



**Australian Government**  
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## **SPECIAL CLIMATE STATEMENT 22**

**Australia's wettest September on record but it is not enough to clear long-term rainfall deficits.**

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***This Special Climate Statement from the Bureau of Meteorology details recent high rainfall across Australia in 2010, including record rainfall in northern Australia, and reviews the prolonged dry conditions experienced in south-east Australia and in the south-west of Western Australia.***

The end of September 2010 marks 14 years since the start of a very long meteorological drought<sup>1</sup> in south-east Australia. In the south-west of Western Australia, similarly dry conditions have been in place over the past 14 years, while a longer term drying trend has been observed since the 1970s.

The prolonged dry spell has been characterised by a combination of recurrent meteorological drought (short-term dry “spells”), less autumn and winter rainfall in most years, and an absence of very wet periods.

Recent, widespread, above-average rainfall across much of Australia (Figures 1 and 2) has alleviated short-term (month to seasonal) dry conditions. This rainfall has been associated with the breakdown of the 2009/2010 El Niño and the development of a moderate to strong La Niña event in 2010.

The recent rainfall has not ended the long-term rainfall deficiencies still affecting large parts of southern Australia. While some parts received well above-average rainfall, most notably in the Murray-Darling Basin (MDB), drought-affected regions in the far south-east of the continent have experienced near-normal conditions. The south-west has continued its run of very much below-average rainfall, adding further to the long-term drying trend in this region.

### ***Prolonged Dry Conditions across Parts of Australia***

Across south-east Australia, major short-term meteorological droughts occurred in 1997, 2002, 2006 and 2008. Across the south-west of WA, major short-term meteorological droughts occurred in 2001, 2002, 2004 and 2006. This year has seen the south-west experience its driest start to the year on record for the region, and the driest winter on record by a considerable margin (44% below-normal; see Figure 2 and [Special Climate Statement 21](#)<sup>2</sup>). The previous record for low winter rainfall was set in 1914.

Furthermore, October 2009 to September 2010 has been the driest 12-month period on record for south-west Western Australia. The September rains elsewhere in Western Australia had little effect on the region. This has led to record low streamflows in the south-west by a substantial margin.

In addition to recurrent short-term droughts mentioned above, autumn and winter rainfall over the last 14 years in the south-east, and since the 1970s in the south-west, has been 10-20% below long-term rainfall averages. The systematic reduction in autumn and winter rainfall is perhaps more correctly characterised as increasing aridity, or a long-term shift to a drier climate, as opposed to episodic drought such as is commonly observed with El Niño events.

The effect of the prolonged period of drier than average years, and a lack of very wet “recovery” years, can be seen in the accumulated rainfall anomalies for Victoria (for example). Figure 3 shows Victorian rainfall anomalies (departures from the average) as an accumulated value since 1960.

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

<sup>2</sup> Available on the Bureau’s web site at <http://www.bom.gov.au/climate/current/special-statements.shtml>.

Since 1996, there has been no recovery from long-term rainfall deficiencies, with the recent heavy rainfall making little difference to the accumulated deficit.

### **Wet September in 2010**

September 2010 was Australia's wettest September on record, with rainfall averaged over the country almost three times the long-term average, beating the previous record set in 1906.

This record rainfall is largely associated with well above-average rainfall in the tropics and subtropics. The dry season in these regions typically runs from May through to October, making the recent rainfall highly unusual. Large parts of the country had their highest September rainfall on record, including 29% of the Northern Territory, 21% of South Australia and 24% of Queensland. It was also the wettest September on record in the Northern Territory and Queensland, and the third-wettest in both South Australia and Western Australia, despite the very dry conditions in the far south-west.

For the year as a whole, South Australia has already exceeded its average annual rainfall, making 2010 the first above-normal year since 2003.

