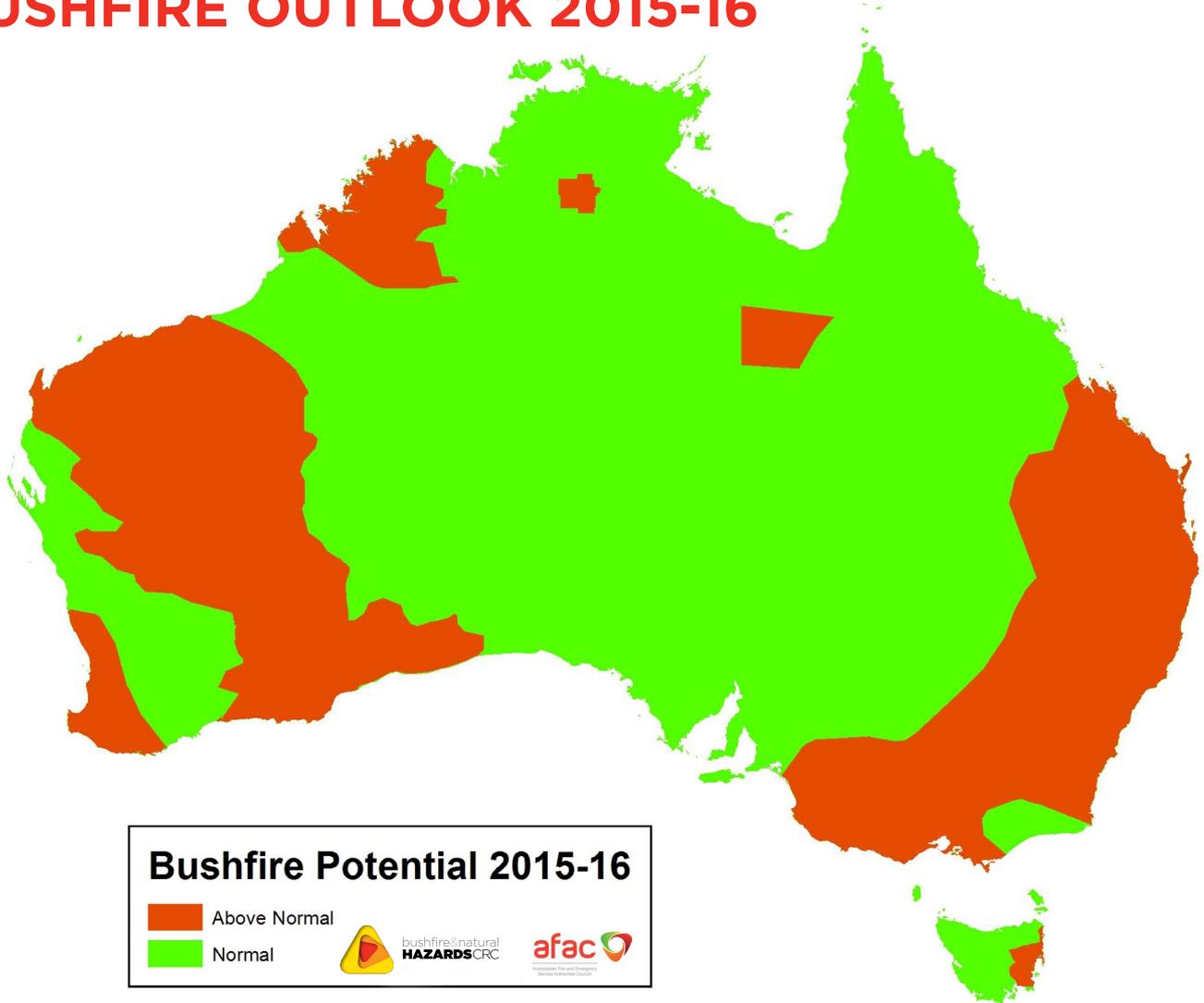


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TOPICS IN THIS EDITION | FIRE WEATHER | FUEL MANAGEMENT

SOUTHERN AUSTRALIA SEASONAL BUSHFIRE OUTLOOK 2015-16



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 2015 workshop in Perth in August, the outlook was assessed and a range of broad climate factors were considered.

