



ANALYTICS

Seasonal Climate Outlook

Australian Autumn Climate Outlook

- The El Niño phase is weakening after a peak in November.
- Warmer than average temperatures are expected across Australia, with relatively drier conditions over northern and parts of southeastern Australia.
- Elevated bushfire risk for parts of southwest WA and central Australia.
- Tropical cyclone season has been active, there remains a chance of further activity before the traditional end of the season at the end of April.
- Most models suggest a transition towards a La Niña event by late winter or spring.

Higher than usual temperature maxima and minima are strongly forecast across Australia: it is at least three times more likely than normal for Australia to experience unusually high (warmest 20% of April to June periods from 1981–2018) maximum and minimum temperatures (Figure 2).

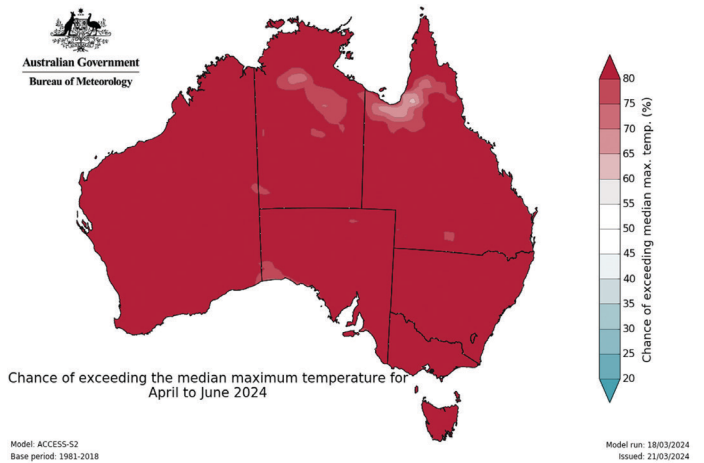


Figure 2: Chance of exceeding the median maximum temperature for April to June 2024. Red indicates an above-average temperature.²

Rainfall and Temperature Outlooks for Autumn 2024

The long-range BoM seasonal outlook indicates rainfall to be below average for most of northern Australia and parts of southeastern Australia through autumn (Figure 1).

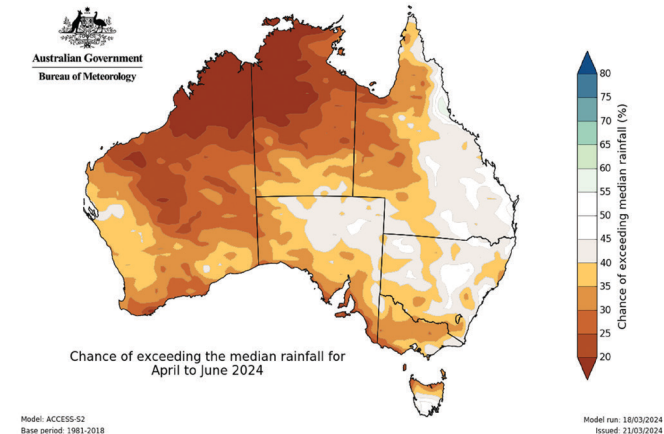


Figure 1: Chance of exceeding median rainfall for April to June 2024. Yellow to brown indicates below average rainfall.¹

Autumn Perils Outlook

Bushfire

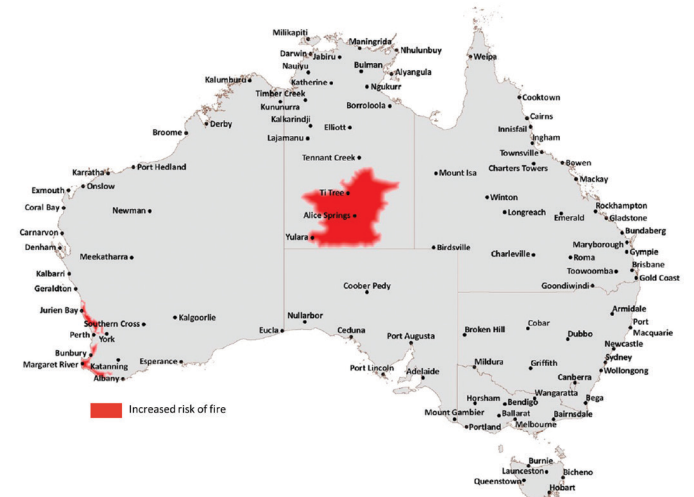


Figure 3: AFAC bushfire risk map for autumn 2024.³

The Australasian Fire and Emergency Service Authorities Council (AFAC) has recently released their autumn bushfire risk outlook, indicating some elevated bushfire risk over southwest Western Australia and in central Australia (Figure 3).

