HAZARD NOTE

bushfire&natural HAZARDSCRC

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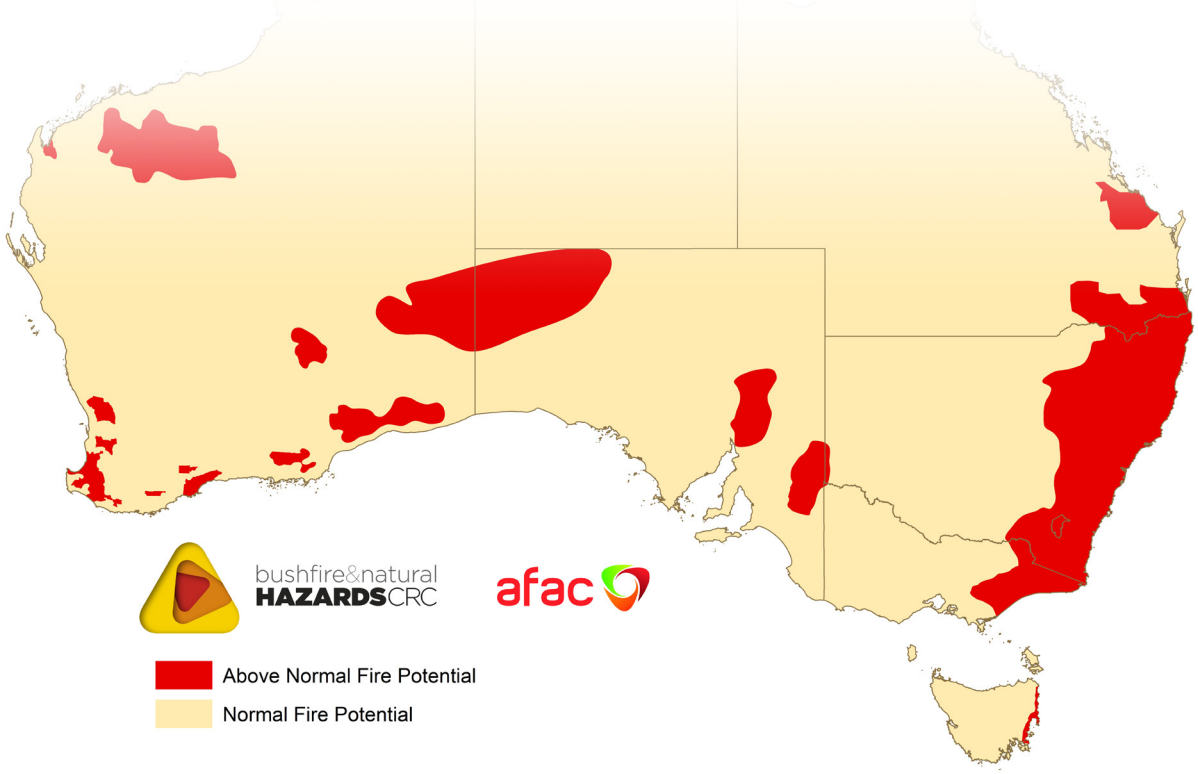
TOPICS IN THIS EDITION | FIRE IMPACTS | FIRE SEVERITY | FIRE WEATHER

SOUTHERN AUSTRALIA SEASONAL BUSHFIRE OUTLOOK 2018-19: NOVEMBER



▲ Above: AREAS BASED ON INTERIM BIOGEOGRAPHIC REGIONALISATION FOR AUSTRALIA AND OTHER GEOGRAPHICAL FEATURES.