In assessing the bushfire potential for any given year, it is important to take into account not only the amount of rainfall in the immediately preceding months but the long-term rainfall deficit across southern Australia.

Leading into this year, many areas have consistently received below average annual rainfall across successive years. This has produced a cumulative reduction in soil moisture levels and increasingly dry forests and grasslands.

In addition to these long-term trends, other climate drivers, such as the currently strengthening El Niño-Southern Oscillation

event across the Pacific and the warmer waters associated with the Indian Ocean Dipole, may further increase the severity and duration of the upcoming fire season.

Such impacts will challenge the limited resources of the fire and land management agencies and have created the situation where each fire season is likely to be more demanding than the last, both in economic and human costs.

The above map shows the bushfire outlook for southern Australia through to 2016. This map has been combined with an updated outlook for the northern Australia bushfire season, which was first released in mid July, to show

the areas of fire potential for all of Australia in 2015-16. (See *Hazard Note 7*, July 2015).

The Southern Seasonal Bushfire Assessment Workshop was hosted by the Department of Parks and Wildlife in Perth on 20–21 August. The workshop, supported by the Bushfire and Natural Hazards CRC and AFAC, 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.

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 in the analysis of fire potential include the distribution of firefighting resources to meet potential threats, as well as previous fire activity and the amount of prescribed burning, which can reduce threat.

The workshop discussed the weather, landscape conditions and cross-border implications leading into the fire season 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, Tasmania Fire Service, the Australian Capital Territory Emergency Service Agency, the New South Wales Rural Fire Service, South Australia's Country Fire Service, Queensland Fire and Emergency Services, 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

The 2015-16 southern fire season comes against a backdrop of long-term drying, record warmth in the Indian Ocean and the continued development of a major El Niño event in the Pacific. Across southern Australia a pattern of drier southern wet seasons (April to October) has continued

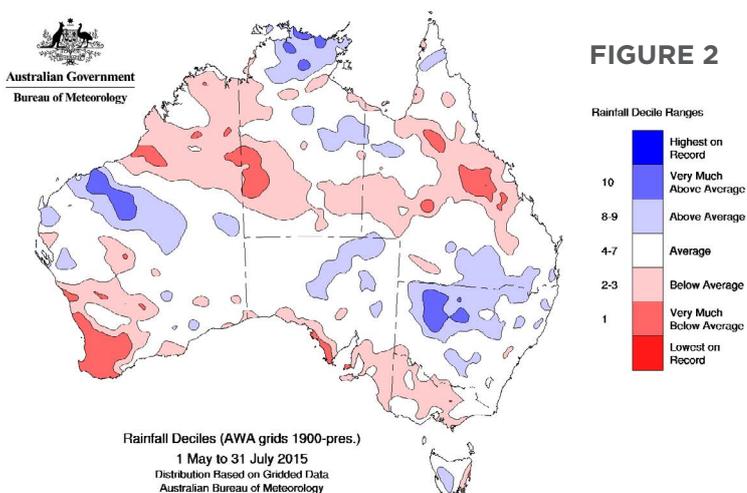
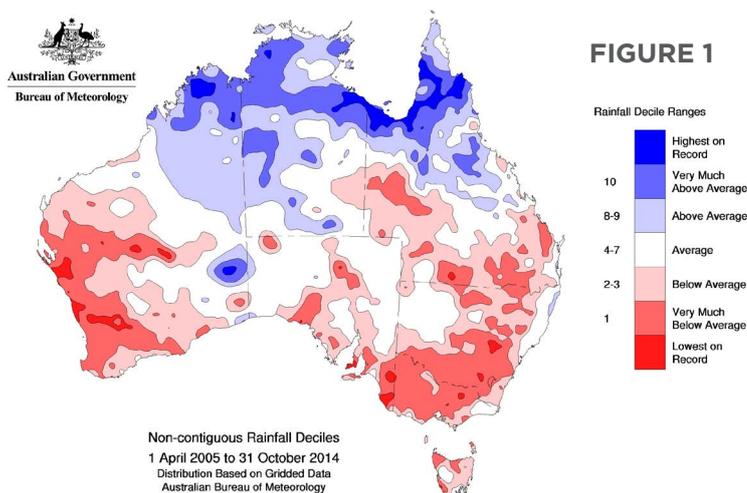
for more than 10 years leaving substantial rainfall deficits (Figure 1). The below average rainfall has been accompanied by above average temperatures, with the past decade being the warmest on record in many areas. The pattern of long-term below-average rainfall and above-average temperatures means that conditions such as soil moisture and fuels are prone to rapid drying with the approach of summer.

