



SPECIAL CLIMATE STATEMENT 16

Long-term rainfall deficiencies continue in southern Australia while wet conditions dominate the north

Issued 10th October 2008
National Climate Centre

Multi-year rainfall deficiencies continue to be at record or near-record levels over many parts of southern Australia, continuing the long-term meteorological drought¹ that has been affecting many southern areas.

In south-eastern Australia (especially Victoria and Tasmania) the situation has worsened during 2008, with three-year rainfalls now at record low levels in numerous locations, including many areas critical for inflows into the Murray-Darling system. Near- to above-average rains in the last twelve months have eased the situation slightly in the northern half of the Murray-Darling Basin (northern NSW and southern inland Queensland) and in south-east Queensland, though large deficiencies remain.

In contrast much of northern Australia continues to experience well above average rainfall, with record high rainfall widespread about the Top End, Kimberly and parts of Cape York Peninsula over the 3 to 10 year timeframe.

Seven-year rainfall deficiencies – October 2001 to September 2008

The last year in which there was widespread above-average rainfall across much of inland eastern Australia, including most of the Murray-Darling Basin (MDB), was 2000. Since then there have been two extremely dry years, 2002 and 2006, along with a succession of years with rainfall generally near- to slightly below average.

The summer of 2007-08 saw above-average rains in the northern half of the MDB, encompassing southern inland Queensland and northern inland NSW. These rains were associated with a La Niña event in the Pacific Ocean from late 2007 into early 2008. As a result, some parts of the northern MDB received rainfall 25 to 100% above average for the twelve months October 2007 – September 2008. This eased multi-year rainfall deficits in this region; the widespread record low totals that existed for the 6-year period ending in October 2007 (see Special Climate Statement 14) have largely been eliminated. For example, Brewarrina, which averaged 262 millimetres (mm) per year (40% below average) for the six years to October 2007 (the lowest such total since 1900), received 757.8 mm in the year October 2007 – September 2008 (75% above average and 5th highest on record). Most of this rain fell between December and March. Rainfall was also close to normal for the last twelve months over most of south-eastern Queensland, easing the most acute rainfall

¹ Meteorological drought refers to drought considered purely from the perspective of rainfall deficits, as opposed to (for example) hydrological drought which involves reduction in water supplies and agricultural drought which involves reduction in soil moisture.

deficits in the region, although the seven-year rainfall in most of the region is still in the lowest decile (Figure 1).

In contrast, it has been another dry year over south-eastern Australia for areas in central NSW, southwards. Rainfall for the last twelve months has been at least 20% below average over most of Victoria and SA, northern and eastern Tasmania, and the southern and western fringes of NSW (Figure 2). Whilst the last twelve months have not been as dry as 2002 or 2006 in most mainland areas, the continued below-average rainfall has exacerbated existing multi-year rainfall deficits in the region. Victoria's area-averaged rainfall for the seven-year period (17.6% below the 1961-90 average) has fallen to the lowest level on record, surpassing the previous record (17.3% below) for a seven-year period set between May 1938 and April 1945. A selection of stations which have set seven-year low-rainfall records are shown in Table 1.

Averaged over the MDB as a whole, seven-year rainfalls are slightly higher than the driest seven-year totals recorded during the 1937-46 period. When comparing rainfall deficits in the MDB on timescales of five-to-ten years, the post-2001 period, the 1937-46 period and the 1895-1903 period (the 'Federation Drought') are essentially indistinguishable in broad terms. (Detailed basin-wide analyses are not available pre-1900, but data from some key long-term stations can be used to support comparisons).

In the south-west of Western Australia rainfall in the last 12 months has generally been 0-20% below average, with no significant effects on the long-term rainfall deficits along the west coast. The exception is between Geraldton and Shark Bay where tropical activity between February and April, including the effects of three tropical cyclones/tropical lows in February and March, has lifted post-2001 rainfall totals above record low levels.