The southwest of Western Australia saw very low rainfall over the summer combined with extreme temperatures — stations in several parts of Western Australia, including Manjimup (42.3°C), Geraldton (49.3°C), and Carnarvon (49.9°C) set their all-time records in February 2024. Rainfall has been the lowest on record for parts of coastal Western Australia, coupled with much warmer than average temperatures over Western Australia, which has increased evapotranspiration, leaving upper layer soil conditions (root zone soil moisture) in the lowest percentiles in (Figure 4).

The warmer and drier conditions are forecast to continue through autumn (Figure 3). These conditions will promote fuel curing, increasing the bushfire risk over areas along the forested and shrubland regions of the populated southwest, and be the region at greatest risk of damaging fires in autumn 2024. Autumn rainfall and temperature outlooks may extend the bushfire season in southwest Western Australia over the coming months.

The drying conditions over the past months and elevated fuel loads in Central Australia have led to an increased fire risk, despite the large landscape-wide wildfires over the past months in this region.

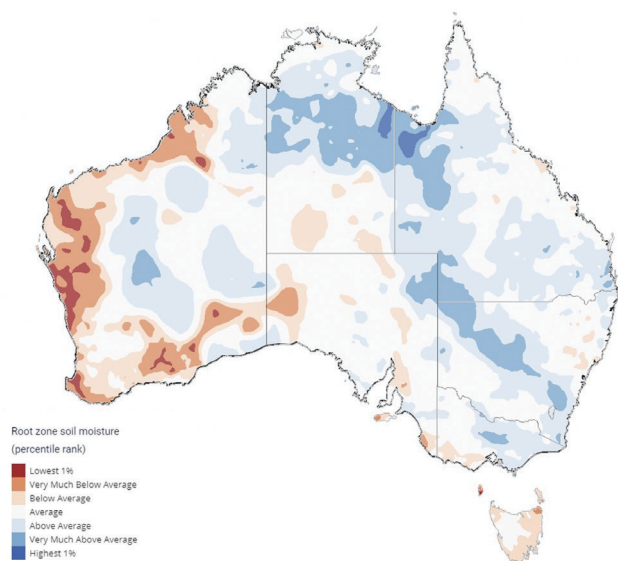


Figure 4: Australian water outlook root zone soil moisture for February.⁴

Rainfall has been the lowest on record for parts of coastal Western Australia, coupled with much warmer than average temperatures over Western Australia, which has potentially increased evapotranspiration leaving upper-layer soil conditions in the lowest percentiles in (Figure 4). These conditions contribute to higher bushfire risk, with higher fuel loads of cured dry vegetation coupled with warmer than average temperatures.

The dry weather of the past summer over Western Australia, South Australia, and western Victoria will provide above-average fuel availability and above average fire potential, and AFAC in particular notes the potential for southwest western Australia in Figure 3.

Bushfires in Western Australia, Victoria, and southern Queensland have impacted a number of homes during the 2023–2024 bushfire season, although no single event has been especially large in terms of homes lost. The most notable event was that at Pomonal in western Victoria, with 46 homes lost in February. The favorable interplay between the Southern Annular Mode and the strong El Niño led to more rain than forecast over southeastern states, largely negating the severity of the fire season here.

Storms

We are approaching the end of the season when especially destructive hailstorms are possible, though these can certainly occur into April, as evidenced by the Sydney 1999 hailstorm. Conversely, we will have a slightly increased chance of significant extratropical cyclones (including east coast lows) affecting southern states towards and through the winter months. With sea surface temperatures along the eastern coast of eastern Australia at exceptional levels recently, between 2–4°C above average, there is additional moisture and energy available for these storms, should they form. The exceptional ocean temperatures included a record of 26.75°C recorded at the Sydney wave buoy 10 km off the coast of Sydney on 8th and 9th of March.⁶ Warmer ocean water provides fuel for storms and east coast low activity, making abundant fuel for heavy rain, should atmospheric weather conditions be favorable.

Tropical Cyclones

The tropical cyclone season traditionally ends in April, but recent months have been quite active, with a burst of tropical low activity around northern Australia. Tropical Cyclone Megan made landfall in the Northern Territory near the Queensland border at Category 3 on 18th of March, with the Australian Defence Force evacuating 380 residents in Borroloola by 22nd of March amid safety concerns as the McArthur River reached a record peak level, 3 m higher than the previous 2001 record level.

Severe Tropical Cyclone Neville formed off the coast of Western Australia in mid-March and strengthened to a Category 4 system but did not make landfall.

This activity continues a reasonably busy cyclone season, with named storms Jasper, Kirrily, Lincoln, and Megan all making landfall this summer. The potential for further cyclones to form before the end of the official cyclone season on 30th of April is possible; the BoM notes that cyclones have historically been recorded to have formed as late as June.