OVERVIEW

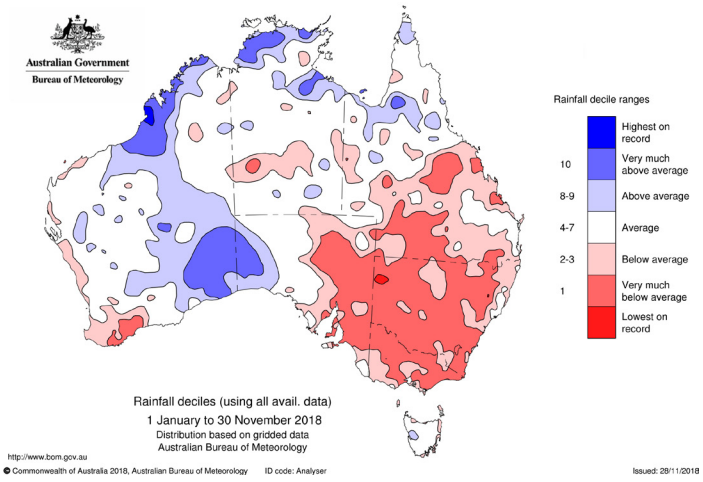
Above normal fire potential remains across large parts of southern Australia, as first identified in September's *Southern Australia Seasonal Bushfire Outlook 2018 (Hazard Note 51)*. Rain in areas of eastern Australia during spring, while welcome, was not enough to recover from the long-term dry conditions. Wet conditions currently being experienced across coastal New South Wales will help, but it will not take long once heat and dry conditions return for vegetation to dry out. For example, the April-to-November period has seen Queensland record the ninth driest and fourth hottest period on record, New South Wales the eighth driest and fourth hottest period on record, and Victoria the 13th driest and seventh hottest period on record. These conditions have resulted in the expectation of above normal fire potential across large parts of Queensland, New South Wales, the ACT, Victoria, Tasmania, South Australia and Western Australia.

ANTECEDENT CONDITIONS

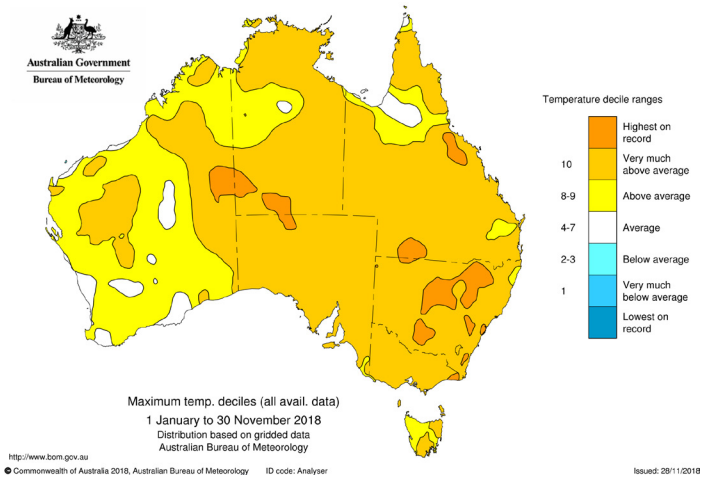
The year-to-date has been unusually warm and dry for large parts of southern and eastern Australia (Figure 1, page 2). The focus of the dry conditions has been New South Wales, where almost the entire state has experienced rainfall in the lowest decile (driest 10% of recordings). This represents serious to severe rainfall deficiencies. Rainfall deficiencies also affect most of northern and eastern Victoria, parts of southern and central Queensland, eastern South Australia and southern Western Australia. Across southern Australia above average rainfall is limited to the arid regions of western South Australia and adjacent parts of Western Australia, as well as small parts of western Tasmania.

In some contrast, October and November have seen near average rainfall at many locations. This rain has not been sufficient to remove the large negative rainfall anomalies which accumulated earlier in the year; it will take a number of months of above average rainfall to remove the deficiencies, meaning that general landscape dryness is likely to persist for many areas for some months.

The warming trend means that above average temperatures now tend to occur in most years, and 2018 has followed this pattern. Temperatures in Australia for the year-to-date have been very much warmer than average, with 2018 likely to finish amongst Australia's 10 warmest years on record. The overall mean temperature for January to November is currently tracking third-warmest on record for Australia (0.95 °C above the 1961–1990 average, Figure 2, page 2). Maximum temperatures have been particularly warm, tracking second-warmest on record for January to November (1.35 °C above average).