The last seven years have also been a very warm period in the MDB, with the basin-wide maximum temperatures 1.11°C above the 1961-90 average (Figure 3). This is slightly cooler than the seven years to September 2007 (+1.18°C), but still 0.76°C warmer than the warmest seven-year period prior to 2001, 1976-83 (+0.35°C). Daily mean temperatures for October 2001-September 2008 (0.66°C above average) are also slightly below those of 2000-07 (+0.72°C), but well above those of any pre-2001 period (1976-83, +0.29°C).

Longer-term (twelve-year) rainfall deficits in the south-east and south-west

In the south-west of WA, and in parts of south-eastern Australia (principally central and western Victoria and south-eastern SA, together with northern and eastern Tasmania), long-term rainfall deficits extend back beyond 2000. In both regions, the most recent year in which there was widespread above-average rain was 1996. At some locations, such as Melbourne, there have been eleven consecutive years with below-average rainfall from 1997 to 2007, with 2008 highly likely to become the twelfth. (Prior to 1997, Melbourne had one run of six consecutive below-average years, 1979-84, with no others longer than four years.)

The continued dry conditions in the south-east over the last twelve months has led to a slight expansion in the area over which post-1996 rainfall totals are at record low levels, particularly in eastern Tasmania and the southern Eyre Peninsula. The area of record low totals (Figure 4) now covers the majority of southern Victoria from Gippsland westwards, extending into SA. It also covers most of the northern and eastern coasts of Tasmania.

A separate area of record low totals on the west coast of WA, extending from north of Perth south to Busselton, has not changed significantly in the last year. This is consistent with a long-term downward trend in regional rainfall which commenced in the 1970s. As is the case for seven-year

deficits, twelve-year deficits have eased slightly in the last year over eastern Queensland, although areas of record lows remain in parts of the Darling Downs and South Burnett regions between Gayndah and Kingaroy. A number of stations across Australia set twelve-year low-rainfall records (Table 2).

The most dramatic rainfall deficits on the twelve-year timescale are around metropolitan Melbourne and to its east, including its major water supply catchments. In this area twelve-year rainfall totals have been around 20% below the 1961-90 average, and 10-13% below the lowest on record for any twelve-year period prior to 1996. Over Victoria as a whole, rainfall for the last twelve years has been 15.3% below the 1961-90 average, or in other words, since the drought began in 1996, Victoria has missed out on nearly two years worth of rainfall (1197 mm missed; 1961-90 annual average 654 mm).

Extreme rainfall deficits develop on a three-year timescale

Relatively dry conditions in 2007 and 2008 have combined with the severe drought year of 2006 to produce extreme rainfall deficits on the three-year timescale in some areas of southern Australia (Figure 5). The most significant of these areas is near the Australian Alps in north-eastern Victoria and southern NSW. This is a particularly critical area as it is the region from which a substantial proportion of the inflows into the Murray-Darling river system are derived. Record low three-year rainfalls are also evident near Melbourne, as well as in northern and eastern Tasmania.

In the Australian Alps there are no reliable long-term (40 years or more) records available from any stations above 1000 metres elevation. However, comparisons using recent data suggest that rainfall at locations in nearby foothills are closely related to rain and snowfall at higher elevations. Four stations with 80 or more years of data in this area – Whitlands and Harrierville (Vic) and Batlow and Tumbarumba (NSW) – have been chosen to represent the Alpine region. Rainfall at these four locations in the three years from October 2005 to September 2008 has been 29% to 42% below the long-term average (Table 3). Apart from Tumbarumba, the three-year rainfall is 8% to 17% below the previous driest three-year period on record. Such data suggest rainfall conditions in many of the key catchments for the Murray-Darling system are historically unprecedented over such a length of time. Similarly dramatic rainfall deficits have occurred in the upper parts of the Eildon catchment as well as the Melbourne water supply catchments, as indicated by the data from Marysville and O'Shannassy respectively. Three-year rainfall has also dropped to record or near-record low levels in the Melbourne region. During the last twelve years, there have been three separate episodes of very low three-year rainfall in Melbourne, with each one being drier than the last.

