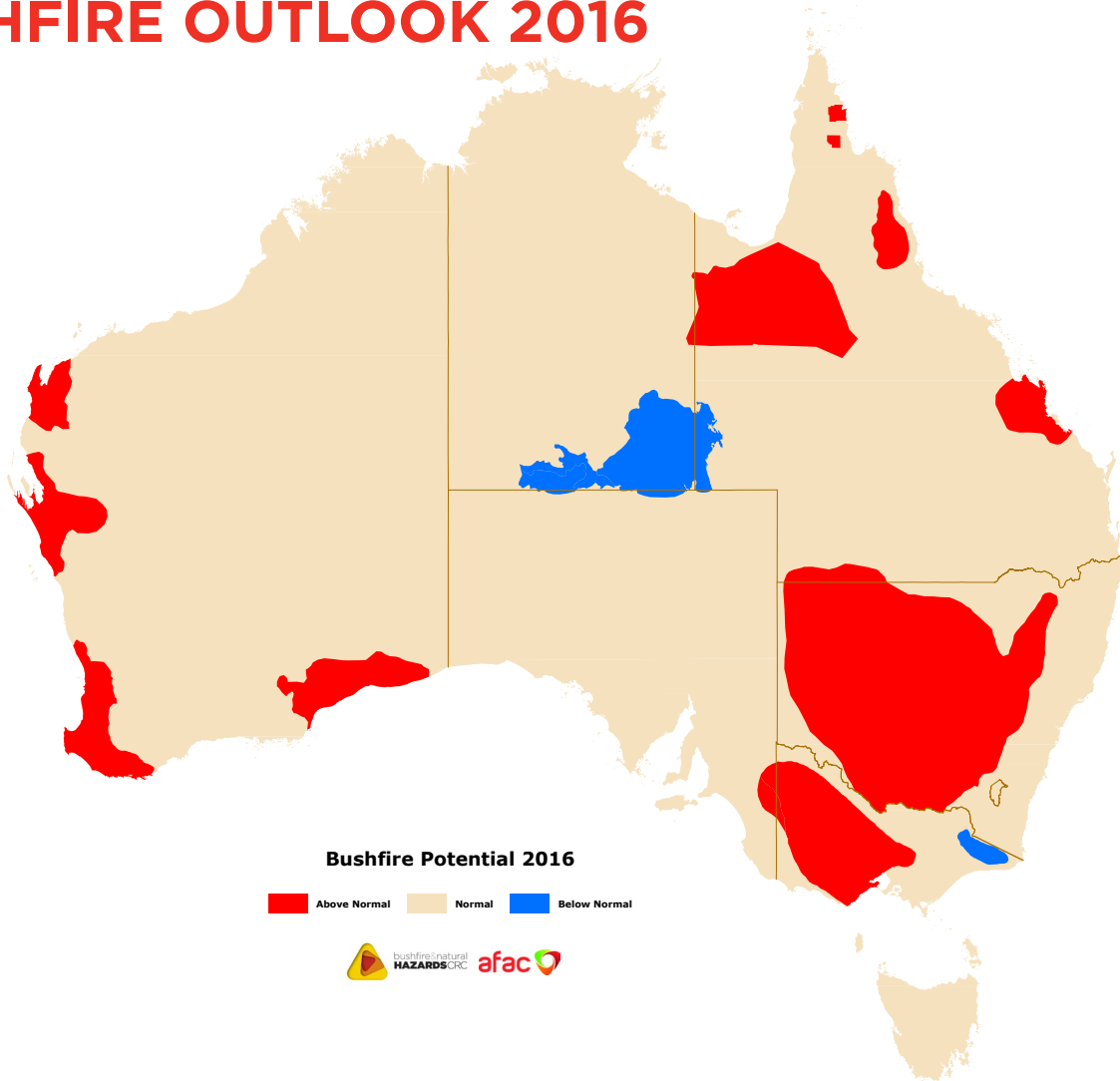


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TOPICS IN THIS EDITION | FIRE WEATHER | FUEL MANAGEMENT

SOUTHERN AUSTRALIA SEASONAL BUSHFIRE OUTLOOK 2016



OVERVIEW

The Seasonal Bushfire Outlook for southern Australia is used by fire authorities to make strategic decisions on resource planning and prescribed fire management for the upcoming fire season. The outlook is developed at an annual workshop convened by the Bushfire and Natural Hazards CRC and the Australasian Fire and Emergency Service Authorities Council (AFAC).

At the 2016 workshop in Brisbane in August, the Outlook was assessed and a range of broad climate factors were considered.

