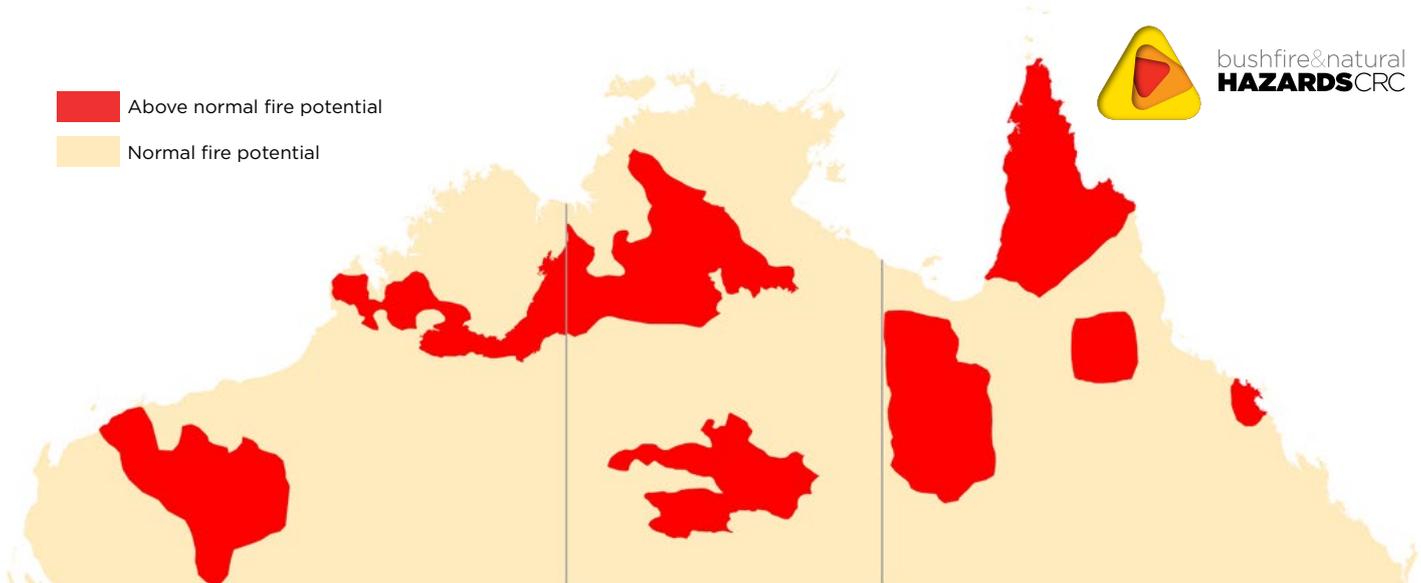


ISSUE 36 JULY 2017

TOPICS IN THIS EDITION | FIRE IMPACTS | FIRE SEVERITY | FIRE WEATHER

NORTHERN AUSTRALIA SEASONAL BUSHFIRE OUTLOOK 2017



Areas are based Interim Biogeographic Regionalisation for Australia and other geographical features.

BUSHFIRE POTENTIAL

This *Northern Australia Seasonal Bushfire Outlook* provides information to assist fire authorities in making strategic decisions such as resource planning and prescribed fire management to reduce the negative impacts of bushfire.

A *Seasonal Bushfire Outlook* for southern Australia will be distributed in early September, and will include an update on the northern fire season.

Bushfire potential depends on many factors. In northern Australia, conditions are determined by the nature of the previous wet season. The volume, location and timing of rainfall are critically important when estimating fuel volumes and growth. They also affect the timing of the drying of the fuel.

The climate outlook for the next few months is also a crucial factor. Of particular interest are the future tendencies of Pacific sea surface temperature associated with the El Niño-Southern Oscillation (ENSO), a major climate driver over Australia. Other less quantifiable factors, such as the

distribution and readiness of firefighting resources, are also considered.