Fire conditions in summer are affected by rainfall in the preceding cool season, as well as conditions during the summer itself. Since the start of autumn, rainfall has been mixed over Australia as a whole, though tending to be below average across southern areas. Rainfall from May to July 2015 (Figure 2) has been below average in south west Western Australia, southern parts of South Australia, much of Victoria, and the east coast of Tasmania. Relatively good rainfall has occurred for most of New South Wales, with small areas of above average rainfall. Inland Western Australia south of the tropics has been mostly wetter than average as a result of unseasonal rainbands.

Soil moisture reflects the net balance between rainfall and evaporation, and includes the impact of warmer or cooler temperatures. Lower-level ("root zone") soil moisture is below average across south west Australia, central and western Victoria, almost all of Queensland, south east South Australia and parts of eastern Tasmania. It is these regions that are most likely to see an early drying of fuels leading into summer. Elsewhere, soil moisture is average to above average, particular across inland areas.

SEASONAL CLIMATE OUTLOOK

Seasonal outlooks in 2015 are being influenced by significantly warmer than normal sea surface temperatures in both the tropical Pacific and Indian Oceans. Since an El Niño was declared by the Bureau of Meteorology in May, the event has become well-established and is currently tracking as one of the strongest on record as measured by sea surface temperatures in the central Pacific. All



international climate models surveyed by the Bureau of Meteorology suggest the 2015 El Niño will continue to strengthen and last into (at least) early 2016.

While there are significant existing long-term rainfall deficiencies in the western half of Victoria, southern South Australia and parts of south west Western Australia, the 2015 El Niño has not been associated with significant rainfall deficiencies across the winter months across much of southern Australia. This pattern may have been influenced by unusually warm waters in the Indian Ocean to Australia's west, which are generally favourable to rainfall in southern parts of Australia. Rainfall, however, has been below average south of the Murray River, in far south west Western Australia and south east Queensland. Each of these regions also have longer-term deficiencies.

The climate outlook (Figure 3) indicates that the direct impact of El Niño may continue to be modest over spring, with likely above average rainfall over most of western and central Australia. Rainfall shifts are modest for eastern parts of Australia, with small areas favouring below average rainfall.

The outlook for maximum temperatures (Figure 4) for the coming spring shows that above average temperatures are most likely in the east and the far south west. Elsewhere, forecasts probabilities favour cooler than normal maximum temperatures, though probability shifts are relatively modest. The below average maximum temperatures are related to the (likely) increased rainfall coming out of the Indian Ocean.

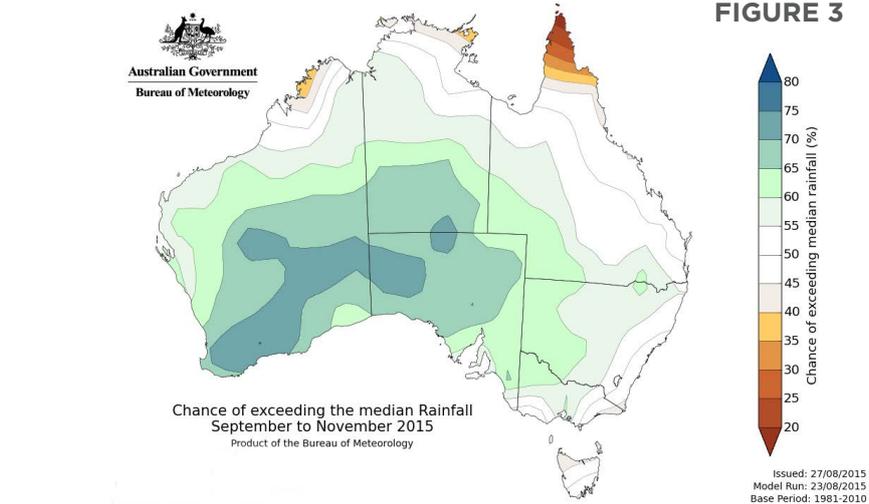
It is worth noting that the temperature forecasts use a 1981-2000 base period, which means that even average conditions will be above the historical longer-term normal (for 1910 to present). This highlights the difficulty in defining what is meant by average temperatures in a warming climate.

