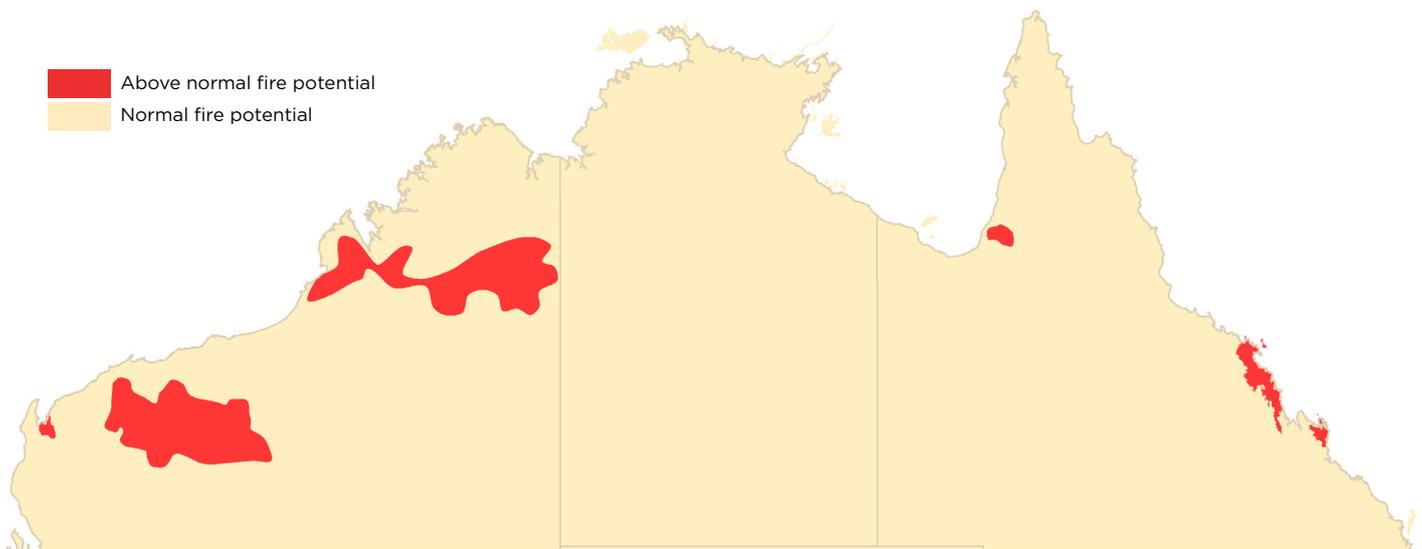


NORTHERN AUSTRALIA SEASONAL BUSHFIRE OUTLOOK 2018



▲ 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 published 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 vegetation (fuel) volumes and growth. They also affect the timing of the drying of the vegetation.

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, 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 Australian Fire Managers' Forum, chaired by the Bushfire and Natural Hazards CRC, met in Townsville, Queensland, in June. This year marked the 20th anniversary of the forum, which gathers fire managers over three days from a range of public and private organisations from across northern Australia. 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/events/2018-nafm.

Forum attendees included representatives of the Queensland Fire and Emergency Services, Queensland Parks and Wildlife Service, Bushfires NT, WA Department of Fire and Emergency Services, WA Department of Biodiversity, Conservation and Attractions, NSW Rural Fire Service, the Department of Defence, the Bureau of Meteorology, the Australian Institute for Disaster Resilience, Charles Darwin University and the Australian Wildlife Conservancy.

ANTECEDENT CONDITIONS

The past 12 months has seen Australia

dominated by record warm daytime (maximum) temperatures, with highly variable rainfall. The months of October, November, January and March delivered widespread above average rainfall to tropical Australia, while September, December, April and May saw most areas experience average to below average rainfall.

The second half of 2017 saw the development of a weak La Niña in the Pacific Ocean, which peaked early in 2018 before rapidly declining. The overall impact of the La Niña on Australia's climate was modest, with intra-seasonal (month-to-month) variability tending to dominate rainfall patterns. This intra-seasonal variability led to near average northern wet season rainfall overall (October 2017 to April 2018), tending towards above average in the far north west, Top End and Gulf of Carpentaria, and below average in parts of inland Queensland (Figure 1, page 2).