The above map shows the bushfire outlook for southern Australia through to the end of 2016. This map has been combined with the outlook for the northern Australia bushfire season, which was released at the beginning of July, to show the areas of fire potential for all of Australia. (See *Hazard Note 18*, July 2016). This Outlook will be reviewed towards the end of spring to take into account the impacts of actual temperatures and rainfall in the lead up to summer.

The Southern Seasonal Bushfire Assessment Workshop brought together

fire and land managers, climatologists and meteorologists to evaluate the upcoming season for the southern part of Australia.

BUSHFIRE POTENTIAL

Fire season potential depends on several factors. The amount, location and timing of rainfall in the period leading up to the fire season are critically important for estimating fuel loads and dryness. The temperature and rainfall outlooks for the next few months are crucial factors for influencing the development of fire threat.

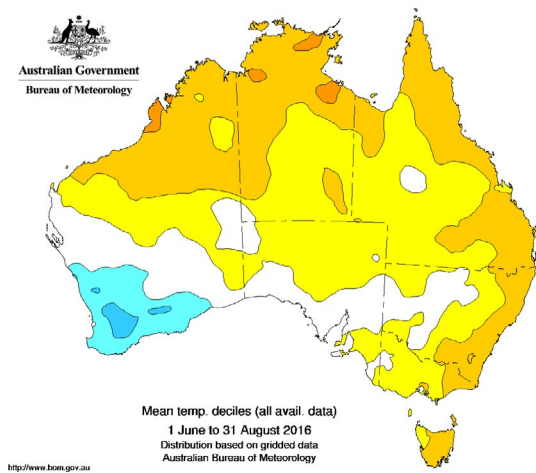


FIGURE 1

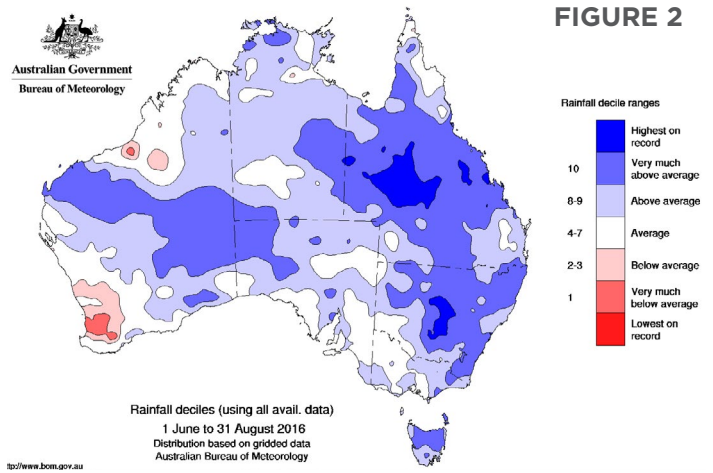
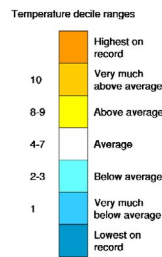
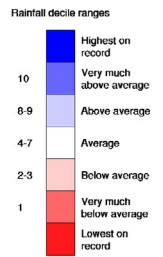


FIGURE 2



Of particular importance are the future tendencies of sea surface temperatures in the Pacific Ocean, associated with the El Niño-Southern Oscillation, and those in the Indian Ocean. These are major drivers of climate over much of Australia. Other factors considered include the distribution of firefighting resources to meet potential threats, as well as previous fire activity and the amount of prescribed burning that can reduce the threat.

The workshop discussed the weather, landscape conditions and cross-border implications leading into summer and determined areas that had the potential for a fire season that was above normal, normal or below normal. Attendees included representatives of the Bushfire and Natural Hazards CRC, AFAC, the Bureau of Meteorology, Queensland Fire and Emergency Services, Tasmania Fire Service, the Australian Capital Territory Emergency Service Agency, the New South Wales Rural Fire Service, South Australia's Country Fire Service, Victoria's Country Fire Authority and Department of Environment Land, Water and Planning, and Western Australia's Department of Parks and Wildlife and the Department of Fire and Emergency Services.

ANTECEDENT CONDITIONS

For every month of 2016 the Australian national mean temperature has been above average. This warmth culminated in the August 2015 to July 2016 period was +1.33 °C above the 1961-1990 average, the largest anomaly for any 12-month period since records began in 1910.