Victoria has averaged over 500 mm of rainfall in the first nine months of this year, representing just over 80% of its annual rainfall. This is the wettest start to the year since 1996. However, recent rainfall is not extraordinary in a historic context, with the January-September total of 552 mm ranking 28<sup>th</sup> highest in the 111 years of record (1900 to the present).

For south-east Australia as a whole, it has been the wettest first 9 months of the year since 1996, and ranks 29<sup>th</sup> highest overall.

In light of recent rainfall across Australia, both above and below-average, it is of interest to examine the effect on the long-standing rainfall deficits last discussed in [Special Climate Statement 16](#) (October 2008). That statement examined the long-term meteorological droughts of 12 and 7 year durations. This statement now extends these periods by two years, to examine the most recent 14 and 9 year periods.

### **Nine-year rainfall deficiencies – October 2001 to September 2010**

As discussed in the 2008 Statement, the last year in which there was widespread above-average rainfall across much of inland eastern Australia, including most of the MDB, was 2000. Since 2000 there have been two extremely dry years, 2002 and 2006, along with a succession of years with rainfall generally near-average to slightly below-average.

The La Niña event in 2010 has seen widespread above-average rainfall across northern and eastern parts of mainland Australia. The rainfall in Victoria has typically been close to average, although there was flooding associated with heavy rainfall on the 4<sup>th</sup> and 5<sup>th</sup> of September.

Above-average rainfall, especially in the northern part of the MDB, has eased rainfall deficiencies present since 2001 (Figure 4), although the largest positive rainfall anomalies have been concentrated in the northern and western parts of the MDB, with the high-rainfall areas near the Great Dividing Range only slightly above-normal.

Despite above-average rainfall over much of Queensland in 2010, long-term rainfall deficits still exist in the south-east of the state. For the seven-year period to 2008 much of southern Queensland was experiencing rainfall values in the lowest 10% of historical totals. This situation has eased, but there remains an extensive area of rainfall totals in the lowest 10% of such periods on record, covering much of the south-east corner.

South-eastern Australia, including southern parts of the MDB, Victoria and Tasmania, largely missed the widespread well-above-average falls experienced further north in 2010. These areas are still covered by extensive rainfall deficits for the nine-year period. Much of Victoria (88%) has recorded rainfall in the lowest 10% of such periods on record; 56% of Tasmania has likewise recorded rainfall totals in the lowest 10% of such periods on record. However, the large areas of lowest-on-record rainfall that were present in Victoria for the seven-year period October 2001 to September 2008 are no longer present at the nine-year time scale, except in some small areas in the east of the state and around Melbourne.

In south-west Western Australia, a continuation of extreme low rainfall years, coupled with no intervening years of widespread above-average falls, has led to this region experiencing the second-driest nine-year period on record. This has led to the development of a large area of lowest-on-record rainfall on and near the west coast between Cape Leeuwin and Kalbarri.

### **Longer-term (fourteen-year) rainfall deficits in the south-east and south-west**

As discussed in Special Climate Statement 16, in the south-west of Western Australia and in parts of south-eastern Australia, long-term rainfall deficits extend prior to 2000. In contrast, across the north of the continent above-average rainfall has dominated, with very extensive areas of above-average to record rainfall since late 1996.

Figure 5 shows rainfall deciles for the 14-year period October 1996 to September 2010. In the southern drought-affected regions, the most recent year in which there was widespread above-average rain was 1996. Some locations, such as Melbourne, have experienced thirteen consecutive calendar years with below-average rainfall from 1997 to 2009. [Prior to 1997, Melbourne had just one run of six consecutive below-average years, 1979 to 1984, with no other dry periods longer than four years.]