The third major region where three-year rainfall has fallen to record or near-record low levels is over northern and eastern Tasmania. Both 2006 and 2008 have been very dry years in these regions (with 2006 being the drier of the two in the north, and 2008 in the east), while 2007 was also mostly drier than average, although not to the extent of the other two years. It is likely that further records on the 3-year timescale will be set in Tasmania over the coming months, as acutely dry conditions did not become established there until early 2006, following a wet finish to 2005.

Contacts for further information

Dr Blair Trewin, (03) 9669 4623
 Dr David Jones, (03) 9669 4085 (or 0400 132 764)
 Dr Andrew Watkins, (03) 9669 4360 (or 0439 381 710)

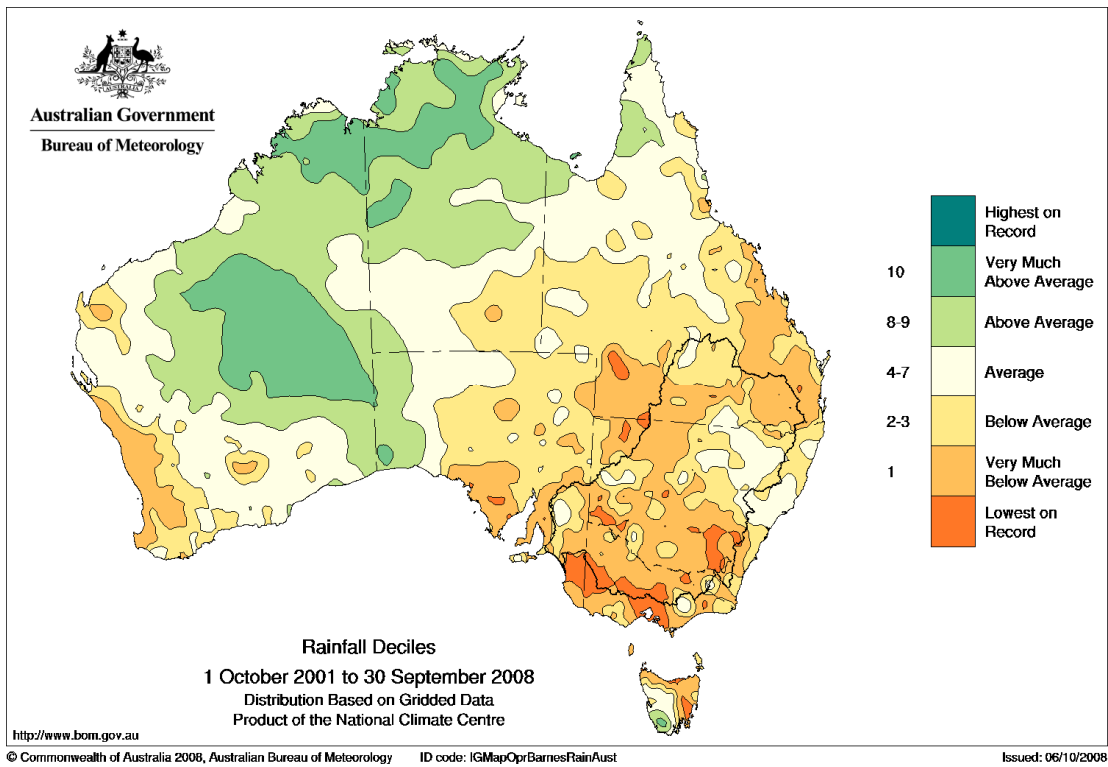


Figure 1. Australian rainfall deciles for the 7 years October 2001 to September 2008.