▲ Figure 1: PRELIMINARY JANUARY TO NOVEMBER 2018 RAINFALL DECILES.



▲ Figure 2: PRELIMINARY JANUARY TO NOVEMBER 2018 MAXIMUM TEMPERATURE DECILES.

These high temperatures add to the impact of reduced rainfall and increase evaporation further drying vegetation.

As might be expected given the broad climatic factors, spring saw elevated fire danger for much of Australia, with several significant bushfires. The dry landscape means that any warm windy conditions are likely to see elevated fire risk. Countering the climate signal, poor growth of grass and annual plants means that vegetation loads are reduced in drought-affected areas. Recent rainfall has not been significant enough to drastically change the vegetation (fuel) loads, with many southern and eastern areas already cured or carrying little grass growth.

Fire season severity is increasing across southern Australia as measured by annual indices of the Forest Fire Danger Index (FFDI). The increases are tending to be greatest in inland eastern Australia and coastal Western Australia. For example, the Victorian annual FFDI has increased by about 50% since 1950, with particularly high values during the severe fire seasons of 2002/03, 2006/07, 2008/09 and 2015/16. The increases reflect rising temperatures and below average rainfall during the cool season (April to October).

Ocean temperatures in the tropical Pacific now exceed El Niño thresholds, but tropical winds, cloudiness, air pressure and broadscale patterns of rainfall are yet to reach El Niño levels, suggesting that the ocean and atmosphere are not yet coupled (i.e., yet to have formed a feedback). Coupling is required to drive widespread global and Australian impacts. As a result, the Bureau of Meteorology's El Niño-Southern Oscillation Outlook remains at El Niño ALERT. El Niño ALERT means there is approximately a 70% chance of El Niño forming in 2018; about triple the normal chance. International models suggest that ocean conditions are likely to remain above El Niño thresholds for the coming months, suggesting that coupling will occur late in the year. El Niño impacts in Australia over summer typically include higher fire risk, a greater chance of heatwaves and fewer tropical cyclones.

A positive Indian Ocean Dipole (IOD) has affected Australia in 2018, acting to reduce rainfall. However, climate model outlooks suggest it will decay by early summer, consistent with its natural decay cycle. A positive IOD during spring typically increases the chance of below average rainfall for southern and central Australia, and has been linked to higher summer fire danger in southern Australia. The IOD typically has little direct influence on Australian climate from December to April.

CLIMATE OUTLOOK

The climate outlook for the coming three months of summer is mainly influenced by the Pacific and Indian Oceans, together with other factors including long-term trends.

The outlook for summer rainfall (Figure 3, page 3) shows a mixed signal across Australia. The expected decline in the positive IOD by early December, and a forecast for high pressure systems to be further south than usual in the Tasman Sea, means that probabilities in south eastern Australia generally sit near 50%. Below average rainfall is favoured in tropical Australia, and particularly so in north eastern parts. Most of Queensland has above median rainfall probability of in the range of 25-40%. Historical outlook accuracy for December to February is moderate across western and northern Australia. Elsewhere, accuracy is low to very low.

The outlook for summer maximum temperatures favours above average daytime temperatures for nearly all of Australia. Probabilities are particularly high in northern and western areas where they widely exceed 80%. Probabilities in the south are typically in the range of 60-80% (Figure 4, page 4). The outlook for minimum temperatures (not shown) is similar to that for maximum temperatures, with above average temperatures favoured across almost all of Australia and probabilities widely above 80% in the tropics. Historical accuracy for December to February maximum temperatures is moderate across most of Australia, but low in the eastern Northern Territory, western Queensland, and southern South Australia. Minimum temperature accuracy is moderate for most of Australia, except the central Northern Territory, central to northern parts of Queensland, and along the South Australia eastern border, where accuracy is low to very low.

Updates to climate forecasts and the outlook for the IOD and the El Niño-Southern Oscillation will continue to be published at www.bom.gov.au/climate/ahead.