Despite a number of significant cold spells, winter has continued the pattern of above average temperatures, with a mean temperature anomaly of +0.9 °C (Figure 1). The longer term changes are important for the season ahead, noting that summer 2015/2016 marked the fourteenth

consecutive warmer than average southern fire season (October to April). These warmer conditions have contributed to elevated fire risk in most years in recent decades.

After a dry second half of 2015, most parts of Australia have seen very good rainfall since mid-autumn 2016 (Figure 2). Nationwide, preliminary analysis shows that winter 2016 saw a national average rainfall of 116mm, the second wettest on record. June and July were both particularly wet months, with June 2016 being the second-wettest June on record, while large areas of the country reported record high rainfall during July. The pattern of heavy rainfall following a strong El Niño is not uncommon and is tied to the warming of ocean waters around Australia.

Winter rainfall was particularly good across Queensland, most of NSW, Tasmania, eastern Victoria and parts of inland and central districts of South Australia and eastern Western Australia. A beneficial result of the above average rainfall has been the removal of short-term rainfall deficiencies, with soil moisture now near or above normal. Rainfall tended closer to average in remaining parts of Victoria and the west coast and Murray Mallee areas of South Australia. The far south west of Western Australia has experienced another winter of below average rainfall, meaning that 15 of the past 16 winters have been below average. In this region the long-term drying of vegetation and the landscape continues in a pattern that became established in the 1970s.

The generally good rainfall and above average temperatures has seen vegetation growth that is above average across much of southern and eastern Australia, particularly through much of New South Wales. With good soil moisture conditions and above average rainfall forecast, this pattern is expected to continue for some months, increasing fuel loads.

Winter 2016 was a period that saw Australia's climate become strongly influenced by a negative Indian Ocean Dipole. This pattern tends to increase winter and spring rainfall for southern and eastern Australia and generally sees cooler than average temperatures. Typically, once a negative Indian Ocean Dipole becomes established in the winter, it is expected to persist through spring and decay rapidly in summer. Meanwhile, ocean temperatures along the equatorial Pacific returned to near average values following the end of the strong 2015/16 El Niño. The range of observations and model forecasts suggest that the tropical Pacific will continue to remain in neutral conditions (though just falling short of a La Niña) or may see the development of a weak La Niña. The Indian Ocean Dipole is expected to persist into spring, and is likely to end around November.

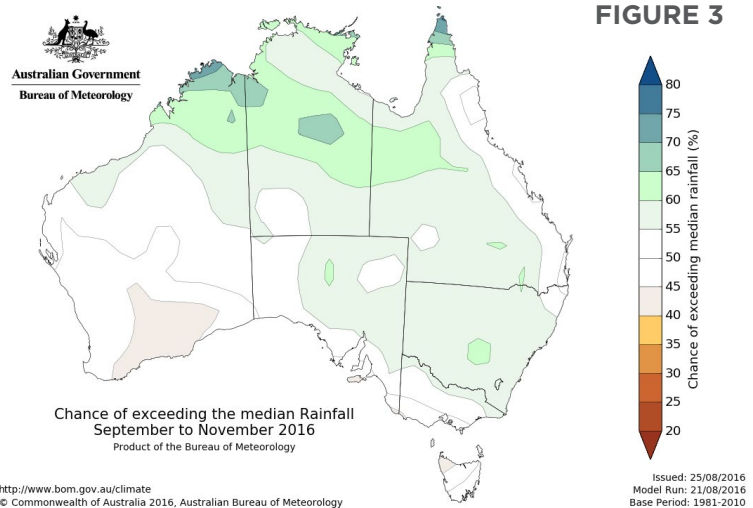
CLIMATE OUTLOOK

The climate outlook for the coming three months is influenced by both the Pacific and Indian Oceans. The combination of neutral to near La Niña in the Pacific and a negative Indian Ocean Dipole favours wetter than average conditions in many areas. While the natural drivers will tend to reduce temperatures, the overall pattern of well above average global temperatures (i.e., global warming) means that Australian temperatures are expected to be mostly above average.

The outlook for spring rainfall indicates a higher chance of above average rainfall is likely across most of northern and eastern Australia. The probability of above average is typically in the range of 55 to 65 percent, meaning a leaning towards wetter than average conditions. In some contrast, the odds in south west Australia are tending towards below average rainfall. The rainfall odds are close to 50:50 elsewhere.

The outlook for both maximum and minimum temperatures strongly favours above average temperatures across most of Australia. The likelihood of above average temperatures is typically in the range of 60 to 75 per cent, locally exceeding 80 per cent in Tasmania and in some northern areas. This forecast suggests that Australia is likely to experience another warmer than average spring, with summer-like temperatures likely to start earlier in southern Australia than is historically the case.

Updates to forecasts and the outlook for the Indian Ocean Dipole and La Niña are published at www.bom.gov.au/climate/ahead.



REGIONAL SUMMARIES

QUEENSLAND

While some parts of inland Queensland have seen record rainfalls, much of the state remains drought affected and grass fuel loads are still sparse to moderate in these areas.

With the exception of the south east corner of the state, forested areas have received above average rainfall in the three months leading up to the start of the fire season. As a result the fire season is likely to see a slower start than usual. The outlook is for lower maximum temperatures and above average rainfall through to October. These two factors, plus the likelihood of an early northern rainfall onset, make the potential of an above normal fire season unlikely across most of Queensland.

Queensland Fire and Emergency Services worked closely with Queensland Parks and Wildlife around Rockhampton to assess the increased risk as a result of Severe Tropical Cyclone *Marcia* in preparation for the 2015 fire season. Mitigation activities guided by these assessments continued in the lead up to the 2016 season. Residual risk remains in the area and this will be a focus again this season.

Soil moisture is relatively dry to the west of the Great Dividing Range, from around Bundaberg, and south to the New South Wales border, particularly around Biggenden, Gayndah, Kingaroy and Dalby. While normal fire potential is expected for this outlook period, it is important to recognise that an active fire season is still probable and more likely in the areas with the underlying soil dryness.

NEW SOUTH WALES

A delayed start to the bushfire season in New South Wales is likely due to above average winter rainfall for much of the state,

and a prediction for the chance of above average rainfall over the next three months.

However, a predicted end to the current negative Indian Ocean Dipole and more neutral El Niño-Southern Oscillation conditions in spring could see a shift away from wetter and cooler conditions towards more typical summer conditions. This shift could be exacerbated by the warmer than average temperatures – as part of a global warming trend – that are drying forest and grassland fuels.

It is expected that the significantly higher than average rainfall received over winter in the central and western parts of the state will result in prolific grass growth over spring. This grass growth, combined with a drying phase and summer conditions, could lead to above normal fire potential for central and western grassland areas during summer.

The trend towards significantly exceeding average rainfall totals was less pronounced adjacent to the south western and western boundaries of the state. As a result, the prediction here is for normal bushfire potential as the likelihood of prolific growth is not considered high.

The Sydney Basin and the Greater Hunter have followed the trend for above average rainfall over winter and are likely to see a delayed start to the bushfire season. However, the prediction for conditions to shift towards more typical conditions over summer could see fuel availability coinciding with the peak of summer, leading to the prediction for normal bushfire potential.

Forested areas south of Sydney have also received above average rainfall over winter. A late start to the fire season is common for these areas and, therefore, fire potential is expected to follow a normal season pattern.

Recent rainfall in northern New South Wales has reduced the potential

from the early predictions of an above normal season, to a season that is likely to follow a more normal pattern.

ACT

After three wet months the upper soils in the Australian Capital Territory are wetter than average for this time of year. The forecast changes of the Pacific and Indian Oceans, towards climatically neutral conditions, are expected to bring near average rainfalls and temperatures through to at least November.

This could encourage an early and vigorous growth of grasses. It will also boost the recovery of the high country forests that have been affected by large fires since 2003. These higher fuel loads may be offset by the effects of rainfall on fuel flammability.

High levels of grassland curing may not be seen until mid-summer at the earliest. The amount of flammable fine fuels in the forest areas is also expected to remain low until mid-summer.

As a result, the bushfire potential for this outlook period is assessed as normal.

As summer approaches, conditions will be closely monitored, particularly if there is an earlier than currently expected change to drier conditions.

VICTORIA

East Gippsland has a mostly below normal fire potential this year. It has received very much above average rain in the short and long term, and the temperature outlook is not likely to support strong late spring drying in the forests. The fire season in East Gippsland is expected to begin later than normal on these current signals. The marginal chances of above average rain along the Murray River and in Far East Gippsland raise the possibility of a delayed start to the fire season in those areas. This also means the Murray

Valley is likely to have normal fire potential despite underlying dryness in some areas.

In west and south Gippsland, parts of Victoria's Central Highlands, including Melbourne's water catchments, and across most of south west Victoria, the slight chance of above average rain coupled with a high probably (80 percent) of above average temperatures, plus existing severe rainfall deficits, indicates strong late spring drying is likely in forested areas. This could see rapidly escalating fire behaviour later in summer.

