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**Bureau of Meteorology**

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## **SPECIAL CLIMATE STATEMENT 42**

### **Very heavy December rainfall in southwest Western Australia**

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This statement is based on preliminary data available as of 14 December 2012, which may be subject to change as a result of standard quality control procedures.

## **Very heavy December rainfall in southwest Western Australia**

A deep surface trough interacted with a slow moving middle level low off the Western Australian west coast to produce widespread showers and thunderstorms across most of Western Australia from 10 to 13 December 2012. The middle level low was both slow moving, allowing moisture to build up over southwest Western Australia over a period of several days, and in phase with the surface trough, enhancing atmospheric instability. These factors combined to produce unusually heavy rainfall in southwest Western Australia over several days.

Very high rainfall totals were reported in the Lower West and Southwest districts on the 11<sup>th</sup> and 12<sup>th</sup>, but particularly in northern parts of the Southwest district, around the localities of Bunbury, Harvey, and Collie, with many sites registering December daily records and with some even surpassing their highest monthly total for December. Three daily rainfall reports during the event exceeded the previous highest daily rainfall recorded in the Southwest Land Division (SWLD) for December; a record that was broken in 2011 (i.e., just one year ago) after standing for more than 70 years. The heaviest rainfall was reported during the 24 hours to 9am on 13 December with the highest fall being 210.8 mm at Yourdamung Lake, northeast of Collie in the Southwest district. This is the fifth highest daily rainfall total on record in the SWLD for any month.

### Daily rainfall totals and their historical context

The first significant weather of this event appeared on the 10<sup>th</sup> as thunderstorms developed over the Southwest district and Wilgarrup (northeast of Manjimup) recorded a daily total of 48.2 mm in the 24 hours to 0900 WST on the 11<sup>th</sup>, its highest December daily fall in 106 years of record. However, falls in the region were generally modest with most sites recording less than 10 mm.

A middle level trough developed near the SWLD west coast on the 11<sup>th</sup> and a low formed in the trough as showers and thunderstorms occurred over the Lower West and Southwest districts. The most significant falls occurred late on the 11<sup>th</sup> and in the early morning on the 12<sup>th</sup> in the southern Lower West and northern Southwest districts. Heavy falls were reported in the 24 hours to 0900 WST on the 12<sup>th</sup>, mostly in the 30 to 80 mm range, though totals to almost 110 mm were recorded (Figure 1a & Table 1). Mandurah in the Lower West reported 74.2 mm in the 24 hours to 0900 WST on the 12<sup>th</sup>, the highest December daily rainfall observed in Mandurah since records commenced in 1907 (rainfall readings have been taken at several sites in Mandurah since records began). The heaviest falls were reported further south in the Harvey and Myalup area. Department of Agriculture and Food Western Australia (DAFWA) weather stations recorded daily totals of 88.2 mm at Myalup, and 109.2 mm at Harvey (to the northwest of the Harvey township). The daily total at Harvey (DAFWA) was, at the time, the fifth highest daily rainfall on record in the SWLD in December. A few sites with long-term rainfall records broke their December daily record as a result of the intense rainfall (Figure 2a). Brunswick Junction, just south of Harvey, more than doubled its previous December daily record from rainfall readings going back 104 years (Table 2).

The middle level low slowly tracked northward parallel to the southern west coast on the 12<sup>th</sup>, and an intense and persistent rainband developed over the Collie and Bunbury region of the Southwest district during the morning. It remained over the region during the afternoon before clearing during the early evening. Falls in the Bunbury area were generally in the 60 to 90 mm range in the 24 hours to 0900 WST on the 13<sup>th</sup>, with more intense rainfall reported around Collie and to the northeast

(Figure 1b & Table 3). Collie and Collie East reported daily totals of 157.2 mm and 135.8 mm respectively, whilst Yourdamung Lake, approximately 20 km to the northeast of Collie, registered the highest daily total during the event of 210.8 mm. The daily total at Collie was its highest daily fall for any month in 106 years of record (almost four times greater than the previous record December total), whilst sites between Collie and Bunbury also exceeded their previous highest December daily rainfall (Figure 2b & