowledge Hub is managed by the Australian Institute for Disaster Resilience on behalf of the Australian Government.



Contribute a resource

Know of a great resilience resource? The Australian Institute for Disaster Resilience welcomes content submissions for the Knowledge Hub – read the guidelines and submit online at knowledge.aidr.org.au/contribute.

"I use several of the handbooks day-to-day. I've got four of them on the shelf directly behind my desk that I can just turn around and grab."

Russell Dippy
Senior Sergeant First Class, South Australia Police

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