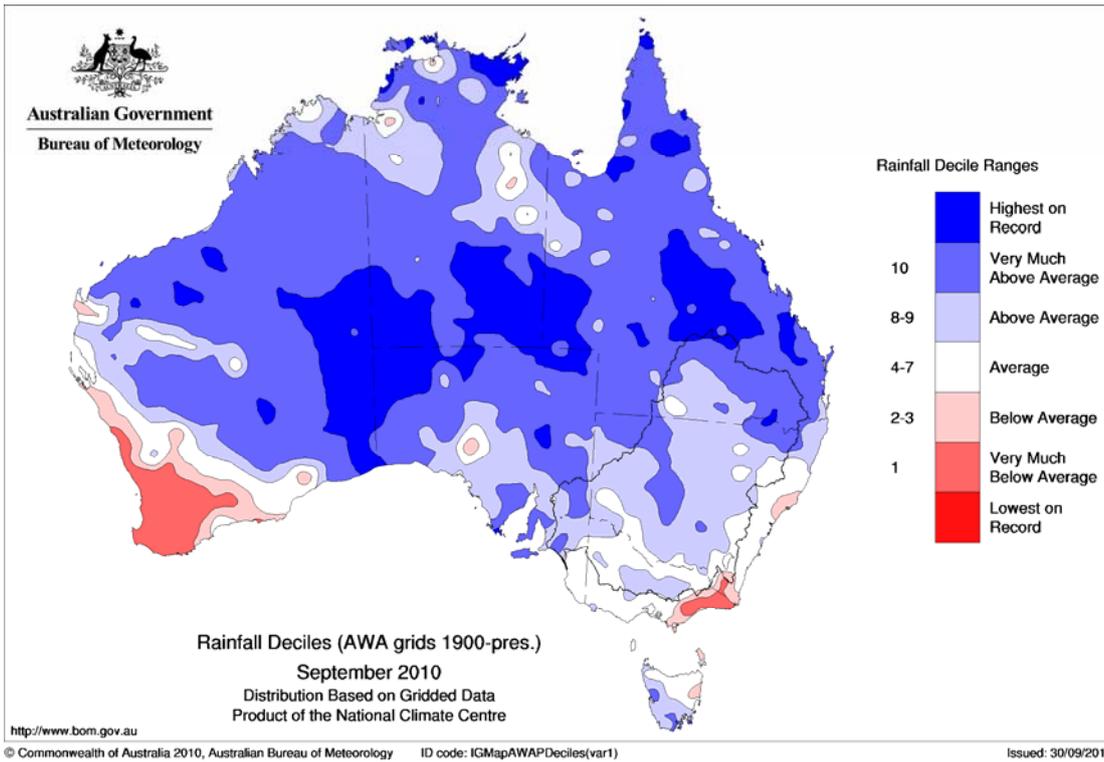
Although 2010 has been the wettest year in Melbourne since 2005, January-September rainfall has still been 35 mm below normal, and it is likely that 2010 will be a fourteenth consecutive year of below-average rainfall for the city. In fact all of the southern capital cities, excluding Hobart, have had their driest 14-year period on record, ending in September (Table 2).

Due to the generally below-average rainfall across eastern Victoria over the past two years, areas of lowest-on-record rainfall have expanded into eastern Victoria for the 14-year period. Around half of Victoria and half of Tasmania have recorded lowest-on-record rainfall for the period.