The anomalies of the past wet season, with wetter conditions in the west, tending to drier in parts of Queensland, has been repeated in recent years. As a result, there are now large multi-year rainfall deficiencies across most of Queensland, extending south

DEFINITIONS

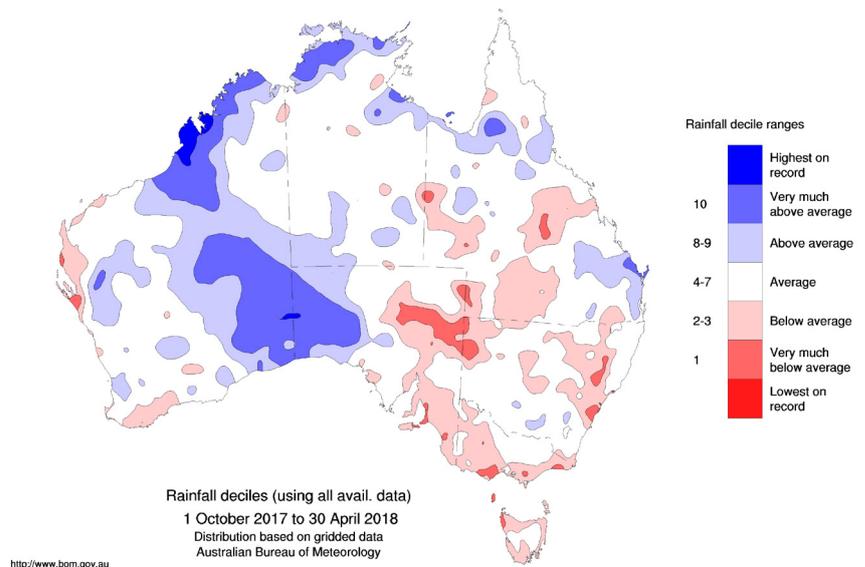
Bushfire potential: The chance of a fire or number of fires occurring of such size, complexity or other impact (such as biodiversity or global emissions) that requires resources (from both a pre-emptive management and suppression capability) beyond the area in which it or they originate. Fire potential 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.

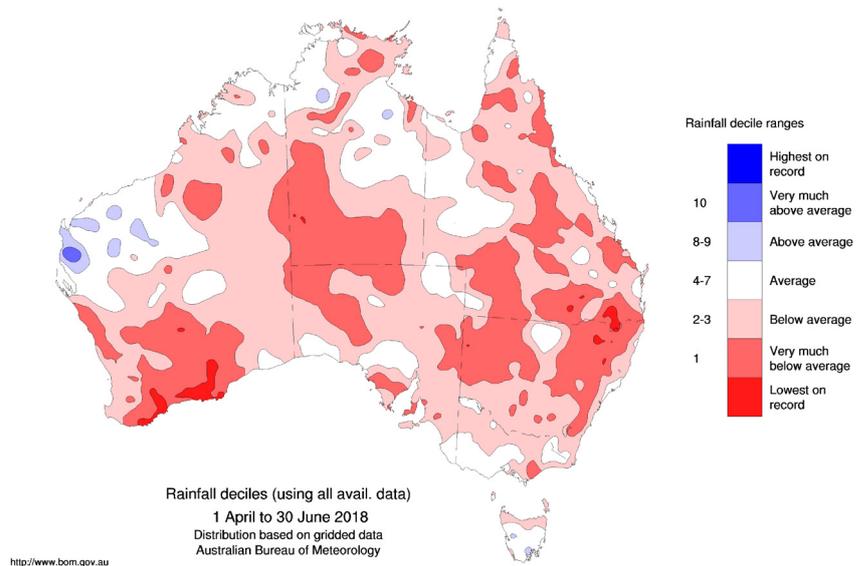
IBRA: Interim Biogeographic Regionalisation for Australia. Australia's landscapes are divided into 89 large geographically distinct bioregions based on common climate, geology, landform, native vegetation and species information.

into New South Wales. In contrast, nearly all of north west Australia has seen above average rainfall conditions over the past four to five years. These very long-term rainfall patterns influence vegetation growth in the region, which tends to be heavier where rainfall is above average and lighter where rainfall is below normal.