The annual Northern Australia Fire Managers' Forum, chaired by the Bushfire and Natural Hazards CRC, met in Kununurra, WA, in June. During the two-day proceedings, the forum discussed the seasonal outlook for the imminent fire season, enabling the production of this *Hazard Note*. All other presentations from the Forum are online at www.bnhcrc.com.au.

Forum attendees included representatives of the WA Department of Fire and Emergency Services, WA Department of Biodiversity, Conservation and Attractions, Bushfires NT, NT Fire and Rescue Service, Queensland Fire and Emergency Services, Queensland Parks and Wildlife Service, the Bureau of Meteorology, AFAC and Charles Darwin University.

ANTECEDENT CONDITIONS

The second half of 2016 was dominated by a strong negative Indian Ocean Dipole (IOD) that decayed in November, associated with the development of the

monsoon. The Pacific Ocean was ENSO neutral, with little clear influence on the Australian climate over summer. Ocean waters around northern Australia remained near record warm temperatures during the northern wet season (October to April).

Rainfall in northern Australia was largely split between unusually heavy falls in the north west, the Northern Territory and most of central Australia, and below average rainfall across most of Queensland (Figure 1, page 2). Most tropical areas west of the Northern Territory-Queensland border saw October to April rainfall which was in the top 20% of records or higher, with record heavy falls near the Kimberley region of Western Australia. In contrast, Queensland rainfall was patchy and mostly average to below average. Above average falls were mainly limited to the central Queensland coast, which was affected by Severe Tropical Cyclone *Debbie* in March.

The anomalies of the past wet season are similar to those seen in recent years. As a result, there are large multi-year rainfall deficiencies across much

DEFINITIONS

Bushfire potential: The chance of a fire or number of fires occurring of such size, complexity or other impact (such as biodiversity or global emissions) that requires resources (from both a pre-emptive management and suppression capability) beyond the area in which it or they originate. Fire potential depends on many factors including weather and climate, fuel abundance and availability, recent fire history and firefighting resources available in an area.

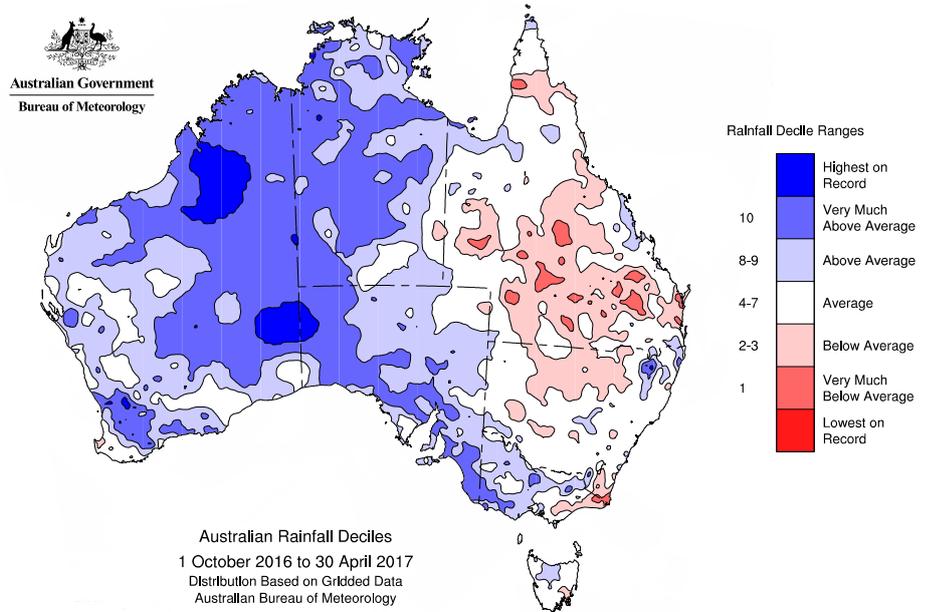
Rainfall decile: A decile is a statistical technique that ranks sorted observations into 10 equal groups. A decile rainfall map will show whether the rainfall is above average, average or below average for the chosen time period and area.

