



# CLIMATE COUNCIL SEASONAL UPDATE:

# ABNORMAL AUTUMN 2014

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# Climate Council Seasonal Update: Abnormal Autumn 2014

As global temperature continues to increase, extreme weather records keep tumbling across Australia. Last year – 2013 – was our hottest on record, ushered in by the record-breaking summer of 2012/2013. Extreme high temperatures haven't been confined to the summer months. September 2013 saw a mean temperature 2.75 °C higher than the average, setting a new monthly record by more than a degree. Temperatures in October were also much higher than average (+1.43 °C), priming conditions for an early and destructive bushfire season in New South Wales. Hot on the heels of these unprecedented events, the summer of 2013/2014 broke 156 extreme weather records over 90 days across the nation.

Now the exceptional heat has continued into the autumn of 2014. The average temperature for April 2014 was 1.11 °C above the long-term average, and continuation of abnormally warm temperatures into late May has delayed the onset of winter conditions across

southern Australia. A remarkable, prolonged warm spell occurred over the period 8-26 May, with daytime temperatures 4 to 6 °C above normal over much of south-central Australia, extending from South Australia and northwest Victoria into Queensland and the Northern Territory. The 24-month period ending with April 2014 was the hottest two-year period on record, with an average temperature 1.16 °C above the long-term average, easily eclipsing the previous 24-month record set in the 2002-2004 period.

With the continuing plague of abnormally high temperatures across the continent, the influence of climate change can be felt now. The intensity and frequency of many extreme weather events in Australia is increasing, with serious and costly impacts on our communities, infrastructure, economy, and the environment.

# Key Facts:

1. Exceptionally warm weather continues. The average temperature across Australia for April was 1.11 °C above the long-term average (1961-1990), and May continued the trend of abnormally high temperatures.
2. A prolonged warm spell occurred over the period 8-26 May, with daytime temperatures 4 to 6 °C above normal over much of south-central Australia, extending from South Australia and northwest Victoria into Queensland and the Northern Territory.
3. The 24-month period ending with April 2014 was the hottest on record for any two-year period, easily beating the previous record set in the 2002-2004 period. The 24-month period ending with May 2014 will likely exceed this newly set record.
4. The climate system as a whole is heating up, and emissions of greenhouse gases, particularly from fossil fuels like coal, oil and gas, are the primary cause.
5. Temperatures are projected to continue to increase, with more extremely hot days and fewer extremely cool days. A further increase in the number of extreme fire-weather days is expected in southern and eastern Australia, with a longer fire season in these regions.
6. These trends can be turned around. Australians have an opportunity to rapidly and significantly reduce our CO<sub>2</sub> emissions to help stabilise the climate and halt the current trend towards more extreme weather events and hotter average temperatures.
7. We are now in 2014 and approaching the halfway point in this critical decade for action on climate change. We are making a start in our transition to a low-carbon economy, but more action is needed. Global emissions are still rising and Australian emissions have yet to make a decisive turn downwards.

# What have we seen this autumn?

The abnormally warm weather that has seen records tumble during the last two summers has continued into the autumn of 2014 (BoM 2014a).

## Feeling the heat around Australia:

- › The average temperature for April 2014 was 1.11 °C higher than the 1961-1990 average (normal), with the average maximum temperature for the month 0.91 °C above normal and the average minimum temperature 1.31 °C above normal.
- › The unusually warm conditions for April were not distributed evenly across the country (Figure 1). Extraordinarily hot conditions were recorded in western Queensland, and much of Western Australia and the Northern Territory experienced temperatures well above normal.
- › Abnormally warm conditions continued in May, with a prolonged warm period from 8 to 26 May. The unusual warmth occurred in South Australia, New South Wales, Victoria, and southern inland Queensland, with unusual warmth also extending periodically to Tasmania and parts of the Northern Territory and southeastern Western Australia (Figure 2).
- › Sydney experienced 19 consecutive days of 22 °C or above from 10 to 28 May, far exceeding the previous May record of 9 days (set from 1 to 9 May 1978 and 1 to 9 May 2007).
- › Sydney (28 days), Adelaide (16 days) and Melbourne (13 days) have all set records for the most consecutive days in May of 20 °C or above.
- › On 15 May Campania recorded the highest maximum temperature (24.1 °C) so late in the season for any Tasmania site. This was followed by a similar record for Victoria, with 27.4 °C at Ouyen on 26 May. Also on 26 May, Birdsville reached 34.7 °C, the highest temperature reached so late in the season at any Australian site outside of the tropics.
- › The Australian area-averaged daily maximum temperature was 27.35 °C or above on each of the five days from 21 to 25 May, higher than any value previously recorded on or after 21 May (previously 27.23 °C on 23 May 1958). The peak value was 27.98 °C on 23 May. Late-season state records were also set for South Australia (28.11 °C on 25 May) and New South Wales (26.41 °C on 26 May).