The climate outlook will be updated by the Bureau of Meteorology around the end of each month leading into summer, providing new insights on the likely upcoming seasonal conditions.

REGIONAL SUMMARIES

ACT

Most of the Australian Capital Territory has wet soil, which is typical for this time of year (out of drought), and this moisture will form a base for vigorous grass growth leading into spring. Some of the more rugged regions will not dry out until at least November, when the higher sun will penetrate into these areas.



The forecast is for a dry spring and this could lead to early curing of the landscape and an elevated grass fire danger.

If the predicted hot summer occurs, and especially if it is accompanied with heatwaves, this could lead to a significant drying of the forest litter and the non-surface fuels. The forest fire danger will be even higher if wind and humidity conditions deteriorate.

In the ACT, major El Niño events tend to lead to hot and dry conditions until at least early autumn, suggesting preparations need to consider a prolonged period of fire danger.

TASMANIA

There is an above normal potential for bushfire across a large part of the east coast of Tasmania, extending from the coastal strip around St Helens southwards, and extending across the Fingal Valley, the North and Southern Midlands and the Eastern Tiers down to Sorell and the Forestier Peninsula.

The likelihood of an early fire season is high in these areas but the amount of spring rain will ultimately determine overall fire activity in the eastern half of the state. The potential for bushfires in the remainder of the state is currently expected to be normal. However, the long-term lack of rain right across Tasmania may lead to more lengthy campaign fires due to the deep level of dryness.

QUEENSLAND

Much of Queensland remains drought affected and as a consequence has very low grass fuel loads.

The soil is relatively dry along parts of the north tropical coast and south east coast. If the El Niño conditions bring low rainfalls, the flammability of the forest fuels will increase as they continue to dry.

South and west of Rockhampton, areas around Inglewood, the Sunshine Coast, Brisbane and the Gold Coast, have had above average rainfall in the lead up to this bushfire season. The higher grass fuel loads in these areas have increased the bushfire potential.

Severe Tropical Cyclone *Marcia* crossed the central Queensland coast on 20 February and the associated winds caused extensive but variable damage across that landscape. The cyclone-damaged vegetation, particularly around Rockhampton, has significantly increased the bushfire potential in that area.

Queensland Fire and Emergency Services has worked with Queensland Parks and Wildlife Services and many other stakeholders to conduct prescribed burns that have reduced fuel loads but the bushfire potential for this area remains high. This increase in bushfire potential has been communicated to the community.

In the north western part of the state above normal fire potential is expected in the greater Mt Isa area, including around Sedan Dip, The Monument, Urandangi and Camooweal.

SOUTH AUSTRALIA

In South Australia the outlook conditions indicate the most likely scenario is for normal fire potential across most of the state, but with above normal fire potential in the Lower South East, Upper South East and parts of the Murraylands.

These districts have received below average rainfall for the past six months, following on from a dry spring and early hot summer in 2014. This rainfall deficit has the potential to result in fuels in forested and scrub areas to be drier than average and be available to burn sooner and more readily than normal.

A normal to above normal fire potential may see the need for firefighting resources over a longer period of time, together

with a longer time for mop-up after the fires. The districts where there is potential for above normal activity may pose resourcing issues during this fire season, should an above normal level of bushfire activity be experienced.

VICTORIA

A preliminary investigation of factors affecting the fire season outlook for 2015-16 point to an above normal season across most of Victoria.

Key indicators of above normal fire potential are currently in place. They include an extended rainfall deficit, drying conditions in eastern central Australia that affect north westerly air patterns, and rain that dampens but doesn't soak soil profiles. Drier conditions in key areas of the continent that affect Victoria's weather, when combined with the normal course of spring warming and increasing day length, lead to a strong likelihood that the season will begin early.