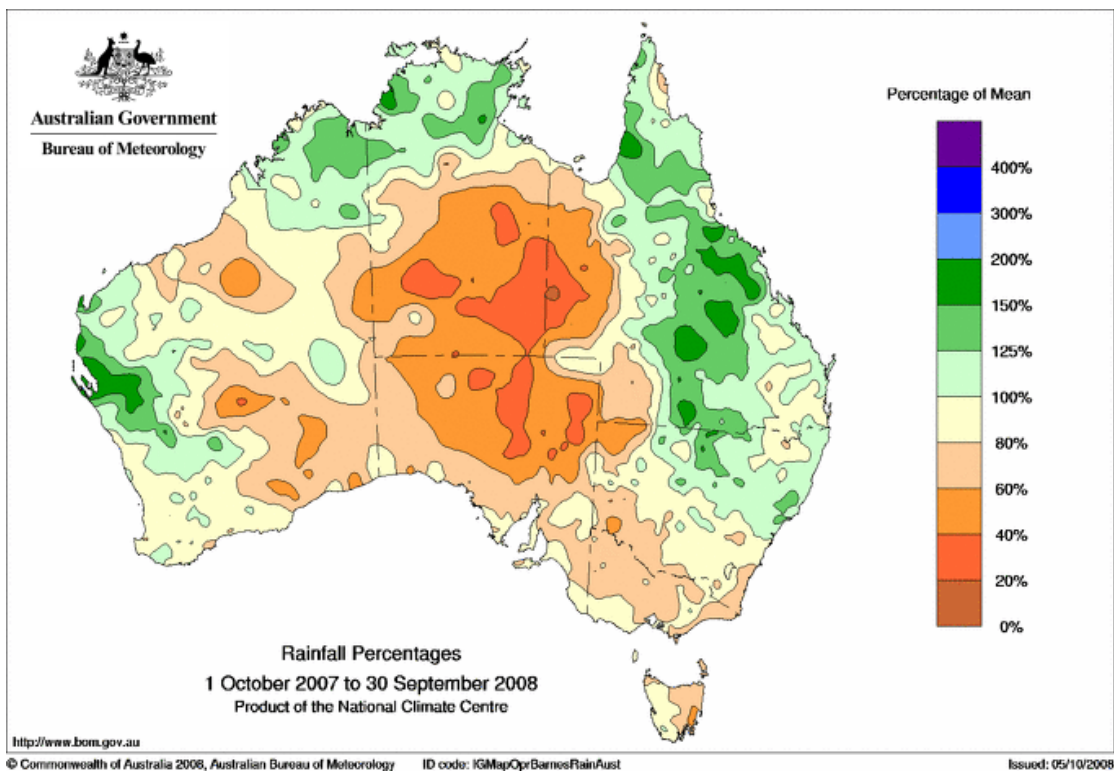


Figure 2. Australian rainfall as a percentage of normal for the 12 months October 2007 to September 2008.