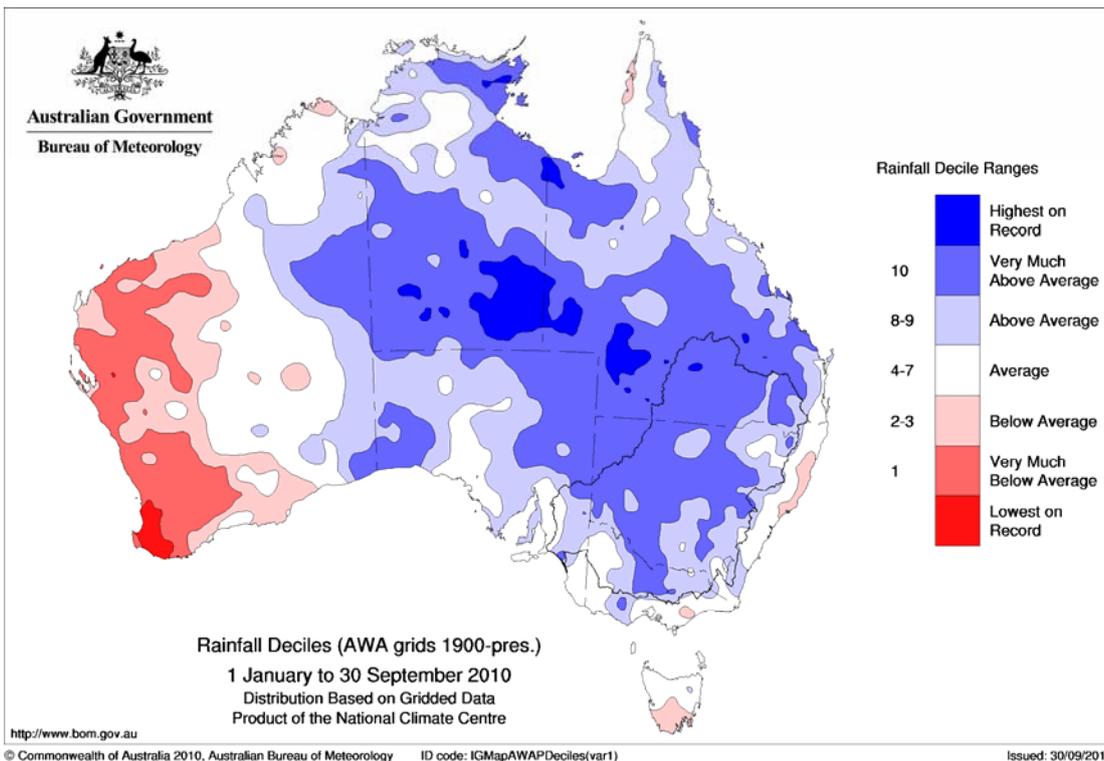
The record dry conditions over south-west Western Australia over the past 12 months have led to a large expansion of areas of lowest-on-record rainfall, to cover western coastal areas between Cape Leeuwin and Kalbarri, and extending inland into the southern wheat belt. The increasing severity of the rainfall deficiencies in south-west Western Australia, with record dry conditions this year, is significant in the context of a 40-year pattern of drying which has affected the region.

Similar to the nine-year period, 14-year rainfall deficits have eased slightly in south-east Queensland, with no areas of lowest-on-record currently present.