Australian temperatures continue to warm in-line with global trends, rising by 1.1°C since 1910. The past 12 months (July 2017 to June 2018) was the second warmest on record for Australian mean temperatures, with an anomaly of +1.09°C (compared to the 1961-90 average), while maximum temperatures were the warmest on record with an anomaly of +1.46°C. One consequence of the rising temperatures is an increase in fire season severity, particularly during the dry season in northern Australia and the warm season in southern Australia. As measured by fire weather indices, northern Australia saw unusually severe fire weather conditions in 2017, with indices showing the second most severe fire weather season since 1950, behind the severely drought-affected 2002.



▲ Figure 1: RAINFALL DECILES FOR 1 OCTOBER 2017 TO 30 APRIL 2018.



▲ Figure 2: RAINFALL DECILES FOR APRIL TO JUNE 2018 SHOWING DRY CONDITIONS OVER MOST OF AUSTRALIA.

The dry season in tropical Australia officially commences in May and ends in September. Significant rainfall is uncommon, with the climate dominated by warm to hot temperatures, lower humidity and east to south east winds which may become gusty and elevate fire risk. Australia's climate turned sharply drier in April 2018, with low rainfall conditions becoming established in the north a month earlier than is normal (Figure 2, above). Temperatures during this period have also been warmer than average across nearly all of Australia. As a result, vegetation has rapidly dried, with little greenness left in the tropical region. The combination of weather and climate factors means the fire season is now well underway,

as is expected for the time of year.

CLIMATE OUTLOOK

The El Niño–Southern Oscillation remains neutral. However, climate model outlooks and recent warming in the tropical Pacific Ocean mean there is a greater than usual chance of an El Niño forming later this year. The Bureau's El Niño–Southern Oscillation Outlook is currently at El Niño WATCH, which means the likelihood of El Niño forming in 2018 is approximately 50%, or about double the normal chance.

Most international climate models surveyed by the Bureau suggest more warming is likely in sea surface temperatures, with a majority indicating

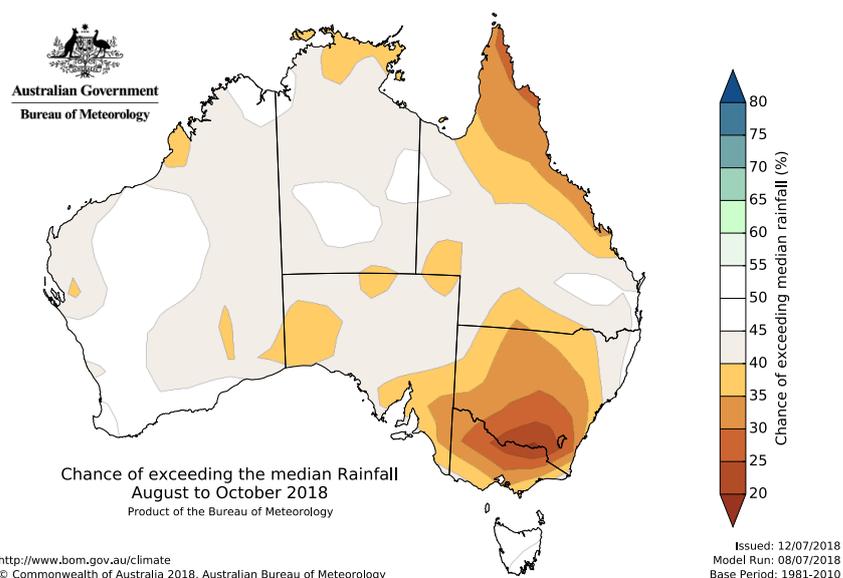
this warming will reach El Niño levels in the southern hemisphere spring. Historically, El Niño is associated with reduced rainfall in northern and eastern Australia during winter and spring. With dry conditions in place, this combination means that fire weather conditions are likely to be challenging and elevated compared to normal.

Overall, the Bureau's forecast suggests that the start to the 2018/19 wet season is likely to be near average, though some parts of Queensland slightly favour a late start. The outlook for the coming wet season will be updated monthly as data and model forecasts become available.