The abnormally warm weather in April and May are part of a longer-term trend towards hotter conditions in the summer months and more warm spells in autumn and winter. In fact, the May 2012-April 2014 period was easily the hottest 24-month period on record for Australia; it will likely be immediately eclipsed by the June 2012-May 2014 period. The 12 months ending

January 2014, February 2014, March 2014 and April 2014 have all been record-warm for Australia, and it is virtually certain that the 12 months ending May 2014 will also set a new record for high average temperature. Such records are consistent with the ongoing global and Australia-wide multi-decadal trends towards a hotter climate.

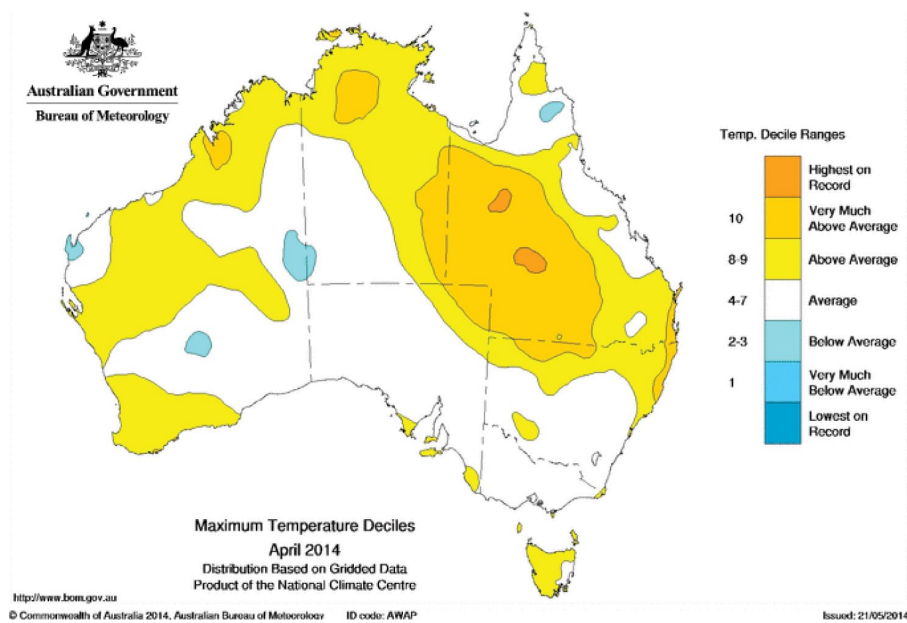


Figure 1: Maximum temperature deciles. April 2014. Source: BOM 2014d

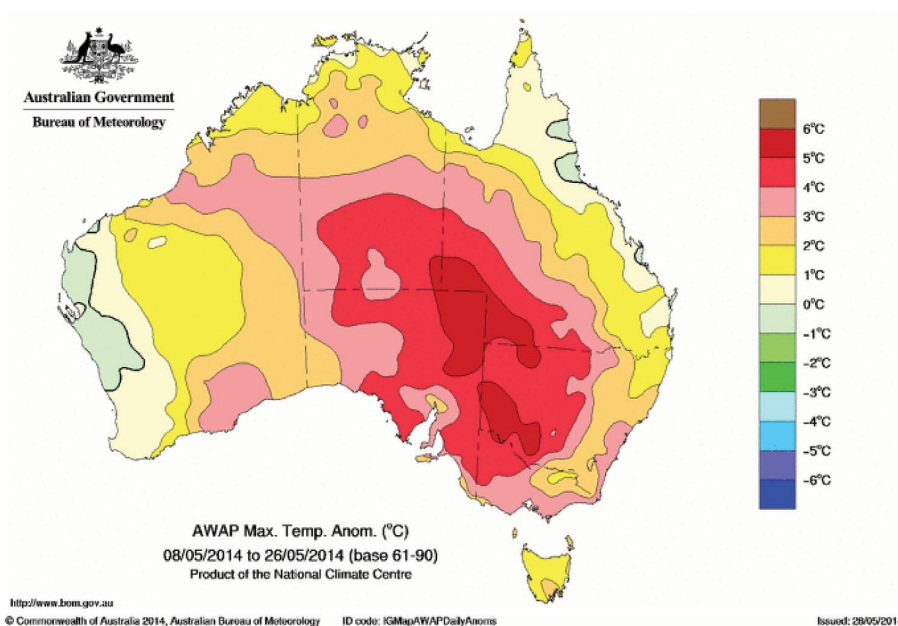


Figure 2: Maximum temperature anomalies (from 1961-1990 average) for the period 8-26 May 2014. Source: BOM 2014c

# What are we likely to see this winter and spring?

The unseasonably warm conditions that many regions of Australia experienced in April and May are likely to continue through winter. Higher-than-average maximum and minimum temperatures are likely over most of the country with the chances of warmer-than-average conditions being particularly high for the southern half of the continent (BoM 2014b).

The odds are increasing that Australia could soon experience an El Niño event, which would likely exacerbate the impacts of climate change by driving temperatures up even higher and triggering drier conditions in the east and south of the continent. Although the specific impacts of El Niño events vary from event to event, in general they lead to declines in rainfall in the eastern half of the country

in the winter/spring seasons and lead to higher maximum temperatures. In addition, exceptionally high sea surface temperatures across much of the Indian Ocean may also be contributing to higher temperatures across parts of Australia (BoM 2014c).

With a warmer winter on the cards this year, the prospect of increasing intensity and frequency of winter warm spells could lengthen Australia's bushfire season and worsen drought conditions (Perkins 2014).