IBRA: Interim Biogeographic Regionalisation for Australia. Australia's landscapes are divided into 89 large geographically distinct bioregions based on common climate, geology, landform, native vegetation and species information.

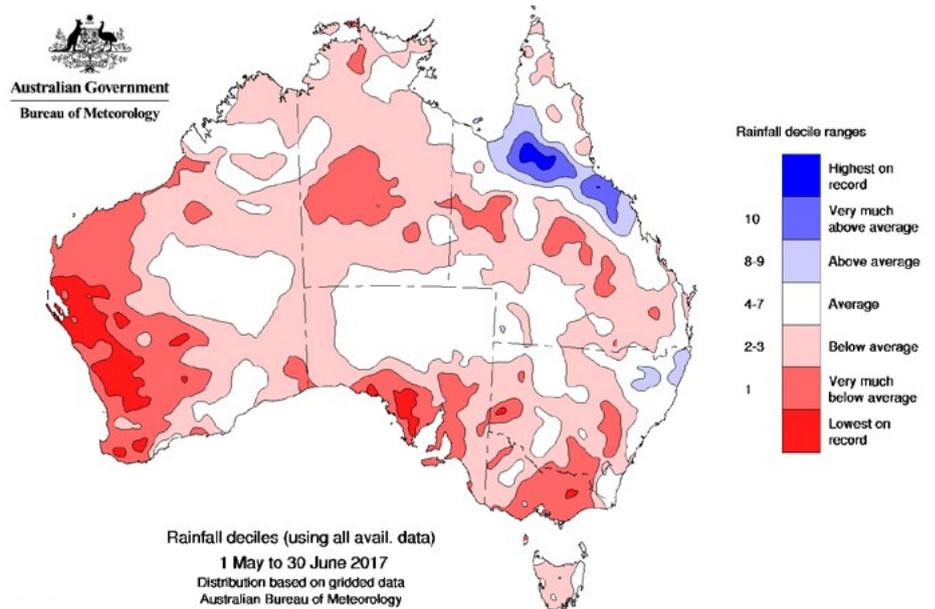
of northern and central Queensland, extending to near the New South Wales border. In contrast, virtually all of north west Australia has seen unusually wet conditions over the last three to four years. These very long-term rainfall patterns influence fuels in the region, which tend to be heavier where rainfall is above average and lighter where rainfall is below average.

Climate change and the associated long-term warming trend means that seasonal temperatures are now mostly above average. The rise in temperature has been associated with a general increase in fire season severity across Australia. After a record-warm northern wet season in 2015/16 (+1.3°C above the 1961-1990 average), the temperatures for 2016/17 were closer to average with an anomaly of +0.3°C. The pattern of seasonal temperature in northern Australia broadly followed that of rainfall, with near to slightly below average temperatures in the inland north west, where rainfall was heavy, while parts of Queensland experienced above average to locally record warm temperatures.

The start of the 2017 dry season (May and June) has seen the return of low rainfall as is expected for the time of year.



▲ **Figure 1:** RAINFALL DECILES FOR 1 OCTOBER 2016 TO 30 APRIL 2017.



▲ **Figure 2:** RAINFALL DECILES FOR 1 MAY TO 30 JUNE 2017.

May and June have been somewhat drier, with the exception of some northern and coastal regions of Queensland (Figure 2, above), and warmer than average across most of northern Australia. As a result, vegetation has rapidly dried, with little greenness left.

CLIMATE OUTLOOK

The tropical Pacific Ocean is currently ENSO neutral. All major climate models indicate it is likely to remain ENSO neutral for the remainder of 2017. This means the Bureau of Meteorology's ENSO Outlook is currently INACTIVE, with neither El Niño nor La Niña expected to influence

Australia's climate this year. The influence of the Pacific Ocean on Australian climate for the remainder of the northern fire season is expected to be minor.