DEFINITION

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.

REGIONAL SUMMARIES

QUEENSLAND

Below average rainfall and above average temperatures have been experienced across much of the state in 2018, with similar conditions forecast for the coming months. With Queensland currently experiencing severe bushfires in several locations, above normal fire potential is expected to continue until substantial rainfall is received. This above normal fire potential takes in the areas identified in September's *Southern Australia Seasonal Bushfire Outlook 2018* – south east Queensland and the Coral Coast north to Capricornia.

NEW SOUTH WALES

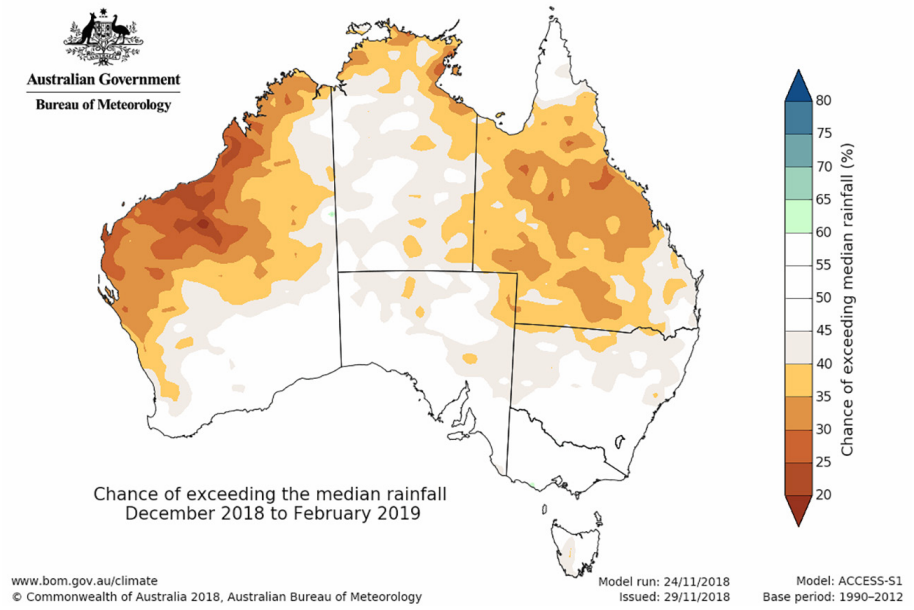
The potential for above normal fire activity in forested areas remains along the NSW coast and to the west of the divide. In the west, this is due to the continuation of prolonged rainfall deficits and the likelihood of warmer than average temperatures.

Rain in coastal areas during spring saw soil moistures recover to average levels, however this benefit is expected to be short-lived due to predicted warmer than average temperatures over summer. For this reason the east coast of NSW has above normal fire potential, as first identified in September in the *Southern Australia Seasonal Bushfire Outlook 2018*. The fire potential will be highest in mid-to-late summer.

There has been some spring growth in grasslands west of the divide, however vegetation (fuel) loads continue to remain at or below average levels. Curing rates in grasslands are expected to increase with the onset of hot dry conditions over coming months. Fire potential in these areas is expected to be normal.

ACT

Although the ACT has received some useful rain over the last month, a high level of drought remains for this time of year. Recent benign conditions have reflected a pool of warm sea surface temperatures in the Tasman Sea, which has favoured the development of rain-bearing low pressure cells near south east Australia. It is not expected that this situation will persist and, under the influence of El Niño and the IOD, warmer weather and a dry landscape should characterise the season ahead. ACT grasslands have shown poor growth over spring, and it is expected that curing will rise quickly when hot weather returns. Bureau of Meteorology hydrological modelling, drought indices and stream flow data all indicate a significant water deficit. This causes high availability of fine forest fuels, as seen in recent fire activity. The latest climate outlook suggests both above average temperatures and around average rainfalls – insufficient to relieve the current drought level. It is expected that above normal fire potential will continue in the ACT, along with the continued occurrence of heat and dust, which will contribute to a challenging summer and reinforce the need for the community to be fully prepared.