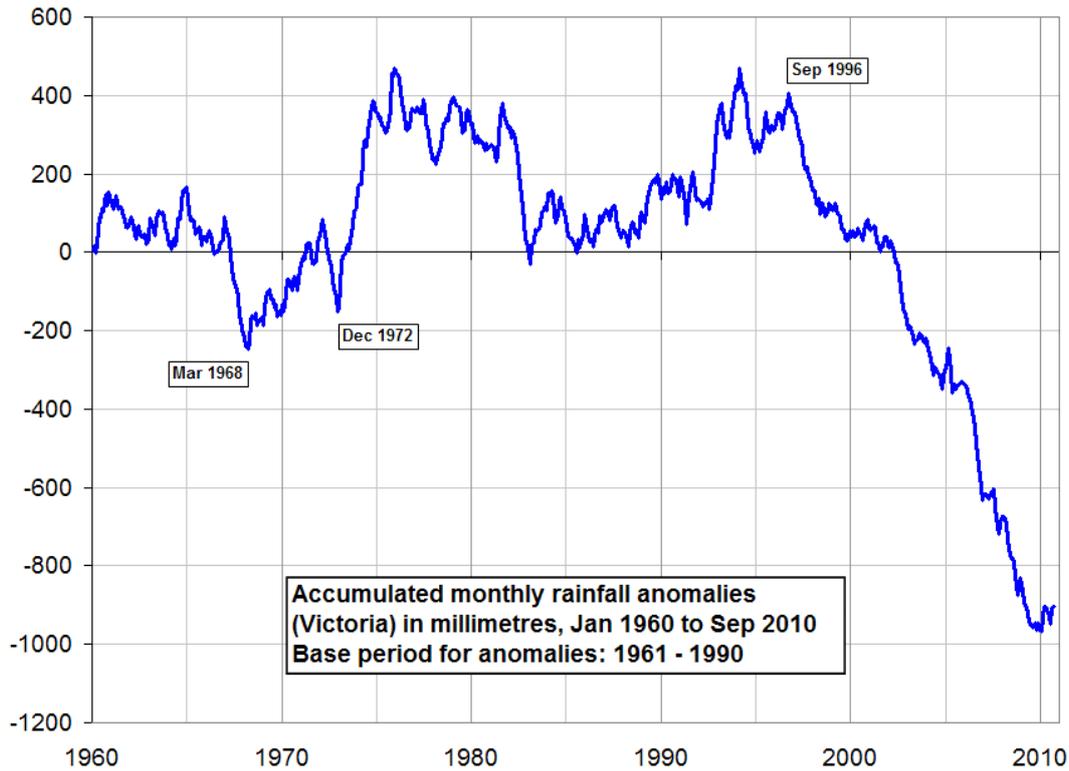
In marked contrast to the south-east and south-west, continuing very wet conditions have occurred over much of subtropical and tropical Australia, with above-average rainfall dominating in 2008, 2009 and 2010. For the 14-year period ending September 2010, some 37% of the Northern Territory and 18% of Western Australia has experienced record wet conditions. The overall pattern of rainfall in the last two years (since the issuing of Special Climate Statement 16 in October 2008) has been consistent with the recent 15 to 30-year pattern of rainfall increases across northern Australia and rainfall decreases across southern Australia.



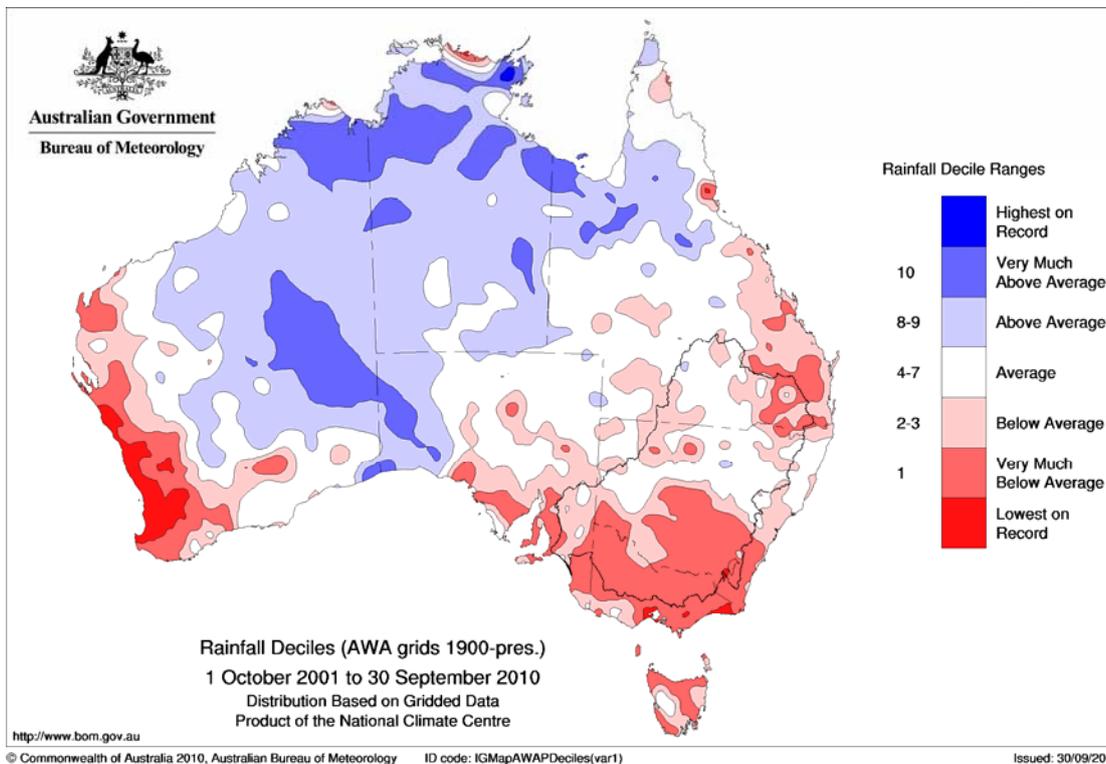
**Figure 1: September rainfall deciles. Area enclosed in black represents the Murray-Darling Basin.**