# The climate change link

Hot weather, heatwaves and bushfires have always been part of the Australian experience. However, the climate system as a whole is heating up (IPCC 2013). Across Australia and over surrounding seas, air and ocean temperatures are now on average almost 1 °C warmer than they were in 1910, with most of the warming occurring since 1950 (CSIRO and BoM 2014). Scientists are more confident than ever that it is our emissions of greenhouse gases that are the primary cause of the observed warming.

A warming climate is making many extreme events worse, such as heatwaves and high fire danger weather, by increasing their frequency and intensity (IPCC 2012; IPCC 2013; Clarke et al. 2012). The IPCC Fifth Assessment report (2013) concluded that it is very likely that we are already seeing a human contribution, via greenhouse gas emissions, to the warmer and/or more frequent hot days and nights that have been observed over most land areas around the globe. That is, the influence of climate change on abnormally hot weather is already apparent.

Although a temperature increase of about 1 °C may seem modest, small changes in average temperature can have a significant influence on extremes (IPCC 2012). On most days, the temperature is not too far from the average, but occasionally some very hot or very cold days can occur. But when the average temperature warms by even a small amount towards a higher level, the temperatures at the “tails”—the ends of the temperature distribution—also shift. The result is a much greater likelihood of very hot weather and a much lower likelihood of very cold weather.

This greater likelihood of extreme high temperatures has been manifest across Australia in the increasing rate at which record summer heat and winter warmth have been occurring. Since 1950 the annual number of record hot days across Australia has more than doubled. Over the past decade, the frequency of record hot days has been more than three times the frequency of record cold days (Trewin and Smalley 2013).

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