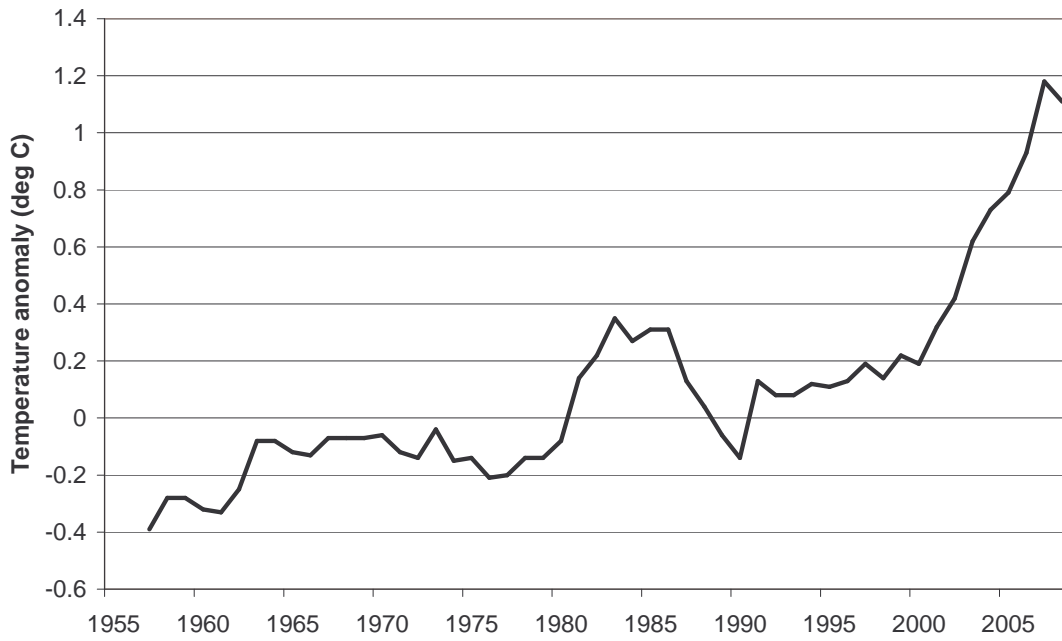


Figure 3. 7-year maximum temperature anomalies (differences from 1961-90 average) for the Murray-Darling Basin.

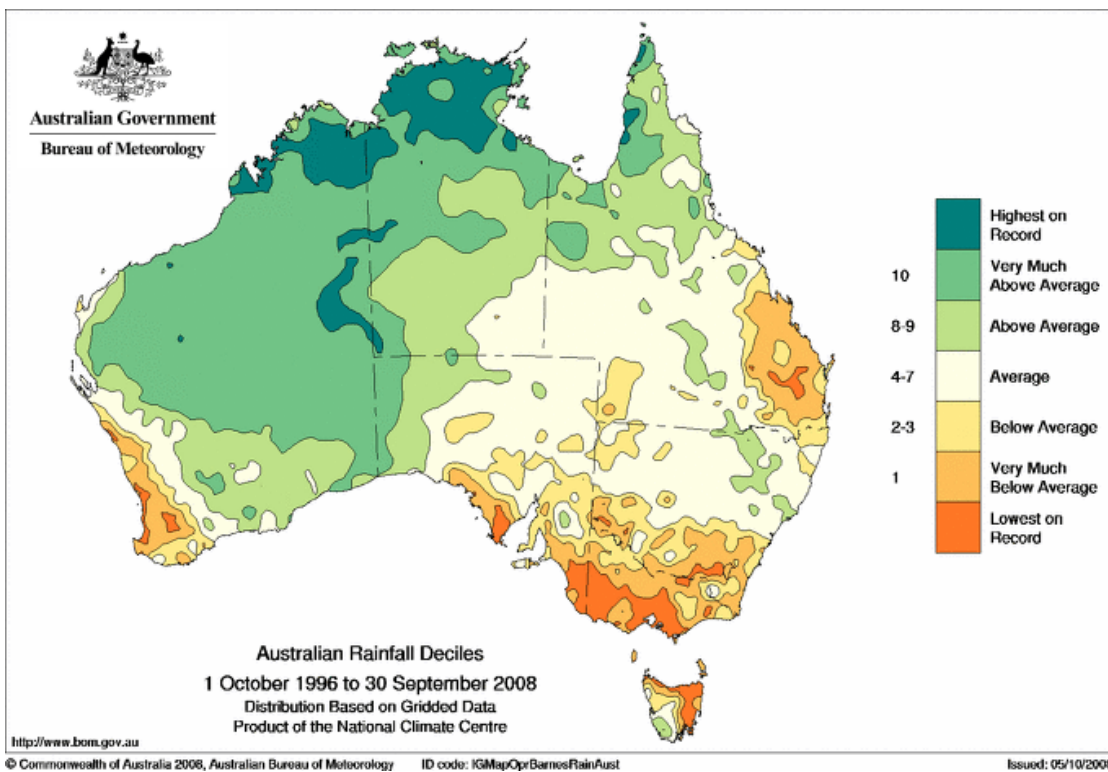


Figure 4. Australian rainfall deciles for the 12 years October 1996 to September 2008.

