

6. Annual Review and Significant Events

January: Australia's hottest on record, but wet in the east

The year commenced with Australia's hottest January since monthly records commenced in 1950, with mean temperatures 1.23°C above normal, breaking the previous record anomaly of +1.16°C set in 1999. It was a wet month through most of mainland eastern Australia, with significant flooding in Queensland, but rather dry further west, as well as in Tasmania, which had its second-driest January on record.

Outside of Queensland, where increased cloud cover in the wet conditions led to below-average daytime temperatures, it was consistently warm over the continent. Both the NT and WA set January records for both mean maximum and mean minimum temperatures. The month was more notable for consistent heat than individual extremes, but some very high temperatures occurred in the second week of January as the hottest air extended to parts of the WA coast. On the 11th it reached 49.2°C at Onslow, Australia's highest temperature in 2008, while 48°C was exceeded at six other sites in the Pilbara.

Queensland was subjected to flooding in association with the La Niña event; the most significant episode occurred between the 10th and 20th as the remnants of tropical cyclone *Helen* moved across the State. The Central Highlands were severely affected, with many properties in Emerald and surrounding areas being inundated as the Nogoa River broke its banks. Anakie, about 40 km west of Emerald, received 313 mm on the 17th and 519 mm over the five days 16th – 20th January.

February: a cool month as wet conditions become more extensive

In contrast with January, February was a cool month over most of Australia, ranking as the ninth coolest on record. NSW was particularly cool with average maximum temperatures 2.67°C below normal, second only to 1954.

It was wet again in eastern Australia, particularly near the Queensland coast, and also over the north of the NT, much of WA, and Tasmania. Once again, however, the wet-season rains failed in much of the continental interior, setting the scene for an extremely dry year.

Extreme rainfall affected Mackay, Queensland on the morning of the 15th, with major flash flooding in many areas of the town. 625 mm fell in 24 hours at Mackay East (most of which fell in six hours), with several other stations in the town exceeding 500 mm. There were numerous two-hour falls in the 200-300 mm range during the event's peak.

Autumn (March-May): very dry, with warm days and cool nights. March heatwave in the south

The start of the season was exceptionally hot in southern Australia. Mean maximum temperatures for the first 18 days of March were 11.8°C above normal at Ceduna, and 8°C or more above normal over an area extending from the Nullarbor in the southeast of WA to western and central Victoria. Adelaide experienced 15 consecutive days above 35°C from the 3rd to the 17th, well in excess of the previous record of eight (for any month); the last 13 of these were above 37.8°C (100°F). All-time records for consecutive days above thresholds were set at a number of other locations, including Kyancutta (13 days above 40°C), Ceduna (12 days above 35°C), Mildura (14 days above 35°C) and Eucla (6 days above 40°C). A Tasmanian March record was set on the 14th when 38.0°C was reached at Campania (Hobart's March record of 37.3°C was equalled on the same day). An Australian record diurnal range of 37.4°C occurred at Eyre (WA) on 5th March when the temperature rose from a minimum of 6.8°C to a maximum of 44.2°C.

For the remainder of the season days tended to be warmer than average, while nights were generally cooler than normal over much of the country, especially in Queensland and the northern tropics. Queensland's first-ever sub-zero March minimum (-0.2°C) was recorded at Stanthorpe on the 30th, while Kalumburu (WA) and Kowanyama (Qld) both had runs of 60 or more consecutive below-normal nights extending from early April to early June. An Australian record low minimum for May of -13.4°C was set at Charlotte Pass (NSW) on the 24th, while Mt Hotham's maximum of -3.2°C on 28th April was a new Australian record for the month.

Winter (June-August): a mild start and cold, dry finish

In relative terms, winter became progressively colder across Australia: June's mean nationwide temperature was the sixth-highest on record, with mild conditions both by day and overnight. Temperatures in July were near normal but well below normal in August, only rising in the final week to lift the national August average to the eighth-lowest on record.

A prolonged period of cold weather affected the southeast in late July and early August, with snow falling to low elevations on several occasions. The most significant event was over the 10th and 11th August when there were widespread snowfalls down to 200 m in the Melbourne area, and down to 300-400 m in parts of southern NSW around Tumut.

The cold in the second half of winter was consistent, featuring an Australian record when the temperature failed to rise above 0°C at Mount Hotham for 53 consecutive days from 7th July to 28th August. A new all-time WA state record was set on 17th August when the temperature at Eyre fell to -7.2°C, breaking the previous record of -6.7°C set at Booylgoo Spring (near Sandstone) on 12 July 1969.

September-October: Generally warm. Very dry in the southeast

September and October were both very warm months, with the combined two-month period (nationally 1.46°C above normal) ranking second for mean temperature behind 1988 (and closely followed by 2006 and 2007). In both months, maximum and minimum temperatures were above normal over almost the entire continent, the most significant exception being in northern Victoria where overnight temperatures were slightly below.