El Niño Southern Oscillation (ENSO) – a transition to La Niña under way?

This current El Niño event peaked strongly in November, with its 3-month running mean of sea surface temperatures at a +2.0°C warmer, which is the fifth highest on record since 1950. In the key tropical Pacific monitoring region for ENSO, the Niño 3.4 region, monthly temperatures above average dropped slightly in January from its peak but remained above average, as the event weakens.

International models forecast a cooling of the central and eastern equatorial Pacific is likely from March onwards, with most models indicating a dip to a neutral ENSO phase by May.

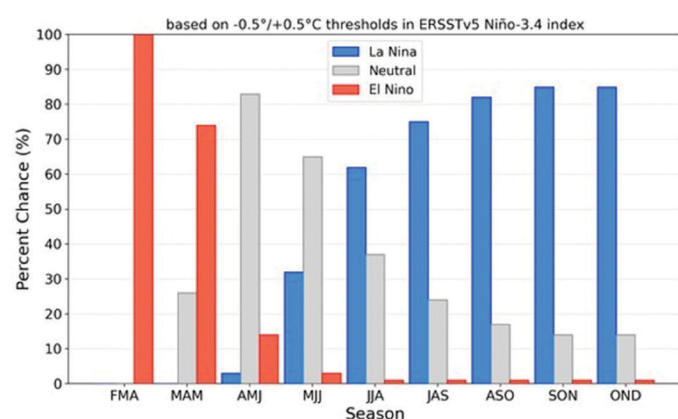


Figure 5: ENSO probabilities through 2024. Red indicates the El Niño phase, blue is the La Niña phase, and grey is neutral.⁵

Historically many strong El Niño events have transitioned quickly into a La Niña phase, and most international models indicate this developing sometime between June and September.

The accuracy of ENSO forecasts is lower during this time of the year, known as the “spring predictability barrier” (a Northern Hemisphere term). During this period, ENSO is usually transitioning and weaker coupling of atmospheric-ocean signals, makes it more difficult for models to predict ENSO patterns accurately.

La Niña is characterised by warmer oceans off the coast of eastern Australia and a higher chance of significant rain events across eastern Australia. With the recent El Niño event having been

relatively wet across eastern Australia and following from the 2020–2023 “triple-dip” La Niña event, water storage levels are high in major catchments at 76% of capacity on average. There are also pockets of NSW and Queensland with saturated root soil moisture levels in Figure 4. It will likely take less additional precipitation to trigger flooding in 2024 in some catchments.

A further La Niña event would extend an unusual run of wetter years, with an increased chance of flooding events from any major rain-bearing weather systems. La Niña events typically cause larger losses than El Niño events, and the recent triple-dip event led to at least \$7.2B of flood losses across several major catastrophe events.

The recent “wet El Niño” on the east coast caused over \$1.2B of flood and cyclone losses during the 2023–24 El Niño. In this case, other drivers, notably the Southern Annular Mode as well as high sea surface temperatures, were more influential in encouraging summer rainfall in eastern Australia.

Other Climate Influences in Autumn

The Indian Ocean Dipole (IOD) is another driver of interannual variability across Australia and is typically in a neutral phase during autumn. Overall current weekly sea surface temperatures are above average across the Indian Ocean and extending south along the Australian Bight. When in its neutral phase, the IOD does not affect Australian climate strongly. Long-range forecasts hint at positive IOD conditions through from April and will persist through winter into spring, and likely tending towards drier conditions.

The Southern Annular Mode is close to neutral and likely to be this way for the coming few weeks. The Madden-Julian Oscillation (MJO), which influences tropical activity, is moderately strong and is driving monsoonal activity presently over northern Australia. The monsoonal action over northern Australia will weaken as the MJO moves east across the central Pacific in late March.

We will continue to monitor the progress of climate drivers and provide updates on significant events, as appropriate.

References

- ¹ACCESS-S2, [Rainfall Outlook, Exceeding Median Rainfall](#), Australian Bureau of Meteorology. BoM. March 2024.
- ²ACCESS-S2, [Temperature Outlook, Exceeding Median Maximum Rainfall](#), Australian Bureau of Meteorology. BoM. March 2024.
- ³Seasonal Bushfire Outlook Autumn 2024, AFAC, February 2024.
- ⁴AWRA-L, [Root Soil Zone Moisture Monthly Relative Values](#), Australian Bureau of Meteorology. BoM. March 2024.
- ⁵February 2024 Enso Outlook: All Along the La Niña Watch-Tower. National Oceanic and Atmospheric Administration. NOAA. February 2024.
- ⁶Sydney Breaks SST Record. *Swellnet*, March 2024.
- ⁷We Just Had the Warmest February on Record, Yale Climate Connections YCC, March 2024.

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