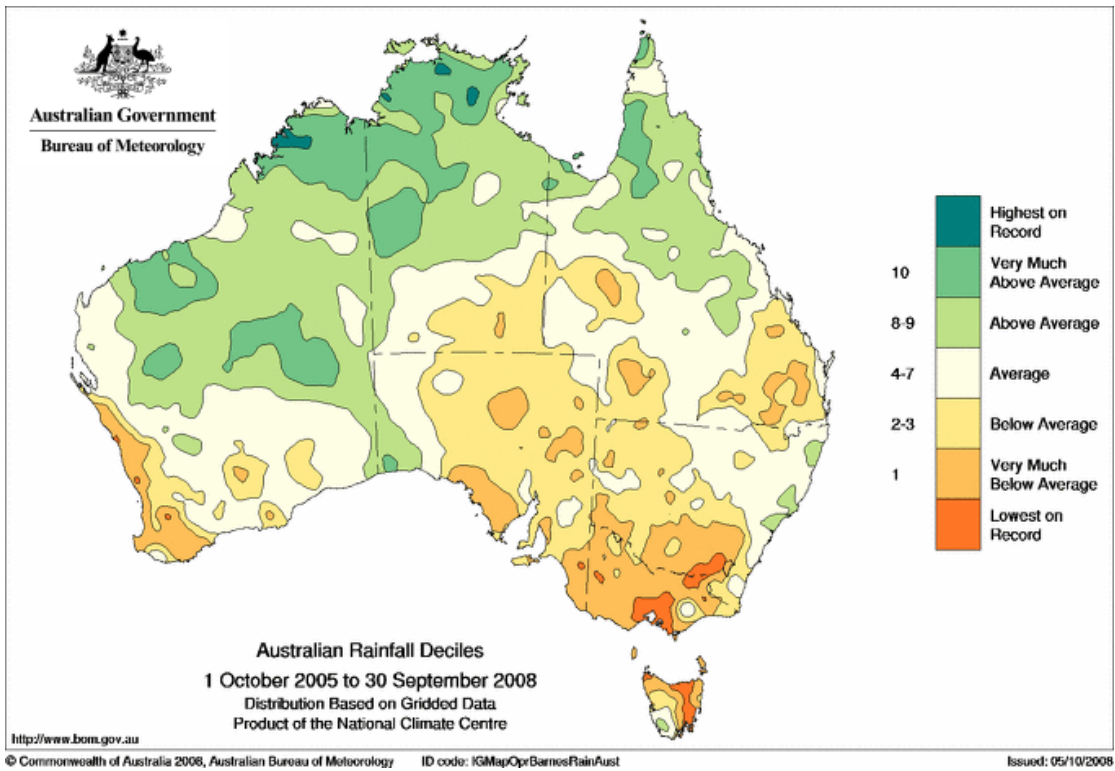


Figure 5. Australian rainfall deciles for the 3 years October 2005 to September 2008.

Station number ²	Name	7-year mean rainfall, Oct 2001 – Sep 2008 (mm)	Previous record ³ (mm)	% below 1961-90 mean	% below pre-1996 record
8051*	Geraldton	331.7	367.9 (Apr 1892 – Mar 1899)	30.2	9.8
16001	Woomera	129.5	137.8 (Jun 1979 – May 1986)	34.4	6.0
18012	Ceduna	238.9	249.8 (May 1983 – Apr 1990)	17.6	4.4
25507	Keith	387.6	404.3 (May 1938 – Apr 1945)	19.1	4.1
70014	Canberra	497.9	502.9 (May 1940 – Apr 1947)	20.1	1.0
70025	Crookwell	644.3	640.1 (Sep 2001 – Aug 2008) 671.6 (Oct 1895 – Sep 1902)	26.9	4.1
72004	Batlow	870.5	847.0 (Nov 2000 – Oct 2007) 1046.4 (Jun 1896 – May 1903)	31.7	16.8
72023	Hume Weir	563.5	557.9 (Nov 2000 – Oct 2007) 569.8 (Dec 1939 – Nov 1946)	20.8	1.1
73007	Burrinjuck Dam	739.0	732.4 (Nov 2000 – Oct 2007) 739.9 (May 1935 – Apr 1942)	22.8	0.1
73054	Wyalong	342.2	339.7 (Dec 2000 – Nov 2007) 415.8 (Apr 1976 – Mar 1983)	33.9	17.7
79023	Horsham	362.2	368.4 (Nov 1895 – Oct 1902)	18.8	1.7
82042	Strathbogie	726.5	812.4 (Apr 1908 – Mar 1915)	29.6	10.6
83012	Harrietteville	1129.5	1123.3 (Nov 2000 – Oct 2007) 1238.4 (May 1938 – Apr 1945)	20.1	8.8
83019	Mansfield	568.8	600.4 (Feb 1940 – Jan 1947)	21.3	5.3
83032	Whitlands	1126.9	1226.9 (Dec 1939 – Nov 1946)	19.3	8.2
86071	Melbourne	498.2	498.1 (Jul 2001 – Jun 2008) 563.6 (Sep 1981 – Aug 1988)	22.0	11.6
86090	O'Shannassy	1101.8	1095.2 (Dec 2000 – Nov 2007) 1238.9 (Aug 1977 – Jul 1984)	21.1	11.1
87043	Meredith	532.2	531.6 (Sep 2001 – Aug 2008) 562.0 (Dec 1939 – Nov 1946)	22.5	5.3
88029	Heathcote	448.3	442.9 (May 2001 – Apr 2008) 455.1 (May 1938 – Apr 1945)	24.6	1.5
88043	Maryborough (Vic)	397.9	396.2 (Jul 2001 – Jun 2008) 401.7 (May 1938 – Apr 1945)	29.2	0.9
89002	Ballarat	535.8	531.3 (May 2001 – Apr 2008) 597.2 (Mar 1979 – Feb 1986)	21.7	10.3