The probability of above-median rainfall is generally in the range of 30-50% in tropical and subtropical areas, with below average conditions tending to be favoured (Figure 3, above right). The tendency for below average rainfall to be favoured is consistent with the Pacific Ocean showing conditions that may lead to the development of El Niño. Historical outlook accuracy for August to October is moderate over most of northern Australia, except for the interior of Western Australia, where accuracy is low. The August to October period is normally dry during the first two months for northern Australia, with typically low rainfall except near the tropical Queensland coast. Rain may begin to become more widespread during October. This means that the impact of rainfall in the coming months, even if it is above average, will tend to be quite modest.

August to October is likely to bring above average maximum temperatures to tropical parts of the country, with probabilities generally in the range of 60-80% (Figure 4, page 4). This suggests that recent warmer than average conditions are likely to continue through the remainder of the dry season. The pattern is similar for minimum temperatures, with the probability of above median typically in the range of 60-75%, except near Cape York where probabilities are closer to 50%. Maximum temperature accuracy is moderate to high over most of northern Australia for this time of year, except the southern Northern Territory and parts of northern Western Australia, where accuracy is low. Minimum temperature accuracy is moderate to high over the northern half of Australia.

The climatic conditions and outlooks generally present a consistent picture, with



▲ Figure 3: CHANCE OF EXCEEDING THE MEDIAN RAINFALL FOR AUGUST TO OCTOBER 2018.

recent unusually warm and dry conditions likely to continue for many areas.

REGIONAL SUMMARIES

NORTHERN QUEENSLAND

The early part of the northern Queensland wet season saw average rainfall. This changed in March, with well above average rainfall across the Gulf Country, Northern Goldfields, North Tropical Coast, and the Herbert and Lower Burdekin. As a result, grass fuel loads as compared to the long-term average are variable across the north. Cape York and areas east of Georgetown have below average grass fuel loads, while west of Georgetown grass fuel loads are around average. Around Normanton and to the north along the western part of Cape York, grass fuel loads are very much above average. Areas that received above average rainfall in March have grass fuel loads that are greener than average for this time of year. Drought declarations are still in force in 23 local government areas, with a further four under partial drought declaration.

Soil moisture is generally close to the long-term average, except for areas inland from Proserpine, Collinsville, Mackay and south to Rockhampton, where soil moisture is below average.

As noted in both the 2016 and 2017 *Northern Australia Seasonal Bushfire Outlooks* (Hazard Notes 18 and 36), 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. The increased fire potential in the areas impacted by *Marcia* led to the creation of a strategic mitigation plan. This plan has been implemented and the risk has largely been mitigated. A similar program was undertaken in the central region following *Debbie*, and to date these activities have mitigated the risk in parts. Ongoing hazard mitigation activities will continue to reduce the risk in cyclone-damaged vegetation, but there remains an increased fire risk in these areas.

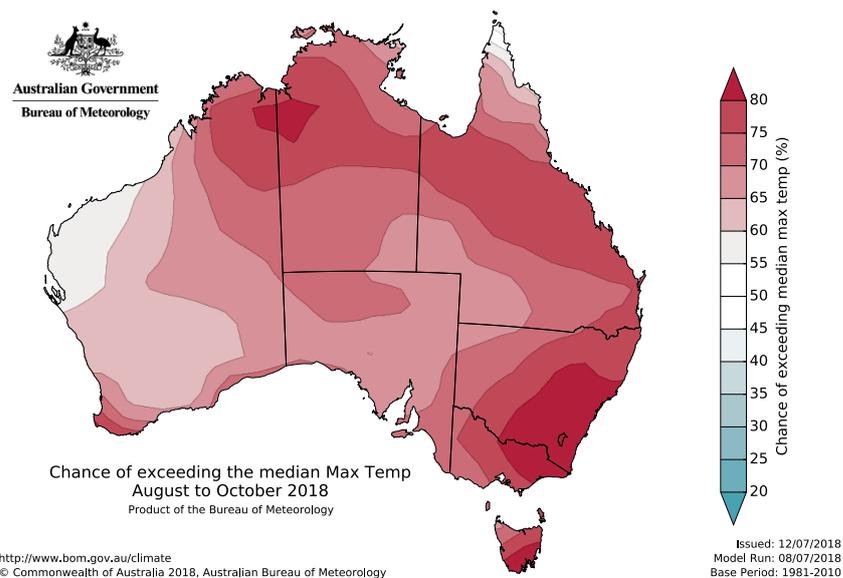
Above normal fire potential is expected for these forested areas along the Central Coast, Whitsundays and the Capricornia. Woodland areas, the savanna country around Normanton and to the north are expected to have normal fire potential, with the exception of a small area in the south west of Cape York, where above normal fire potential is predicted.