In the tropical Indian Ocean, the IOD is currently neutral, with no sign of either negative IOD or positive IOD present in the ocean or atmosphere. However, some climate models suggest a positive IOD could develop in the coming months. Positive IOD events are typically associated with below average winter and spring rainfall over much of Australia. This includes central Australia and most of northern Australia, apart from WA, which is consistent with the seasonal outlooks

described for each state and territory. Overall, the Bureau's forecast suggests that the start to the 2017/18 wet season is likely to be near average, though some parts of north west WA and Queensland slightly favour an earlier start.

The July to September period is normally dry for northern Australia, with low rainfall except near the tropical Queensland coast. This means that the impact of rainfall in the coming months, even if it is above average, will tend to be quite modest. The probability of above-median rainfall is generally in the range of 40 to 60% in tropical and subtropical areas, indicating little shift away from seasonal average conditions (Figure 3, right). The northern areas as a whole slightly favour above average rainfall, while in some southern areas probabilities tend to favour below average rainfall. The lack of a strong rainfall signal reflects a relative lack of influence by the Pacific and Indian Oceans, where climate conditions remain neutral. Historical outlook accuracy for July to September is moderate over most of northern Australia, except around the border of Western Australia and the Northern Territory, and areas surrounding the Gulf of Carpentaria, where accuracy is low.

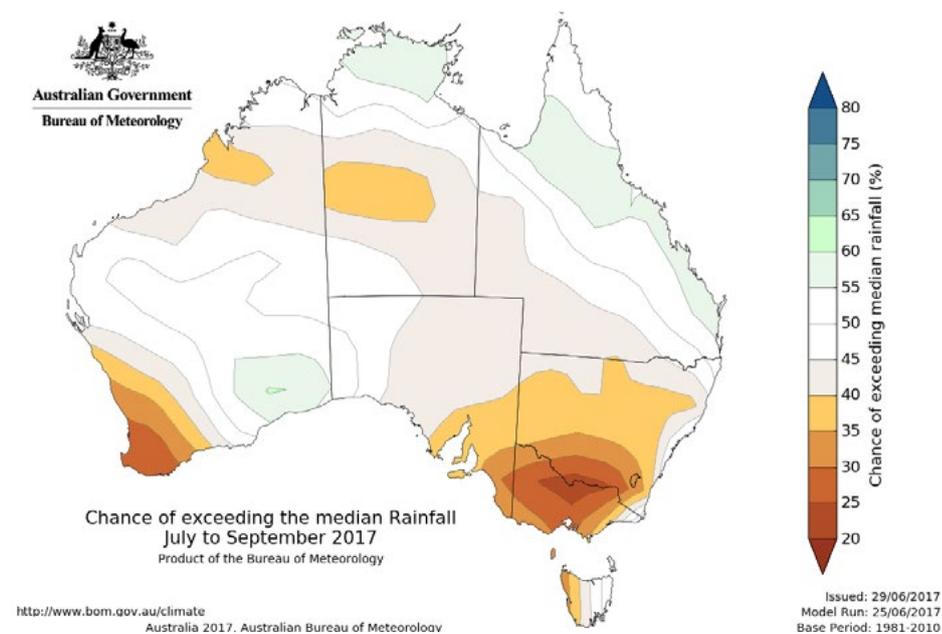
July to September is likely to bring above average maximum temperatures to the tropics, with probabilities generally in the range of 60 to 80% (Figure 4, page 4). This suggests that recent warmer than average conditions are likely to continue through the remainder of the fire season. The overall pattern is similar for minimum temperatures, with the probability of above average minimum temperatures typically in the range of 80% or higher near the tropical coast, dropping to near 60% inland. Maximum temperature accuracy is moderate to high over most of Australia for this time of year. Minimum temperature accuracy is moderate over the northern half of Australia for this time of year.

The climatic conditions and the climate outlook overall presents quite mixed signals for the fire season. For this reason, the state and amount of available fuels is the best guide to the fire season in many parts.