Table 1. Selected stations where 7-year low-rainfall records have been set during the current meteorological drought event.

² Where a station number is shown with an asterisk (*), data from two or more station numbers has been combined for these results.

³ Where a period ending at some point in the last 12 months has a lower rainfall than the figure for the period ending in September 2008, both the lowest value reached in the last 12 months, and the pre-1996 record, are shown. Records set in periods ending after 1996 but before October 2007 (many of which overlap with the current period) are not shown.

Station number	Name	12-year mean rainfall, Oct 1996 – Sep 2008 (mm)	Previous record (mm)	% below 1961-90 mean	% below pre-1996 record
8051*	Geraldton	390.4	389.7 (Sep 1996 – Aug 2008) 397.4 (Jun 1882 – May 1894)	17.9	1.8
9225*	Perth	736.4	758.4 (May 1969 – Apr 1981)	10.1	2.9
10614	Narrogin	422.4	444.9 (Aug 1891 – Jul 1903)	15.9	5.1
18086	Tumby Bay	279.0	286.1 (Jan 1980 – Dec 1991)	14.4	2.5
25507	Keith	401.4	426.7 (Jul 1918 – Jun 1930)	16.2	5.9
26099*	Naracoorte	478.3	522.7 (Dec 1975 – Nov 1987)	18.2	8.5
39039	Gayndah	659.7	647.5 (Feb 1996 – Jan 2008) 681.9 (Dec 1893 – Nov 1905)	11.7	3.3
72004	Batlow	984.0	1122.9 (Feb 1936 – Jan 1948)	22.9	12.4
72043	Tumbarumba	859.9	883.0 (Feb 1936 – Jan 1948)	13.0	2.6
74106	Tocumwal	367.3	374.6 (Jul 1900 – Jun 1912)	22.0	2.0
76031*	Mildura	223.1	226.6 (Jul 1918 – Jun 1930)	22.3	1.6
78031	Nhill	356.6	368.6 (Jul 1918 – Jun 1930)	15.4	3.3
79023	Horsham	381.4	396.2 (Jan 1877 – Dec 1888)	14.5	3.7
82039	Rutherglen	483.9	513.4 (Oct 1918 – Sep 1930)	20.9	5.7
82042	Strathbogie	779.8	826.1 (Aug 1918 – Jul 1930)	24.5	5.6
83012	Harrierville	1211.6	1295.2 (Jul 1918 – Jun 1930)	14.3	6.5
83031	Whitfield	890.2	983.7 (Jun 1904 – May 1916)	21.2	9.5
83032	Whitlands	1192.5	1250.9 (Jan 1961 – Dec 1972)	14.6	4.7
85023	Drouin	835.3	917.2 (Aug 1918 – Jul 1930)	15.7	8.9
86071	Melbourne	516.0	588.4 (Sep 1905 – Aug 1916)	19.2	12.3
86090	O'Shannassy	1110.7	1274.7 (Jun 1935 – May 1947)	20.5	12.9
88001	Alexandra	600.9	618.7 (May 1896 – Apr 1908)	16.5	2.9
88015	Clunes	494.7	498.0 (May 1896 – Apr 1908)	21.1	0.7
88044	Marysville	1109.9	1231.6 (Dec 1904 – Nov 1916)	17.1	9.9
89002	Ballarat	553.7	629.9 (Jun 1979 – May 1991)	19.1	12.1
94029	Hobart	530.7	544.5 (Jul 1978 – Jun 1990)	9.5	2.5
95003	Bushy Park	510.0	516.3 (Nov 1931 – Oct 1943)	15.1	1.2