▲ Figure 3: THE OUTLOOK FOR SUMMER (DECEMBER TO FEBRUARY) RAINFALL.

VICTORIA

Much of East Gippsland has experienced two consecutive years of record low rainfall during autumn, winter, and below average rainfall in spring. As a result, forests are significantly more flammable than normal due to an increase in dead material in the near surface and elevated fuels. Unusually early bushfire activity occurred in East Gippsland during July and August, highlighting the severe level of dryness in forests. These dry conditions are likely to be exacerbated during summer with the climate outlook for average rainfall and above average temperatures resulting in above normal evaporation rates. These areas can expect above normal fire potential this season, as first identified in September in the *Southern Australia Seasonal Bushfire Outlook 2018*. Further north, the Great Divide and Alpine regions experienced above average snowfall, but the current seasonal streamflow forecast indicates below average stream flows are likely for summer. As a result, normal bushfire potential is expected across these regions. In the west and central regions, normal bushfire potential is also expected as infrequent rain has kept soil moisture within the range commonly experienced during spring. There is uncertainty around how much dryness may carry over from previous seasons, as well as how quickly warm and dry conditions expected in summer may increase flammability in forests. The far South West region, extending to the Barwon Otway region, experienced above average rainfall in July, which has led to saturation in the soil moisture profile. August to October was drier than normal in these areas, and November close to average. The timing and severity of grass fires will depend strongly on patterns of wind and relative humidity during summer, and as a result, a normal fire season is expected in these areas. North and north western Victoria have experienced below average rainfall this year, resulting in reduced cropping activity and pasture growth. These areas are likely to experience a normal fire season. It should be noted that due to the uncertainties in the longer-term climate outlook, areas of normal fire potential may still experience unpredicted severe bushfire activity during late summer.

TASMANIA

The fire season has commenced in the east and south of the state. However recent rains have eased the strong drying trend seen during late winter and spring. As a result, the majority of Tasmania has fuel moisture levels close to normal for early summer, apart from King Island, Circular Head and the far south east.

Only a relatively short drying period is needed to return the eastern coastal strip to dangerously dry conditions, and so the strip between Dunalley and St Helens is now regarded as having above normal fire potential. This area has extended south since September's *Southern Australia Seasonal Bushfire Outlook 2018.* Fire activity in the period up to the end of December should be relatively normal across Tasmania, and rain during that time will determine where fires will occur after grasslands have cured.