REGIONAL SUMMARIES

NORTHERN QUEENSLAND

The bushfire season across northern Queensland is primarily influenced by geographic location, the relationship between climate and vegetation, and



▲ **Figure 3:** THE PROBABILITY OF EXCEEDING THE MEDIAN RAINFALL, JULY TO SEPTEMBER 2017.

long-term, seasonal and short-term climatic, conditions. The 2016/17 wet season comprised of mainly storm rain in western shires, with the main wet season monsoonal activity restricted to the Gulf of Carpentaria, Cape York and eastern coastal areas south of Bowen. Western local authority areas of Mount Isa, Cloncurry, Boulia, Diamantina, Winton, Barcoo and Longreach received significant dry season (winter) rain in 2016, producing high pasture growth. However, low levels of wet season rain (summer) and heatwave conditions resulted in this fuel being 80% to 90% cured by April 2017.

Following three years of drought, much of western and central Queensland has been destocked. This year's rain has led to increased fuel loads in some of these areas. However, due to both the high price and shortage of store cattle, these areas remain either destocked or only lightly stocked. This has created higher than normal fuel loads that will carry into this northern Queensland fire season.

Severe Tropical Cyclone *Marcia* in February 2015, followed by Severe Tropical Cyclone *Debbie* in March 2017, caused significant damage to coastal vegetation south of Bowen. Very strong winds stripped leaves from the canopy, increasing the fine fuel loads and changing the structure of the vegetation.

These changes to the fuel persist and there remains an increased fire risk in this area. QFES staff from northern and central regions are coordinating risk identification and hazard mitigation activities to address

the increased risk. This work will prove valuable to decision makers for the fire season. As a result of this, further work is being undertaken in preparation.

Drought declarations are still in force in 32 local government areas, with a further three under partial drought declaration.

In collaboration with other fire and land management agencies, the Carpentaria Land Council Aboriginal Corporation and landowners, the bushfire potential for the fire season has been assessed as follows:

- Above normal fire potential is expected in the coastal ranges from Gladstone, to north of Bowen.
- High fuel loading in Cape York has resulted in above normal fire potential in areas not subject to early season hazard mitigation burning.
- Parts of Etheridge and Croydon shires received good summer rain and consequently have high fuel loads. Due to reduced livestock numbers the high fuel loads will persist into the fire season.
- Woodlands and grasslands around the Mount Isa region, Boulia east to Julia Creek, north to Normanton and west to near the Northern Territory border have above normal fire potential.
- Normal fire potential is predicted for all other areas north of latitude S25°. Regions of south east and western Queensland south of latitude S25° will be assessed for the *Southern Australia Seasonal Bushfire Outlook 2017*, to be published in September.

NORTHERN TERRITORY

Substantial rainfall recorded across the Northern Territory in September 2016 eased the threat to landholders to respond to late season bushfires last fire season. Rainfall has since varied in quantity, extent and timing, though all regions have received at least the average rainfall.

This has resulted in strong fuel growth in varying quantities across the Territory. Pasture conditions have also been observed to be of high quality.

Significant mitigation burns across the Territory have been conducted by agencies, landholders and carbon farming projects. These have provided good results, minimising the potential for fire risk later in the year. Finer scale burning close to populated areas was restricted due to the lengthy wet season. This, in conjunction with the delayed curing of gamba grass, had a negative effect on fire management.