Table 2. Selected stations where 12-year low-rainfall records have been set during the current meteorological drought event.

Station number	Name	3-year mean rainfall, Oct 2005 – Sep 2008 (mm)	Previous record (mm)	% below 1961-90 mean	% below pre-1996 record
18012	Ceduna	209.1	226.7 (Dec 1979 – Nov 1982)	27.8	7.8
25509	Lameroo	272.3	274.5 (Nov 1974 – Oct 1977)	30.0	0.8
70220	Boorowa	388.1	388.4 (Jul 1894 – Jun 1897)	38.9	0.1
72004	Batlow	749.0	905.1 (Jan 1965 – Dec 1967)	41.3	17.2
72023	Hume Weir	465.4	515.8 (Feb 1936 – Jan 1939)	34.6	9.8
72042	Tarcutta	427.6	447.8 (Dec 1911 – Nov 1914)	37.0	4.5
79017	Goroke	364.5	359.1 (Sep 2005 – Aug 2008) 390.8 (Jan 1912 – Dec 1914)	31.2	6.7
82042	Strathbogie	620.7	679.5 (Oct 1942 – Sep 1945)	39.9	8.7
83012	Harrierville	941.8	1072.8 (Aug 1942 – Jul 1945)	33.4	12.2
83019	Mansfield	485.8	491.9 (Aug 1942 – Jul 1945)	32.8	1.2
83032	Whitlands	929.7	1007.7 (Oct 1942 – Sep 1945)	33.4	7.7
85023	Drouin	777.0	756.5 (Mar 2005 – Feb 2008) 779.7 (Feb 1925 – Jan 1928)	21.6	0.4
85096	Wilsons Promontory	807.7	792.7 (Mar 2005 – Feb 2008) 820.6 (May 1959 – Apr 1962)	24.7	1.7
86071	Melbourne	457.3	447.7 (Mar 2005 – Feb 2008) 475.9 (Jan 1925 – Dec 1927)	28.4	3.9
86090	O'Shannassy	962.7	1115.4 (Feb 1936 – Jan 1939)	31.0	13.7
87043	Meredith	482.9	475.4 (Mar 2005 – Feb 2008) 487.6 (Jan 1943 – Dec 1945)	29.7	1.0
88001	Alexandra	520.1	524.6 (Aug 1942 – Jul 1945)	27.7	0.9
88044	Marysville	970.8	1075.4 (Sep 1909 – Aug 1912)	27.5	9.7
89002	Ballarat	491.1	477.3 (Mar 2005 – Feb 2008) 522.2 (Dec 1924 – Feb 1927)	28.2	6.0
92038	Swansea	394.7	412.5 (Jan 1906 – Dec 1908)	31.0	4.4
92045	Eddystone Pt	551.4	543.3 (May 2005 – Apr 2008) 556.2 (Dec 1924 – Nov 1927)	32.6	0.9
93014	Oatlands	408.2	415.4 (Dec 1939 – Nov 1942)	22.1	1.7

Table 3. Selected stations where 3-year low-rainfall records have been set during the current meteorological drought event.