Normal fire potential is expected 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 2018*, to be published in September.

NORTHERN TERRITORY

The Top End wet season commenced in November 2017, generally easing the threat to landholders of late season bushfires. Rainfall has since varied in quantity, extent, and timing, resulting in inconsistent rainfall. Some areas around the Victoria River district recorded totals below the season average, with the rain finishing relatively early in the wet season.

The effectiveness of mitigation burns across the Northern Territory have varied due to the differing conditions experienced during the wet season. Where planned burns have been undertaken by agencies and landholders, including carbon farming projects, good results have been achieved to minimise the risk of bushfires occurring later in the year. Finer scale burning has been restricted close to populated areas in locations where above average rainfall occurred. This was due to high soil moisture retention that prevented access to undertake broader planned burning. In addition, the delayed curing of gamba grass meant that mitigation burns in areas infected were delayed. These mitigation burns will continue to be completed when conditions allow.



▲ Figure 4: CHANCE OF EXCEEDING THE MEDIAN MAXIMUM TEMPERATURE FOR AUGUST TO OCTOBER 2018.

Central regions

Large areas of central Australia have received high amounts of rain over the past two years, which has increased the fuel loads. In particular, the Lasseter region has observed above average rainfall that has led to good grass growth. Large areas with a high distribution of buffel grass have an increasing bushfire risk due to this strong growth, particularly within road reserves, drainage areas and water courses. Although fuel loads are increasing, grazing and planned burning efforts suggest that normal bushfire conditions can be expected.

The effectiveness of mitigation efforts has varied depending on land tenure. Landscape scale aerial burning is occurring throughout most Aboriginal Land Trusts. Mitigation efforts within the Tanami region have been widely successful and this has reduced the overall bushfire risk to that region.

Top End region

Inconsistent rainfall across the wet season has led to average levels of fuel loads across the region. The dry end to the wet season allowed for earlier access to country in some locations for mitigation purposes. Curing has been mostly consistent across the Top

End except for areas that received below average rainfall, including the Victoria River district, which resulted in earlier than normal curing. As a result of the dry conditions, these regions had reduced mitigation works. Grass fuels have been retained for primary production by landowners.

Gamba grass prevalent area

Gamba grass continues to spread to new locations across the north west Top End, increasing fuel loads and changing fire management practices on properties. Mitigation efforts have varied depending on tenure, land value or the management objectives of landholders. Soil moisture has been above average since April, which has restricted on ground mitigation programs in some areas. The onset of strong winds has impacted aerial mitigation works. Where burning has taken place, good results have been achieved, with mitigation works in in the Darwin Coastal and Daly Basin regions continuing as weather permits.

NORTHERN WESTERN AUSTRALIA

Northern Western Australia has experienced

its third wettest wet season on record.

This above average rainfall has resulted in higher than average soil moisture for most of the Dampierland, parts of the Great Sandy Desert and the northern Kimberley. Above average June rain over the north west of Western Australia has alleviated soil moisture deficiencies in the coastal south east of the Pilbara and north eastern Gascoyne. However, June rainfall was below average in the Kimberley.

Cooler and wetter wet season conditions have resulted in the accumulation of higher than average grass fuel loads. This has contributed to above normal fire potential for the Dampierland and parts of the Pilbara and Carnarvon regions. The central Kimberley and Ord Victoria Plain received less rainfall and have cured earlier, with the areas not subjected to prescribed burning classified as above normal fire potential.

For other areas of northern Western Australia, normal and reduced fuel loads through wet season fires, grazing and prescribed burning efforts suggest that normal bushfire conditions can be expected.

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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