Central regions

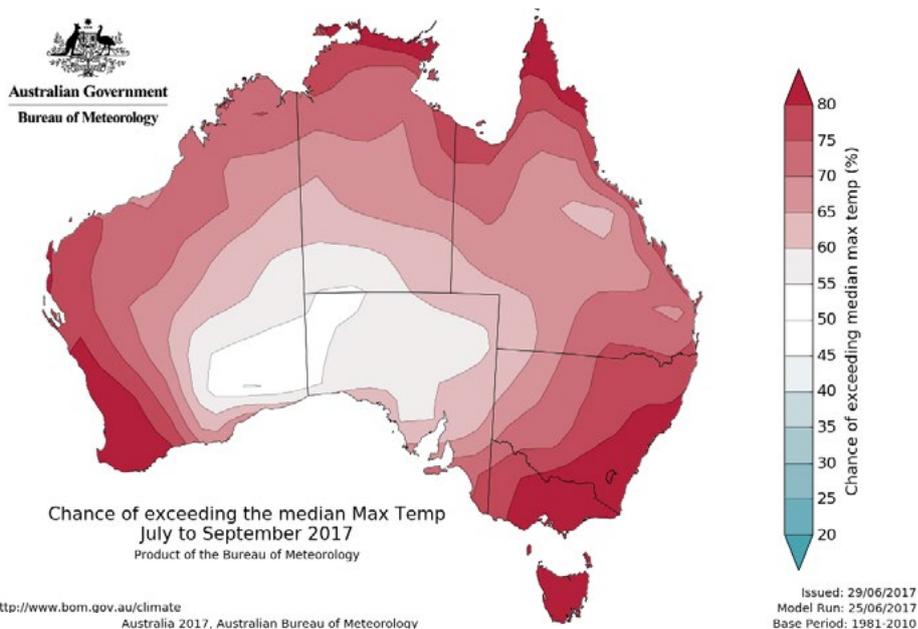
Above average rainfall over the past two years throughout much of central Australia has contributed to increased fuel loads. Areas of high buffel grass distribution have significantly increased the bushfire risk due to the high rainfall, particularly within drainage areas and water courses.

The effectiveness of mitigation efforts has varied depending on land tenure. Landscape scale aerial prescribed burning was trialed within the MacDonal and Burt Plains regions on pastoral estates, but had limited success due to minimal weather opportunities and landowner take-up. Mitigation efforts within the Tanami region have been widely successful.

Top End (excluding areas prevalent with gamba grass)

Consistent and regular rain fell from November through to April across all regions north of the 20th parallel.

The significant rainfall promoted good



▲ Figure 4: THE PROBABILITY OF EXCEEDING THE MEDIA MAXIMUM TEMPERATURE, JULY TO SEPTEMBER 2017.

grass growth, with fuel loads reported as high and needing to be assessed and managed by landholders to minimise threats. Overall the west of the Territory has cured earlier than the east. Mitigation efforts have varied depending on tenure, land value or management objectives of landholders. Where burning has taken place, good results have been achieved. Burning continues in many eastern regions.

Gamba grass prevalent area

Gamba grass continues to spread across the Top End, increasing fuel loads and changing fire management practices on new properties each year. While the September 2016 rain provided welcome relief, it also provided an additional germination period on areas that had been burnt in 2016, providing additional fuel for the 2017 fire season

The retention of above average soil moistures through to April have hampered on-ground mitigation programs, and the onset of strong winds have had an impact

on the ability to undertake aerial mitigation prescribed burning. Where burning has taken place, good results have been achieved. Early strong winds, combined with wet conditions, have led to difficulties in containing and controlling early season management practices.

NORTHERN WESTERN AUSTRALIA

A very much above average wet season across northern Western Australia has resulted in significant pasture growth and delayed curing for parts of the Kimberley, the southern half of the Pilbara and the central Gascoyne.

Taking into consideration the recent weather, fires both planned and unplanned over the past wet and dry seasons, and the amount of available fuels, above normal fire potential is expected in parts of the Ord Victoria Plain and Dampierland Regions of the Kimberley. These conditions have also led to above normal fire potential across the southern half of the Pilbara and central parts of the Gascoyne Regions.

The Bushfire and Natural Hazards CRC is a national research centre funded by the Australian Government Cooperative Research Centre Program. It was formed in 2013 for an eight-year program to undertake end-user focused research for Australia and New Zealand.

Hazard Notes are prepared from available research at the time of publication to encourage discussion and debate. The contents of *Hazard Notes* do not necessarily represent the views, policies, practises or positions of any of the individual agencies or organisations who are stakeholders of the Bushfire and Natural Hazards CRC.

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