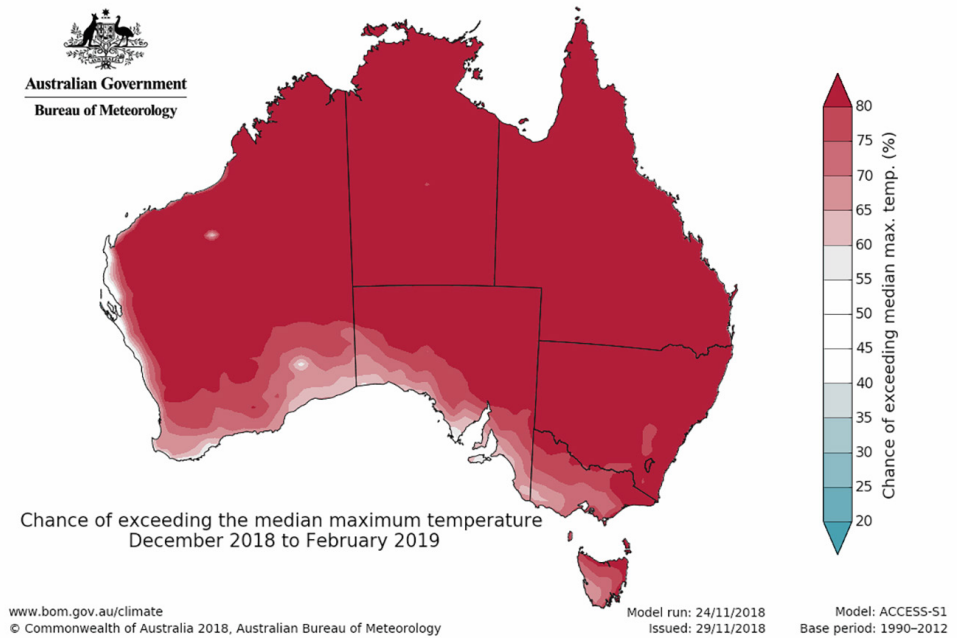
SOUTH AUSTRALIA

Large parts of South Australia have experienced drier than average conditions since the start of 2018. On the basis of the forecast dry conditions, and the cumulative effects of the long-term moisture deficit, the underlying dryness remains, despite some recent rainfall in several areas. The areas identified in September in the *Southern Australia Seasonal Bushfire Outlook 2018* remain as having above normal fire potential. These areas are particularly dry, including parts of the Riverlands, Murraylands and the Flinders Ranges.

Populated areas of the APY Lands, particularly those parts infested with buffel grass, also have above normal fire potential, with a number of fires already occurring this season. Without effective control mechanisms to limit the spread of buffel grass, the abundance of fuel it creates could create an increased and ongoing risk.

Despite some spring rainfall, the fuel growth and forecast dry conditions indicate that the potential for bushfire across the populated areas of the Mount Lofty Ranges remains.

The dry conditions in agricultural areas have resulted in less cropping activity, with South Australia forecast to record a decrease in areas planted and in yields from sown crops. This may reduce the risk of fires from agricultural activity in some areas. Due to the conditions already experienced, the fire danger season has already commenced in the majority of districts across the state, and may need to be extended. Significant bushfires have occurred in similar conditions, and areas of normal fire potential can expect to experience dangerous bushfires as per a normal South Australian fire season.



▲ Figure 4: THE OUTLOOK FOR SUMMER (DECEMBER TO FEBRUARY) MAXIMUM TEMPERATURES.

WESTERN AUSTRALIA

As a result of bushfires in previous seasons, and mitigation achieved by prescribed burning, higher fuel loads in the forests and shrublands across the Darling Range have been fragmented into smaller parcels. This has resulted in the break-up and reduction of above normal fire potential areas within the Swan Coastal Plain, Avon Wheatbelt, Jarrah Forest, and Warren regions.

Despite good winter rainfall, the underlying and persistent deep root zone soil moisture deficits along the Darling Range, south west corner, South Coast, Mallee and Esperance Plains have resulted in the forest and shrubland vegetation in these areas being subject to additional water stress. Rainfall has been below normal during September, October and November. As first identified in September in the *Southern Australia Seasonal Bushfire Outlook 2018*, above normal fire potential is expected to persist in these areas.

Further north, cooler and wetter wet season conditions were experienced in parts of the Pilbara, Gascoyne and Carnarvon regions in 2017-18, which contributed to the accumulation of higher than average grass fuel loads. This has resulted in above normal fire potential in these regions, again as first classified in September in the *Southern Australia Seasonal Bushfire Outlook 2018*. Rainfall for these areas is expected to be below average, and temperatures above average for the coming months, which may see above normal fire potential persist for longer than average in these regions.

The Gascoyne Coast missed the subtropical low rainfall which travelled further to the east, and as a result is experiencing a rainfall deficit. This has affected grass growth and therefore the region is expected to experience normal fire potential.

Parts of south eastern Western Australia received significant rain in the early part of 2018, which is evident in the elevated surface soil moisture in some areas. This has led to increased growth of the shrubs and grasses in these areas. Due to this increased vegetation growth, and therefore expected fuel loads, above normal fire potential is expected in these parts of the Mallee, Coolgardie, Nullarbor, Hampton and Great Victoria Desert regions, as noted in September's *Southern Australia Seasonal Bushfire Outlook 2018*.

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.