Most soils in the extensive western grass plains and their forests have saturated upper layers this year, in many areas evidenced by accumulations of surface water; but a dryness remains at deeper levels, and the current weak signal for spring rain is likely to mean good overall grass growth in these areas, with insufficient available water to soak deeper into the soil to reduce the fire risk in the forests. Melbourne's water catchments have not yet been saturated and now have a long history of underlying dryness. Forest fuels have increased since the 2009 fires, so there is once again potential for fire. Similarly, the eastern Otway Range, Brisbane Ranges, Wombat Forest, and drier forest types bordering Victoria's box ironbark belt also have a long history of dryness. These areas have above normal fire potential.

TASMANIA

The start of the fire season in Tasmania will be delayed as long as top up rains continue, which is expected to at least October and possibly later.

Fuels less influenced by soil moisture such as moorlands, heaths and scrubs, have a normal bushfire potential, while forest fuels have normal to below normal bushfire potential. Grassland fuels have a normal to below normal potential, but will provide a significant threat in the New Year when they are cured. Given the wet outlook for the next few months, opportunities for planned burning will be very limited, at least until autumn.

By early summer, without top up rain, most fuels will have a normal potential in terms of ignitability. Fire weather conditions are likely to be average or even subdued. However, if rainfall is above

average the fire season potential will be below normal at least until the New Year, when grasslands will cure. Overall, the state has normal bushfire potential.

SOUTH AUSTRALIA

South Australia has experienced a wetter than average winter, resulting in the current Soil Dryness Index being below the 10-year average across the state. The potential for slightly above average rain is forecast to continue through September and into October, which may lead to the fire season starting later than in recent years.

This puts the outlook in line with the more traditional South Australian fire season, and as a result, current indications are that most parts of the state can expect a normal fire season. Good rainfall will promote growth, particularly in pastoral areas; however, many of the forested areas have received good soaking rains and will not burn as early as they have in previous years. The exception is parts of the Mallee and Upper South East of the state, which have experienced significant rainfall deficits in recent years. As a result, and despite recent rainfall, these areas are assessed as above normal fire potential.

WESTERN AUSTRALIA

The bushfire outlook for Western Australia has been derived from several information sources including the relative root zone

moisture availability, pasture biomass, recent bushfire and prescribed burning history and forecasted weather conditions.

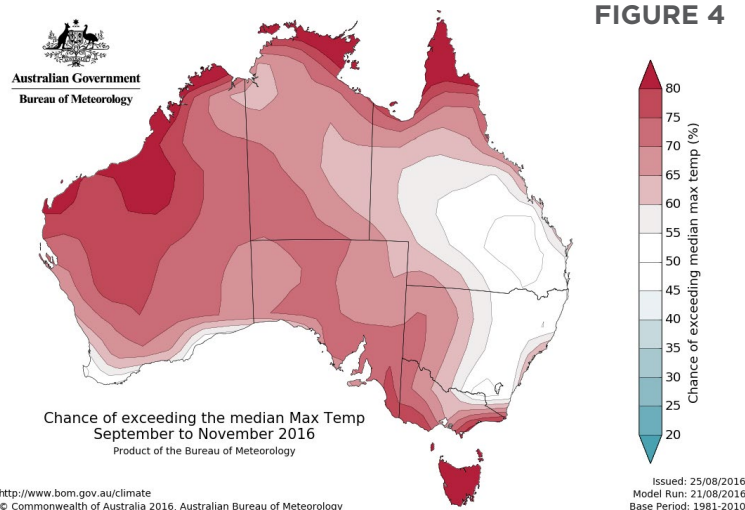
In the Eastern Gascoyne, Murchison, Goldfields, Central West and Desert areas, there is normal bushfire potential due to average rainfall and grass growth.

In the Western Gascoyne and Pilbara regions there is above normal fire potential as a consequence of higher than average grass fuel loads in response to above average soil moisture.

The Wheatbelt and Great Southern regions have above average grass fuel loads for this time of the year due to good rainfall. However, this is not expected to result in above average fuel loads at the end of the growing season, given the impacts of crop harvesting and grazing.

In the Eucla, east of Norseman, above average soil moisture and subsequent pasture growth, combined with pre-existing mature fuels, have resulted in the expectation of higher than normal bushfire potential.

In the South West, despite early and close to average rainfall, there is an underlying long-term deficit in the soil moisture. Recent bushfires and prescribed burning have reduced fuel loads in localised areas. However, on the landscape scale, the current high loads of forest fuels have resulted in above normal fire potential.



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, practices or positions of any of the individual agencies or organisations who are stakeholders of the Bushfire and Natural Hazards CRC.

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