This was the third successive year in which the September-October period was exceptionally warm and exceptionally dry in the southeast. The two-month period was the second-driest on record for SA and the third-driest on record in Victoria (where 2006 and 2007 rank fourth and fifth respectively), while maximum temperatures in both states also ranked in the top five for the third successive year. Monthly area-average records were set in October for low rainfall in SA (85% below normal) and high maximum temperatures in Victoria (anomaly +2.73°C). In addition, with only 12.0 mm of rain Melbourne had its driest September on record (previous record 13.4 mm in 1907). At Canberra and Wagga Wagga, the last three September-October periods have been the three warmest on record. The very dry early spring conditions severely limited inflows into the Murray-Darling Basin, and led to widespread crop failures in southeastern Australia. The dry conditions also led to unusually large diurnal temperature ranges in the region, and there were damaging late frosts in parts of Victoria on 23rd October, with readings of -3.9°C at Westmere and -3.8°C at Ararat.

November-December: Widespread wet conditions

Early November saw a marked change in the Australian climate pattern, with moist air moving into central Australia and remaining there for almost the entire month. This set the scene for a very wet month over much of Australia.



Alice Springs, which had looked set for its driest year on record when it had only received 37 mm in the year to end of October, experienced its wettest November on record with 160 mm, taking it close to the long-term average for the January to November period. Parts of southeast Queensland and northern NSW were affected by severe thunderstorms, including one on the 16th which produced damage estimated at \$100+ million to the Brisbane suburb of The Gap. Overnight on 19th-20th, slow-moving storms produced more than 150 mm of rain in numerous locations west and southwest of Brisbane, including 243 mm at Tallegalla.

23rd December: On a stormy afternoon, a tornado roars through the southern NSW countryside near Rock Flat. Photograph by Heather Leckie. Used with permission.

As is typical for a wet month, maximum temperatures were below normal, especially in WA where the state-wide November average was the third-lowest on record; Perth failed to reach 30°C during the month for the first time since 1964.

The wet conditions persisted into December, apart from across Queensland which was generally drier and warmer than average. Nonetheless Queensland saw its fair share of severe thunderstorms, with flash floods, damaging winds and large hail, which were a prominent feature in eastern Australia. On the 18th a tornado touched down for 2 km near Batania (45 km west of Amberley, Qld) and in NSW on the 23rd a tornado was observed at Rock Flat between Cooma and Nimmitabel.

The northern Kimberley and the adjacent parts of the NT were affected by tropical cyclone *Billy* which crossed the coast north of Wyndham in the early hours of the 20th as a category 2 system. Port Keats (NT) received 327 mm in the 48 hours to 9 am on the 18th, and Wyndham (WA) received 384 mm in the 48 hours to 9 am on the 21st. These heavy falls were instrumental in producing record December totals in parts of the northwest NT and northern Kimberley.

A. Mid-January: Severe floods in central Queensland, especially in Emerald area, from remnants of TC *Helen*.

B. 15th February, Mackay area, Qld: Extremely heavy rain (daily totals up to 625 mm, most of it in 5 hours), with flash flooding.

C. Very dry September-October in parts of southern Australia; driest September and September-October on record at Melbourne.

D. Driest January-October on record for central Australian region, with 215 consecutive rainless days at Papunya (D1). A very wet November followed in most of region.

E. 3rd-17th March: Major heatwave in southern Australia; many record runs of consecutive days above 35° or 40°C, including Adelaide (15 days above 35°C).

F. Consistently low minimum temperatures from late March to the end of May, including Queensland's first sub-zero March minimum at Stanthorpe (F1), and runs of 60 or more consecutive days with below-normal minima at Kalumburu (F2) and Kowanyama (F3).

G. 24th May: Australian record low temperature for May of -13.4°C at Charlotte Pass.

H. Consistent cold conditions from mid-July to late August, with numerous low-level snowfalls. Failed to rise above 0°C for 53 consecutive days at Mt Hotham (H1), an Australian record.

I. 17th August: WA record low temperature of -7.2°C at Eyre.

J. 27th-28th April: Early-season cold outbreak with widespread snow on NSW and Victorian highlands. Australian record low max of -3.2°C for April at Mt Hotham (H1) on 28th.

K. 2nd April: Severe winds in Victoria, Tasmania and southeast SA; widespread tree/building damage and power outages.

L. Storm surges with some coastal flooding and damage in Perth area (L1) on 18th-19th July, and on Port Phillip (L2) and in SE Tasmania (L3) on 1st July.

M. Damaging late-season frosts in southern WA on 22nd September, and parts of northern and western Victoria on 23rd October.

N. 22nd November: Late-season snowfall on NSW Central Tablelands, with some crop damage.

O. November: Severe thunderstorm outbreaks in SE Queensland, with major wind damage in NW suburbs of Brisbane on 16th, and flash flooding in Ipswich area over 19th-20th.

P. 28th November: Heavy rain and flooding from two separate storms 12 hours apart in Tamworth.