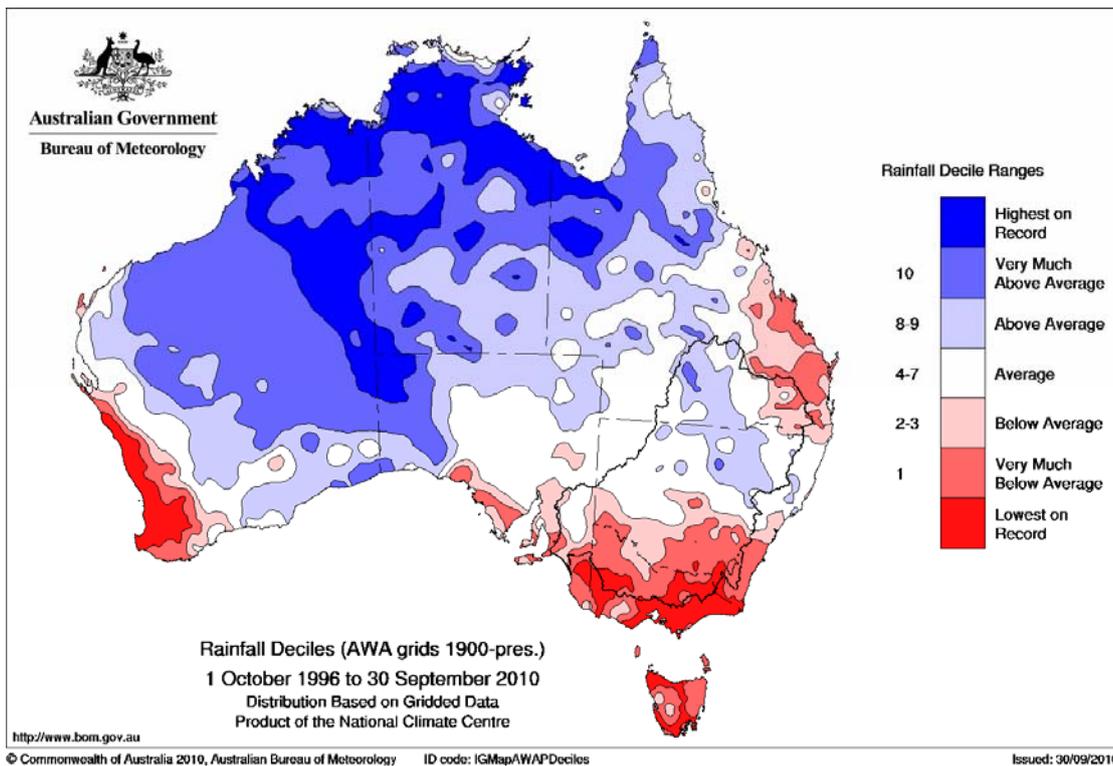
**Figure 2: Rainfall deciles for the first nine months of 2010. Above-average rainfall has fallen across much of the Murray-Darling Basin this year.**