Areas with long-term rainfall deficits extend in a broad band from the South Australian border to the north east foothills, and includes some areas of Gippsland. There are local occurrences of lowest-on-record rainfall in the west of the state.

Short-term rainfall deficits exist across much of the state, with the exception of the south west coast and Far East Gippsland. Crop and pasture growth has been highly variable across the state in response to autumn rainfall patterns. The exact pattern of factors affecting grass growth and curing is not yet clear, though an increased outlook for spring rain may indicate increased grass growth in some areas. Agencies will monitor conditions and the emerging weather outlook closely in the lead up to summer.

Historically, the August to October period is the wettest time of the year in Victoria, and it sets the scene for fuel growth and fuel conditions over the summer. Current climatic signals indicate a slightly better than average chance of above average rainfall and below average daily maximum temperatures across most of the state, leading to an improved outlook for grass growth. However, given

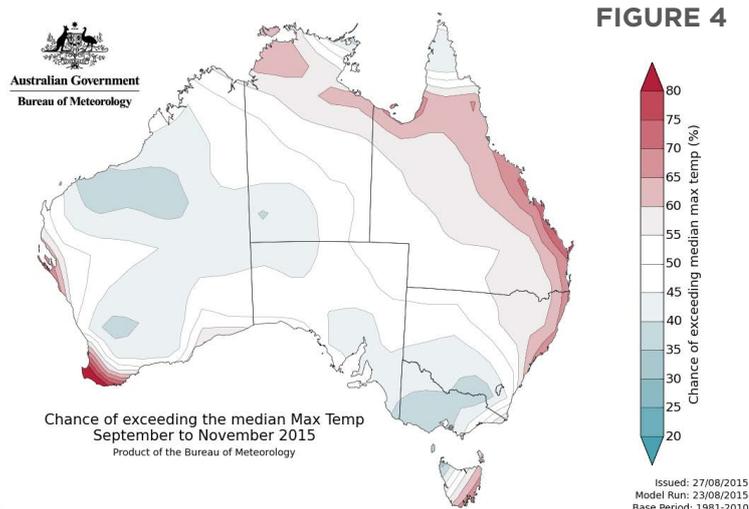
the long-term rainfall deficits, significant rain would be required over the spring period to alter the outlook for an above normal fire potential for most of Victoria.

NEW SOUTH WALES

The effects of the current strong El Niño event are being offset by warmer than normal temperatures in the Indian Ocean. However, the three-month climate outlook suggests drier than average conditions are favoured in north east New South Wales and the far south coast combined with increased chances of warmer conditions in the north east and along the coast. This outlook, coupled with the traditional El Niño risk of higher than average temperatures, could result in a rapid drying of forest fuels and lead to above normal fire potential in the forested eastern parts of the state.

Winter rainfall totals have been near the long-term average over central inland areas. The three-month climate outlook is suggesting further average rainfall. As a result, high grass growth could be a concern when the soils begin to warm in spring. An above normal fire season is expected in these areas.

The western half of New South Wales has generally received useful winter rainfall, close to or above the long term average. However, a normal fire season is expected as there has not been enough rain for significant grass growth.



WESTERN AUSTRALIA

In Western Australia, for the Western Gascoyne and Central West, there is normal fire potential due to average rainfall and grass growth.

In the Murchison, Goldfields and Desert areas, there is above normal fire potential as a consequence of high fuel loads from above average rainfall.

The Wheatbelt and Great Southern regions have average grass fuel loads as a result of average to below average rainfall, leading to normal fire potential.

In the South West, a lack of rainfall, a long-term deficit in the soil moisture and high fuel loads have led to above normal fire potential.

In the South East, higher-than-average rainfalls east of Norseman have created higher fuel loads, leading to above normal fire potential.

Although the El Niño continues to strengthen, the correlation between El Niño and rainfall and temperature patterns is weaker for Western Australia than it is for the eastern states. In an average El Niño, daytime temperatures across the southern half of the state are higher and the wet season onset typically occurs later in the season.

However, every event is different and El Niño is not the only influence on rainfall and temperature; other factors, such as warmer-than-average sea surface temperatures to the north of Australia and in the Indian Ocean, will also affect the climate, and hence, bushfire potential across Western Australia.

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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