**Figure 3: Accumulated monthly Victorian rainfall anomalies (using 1961-1990 climatology) in millimetres for the period January 1960 to September 2010. Since September 1996, there have been continual rainfall deficits that have not been recovered by relieving heavy rain.**



**Figure 4: Australian rainfall deciles for the nine years October 2001 to September 2010. Areas shaded in solid red have experienced their lowest rainfall on record. There has been some relief from long-term drought in the northern Murray-Darling Basin due to recent rainfall.**



**Figure 5: Australian rainfall deciles for the 14 years October 1996 to September 2010. This map illustrates that rainfall in the most recent 14-year period is the lowest-on-record for areas shaded in solid red.**

Station Number	Name	9-year mean rainfall, Oct 2001 - Sep 2010 (mm)	Previous record (mm)	% below 1961-1990 mean
8100	<a href="#">Northampton</a>	380.6	387.2 (Sep 2001 - Aug 2010)	18.5
8254	<a href="#">Kondut</a>	293.7	295.7 (Sep 2001 - Aug 2010)	17.8
9021	<a href="#">Perth</a>	659.5	667.3 (Sep 2001 - Aug 2010)	15.1
9573	<a href="#">Manjimup</a>	879.0	888.1 (Sep 2001 - Aug 2010)	11.1
9657	<a href="#">Roelands</a>	735.7	741.5 (Sep 2001 - Aug 2010)	18.7
10121	<a href="#">Tammin</a>	297.1	299.8 (Sep 2001 - Aug 2010)	14.7
10527	<a href="#">Bulyee</a>	303.6	306.3 (Sep 2001 - Aug 2010)	23.8
10628	<a href="#">Quairading</a>	306.5	308.4 (Sep 2001 - Aug 2010)	14.0
72056	<a href="#">Blowering Dam</a>	764.3	771.4 (Sep 2001 - Aug 2010)	24.3
85034	<a href="#">Glenmaggie Weir</a>	516.6	531.0 (Sep 2001 - Aug 2010)	20.3
85072	<a href="#">Sale</a>	466.8	486.3 (Sep 2001 - Aug 2010)	23.7

Table 1. Selected stations where 9-year low rainfall records have been set during the current meteorological drought.

Station Number	Name	14-year mean rainfall, Oct 1996 - Sep 2010 (mm)	Previous record (mm)	% below 1961-90 mean
9021	<a href="#">Perth</a>	675.4	682.9 (Sep 1996 - Aug 2010)	13.1
9518	<a href="#">Cape Leeuwin</a>	762.0	769.6 (Sep 1996 - Aug 2010)	27.3
9534	<a href="#">Donnybrook</a>	873.3	882.8 (Sep 1996 - Aug 2010)	10.0
9657	<a href="#">Roelands</a>	759.4	768.9 (Sep 1996 - Aug 2010)	16.0
10614	<a href="#">Narrogin</a>	419.6	423.9 (Sep 1996 - Aug 2010)	15.5
23034	<a href="#">Adelaide</a>	417.1	417.1 (Apr 1996 - Mar 2010)	6.8
82068	<a href="#">Mitta Mitta</a>	903.1	908.1 (Sep 1996 - Aug 2010)	12.7
85034	<a href="#">Glenmaggie</a>	527.3	530.0 (Sep 1996 - Aug 2010)	18.6
85042	<a href="#">Jindivick</a>	988.3	993.4 (Sep 1996 - Aug 2010)	14.8
85072	<a href="#">East Sale</a>	474.4	477.2 (Sep 1996 - Aug 2010)	22.4
86071	<a href="#">Melbourne</a>	516.3	517.3 (Sep 1996 - Aug 2010)	19.2
86117	<a href="#">Toorourrong Reservoir</a>	700.9	704.1 (Sep 1996 - Aug 2010)	13.5

Table 2. Selected stations where 14-year low rainfall records have been set during the current meteorological drought.

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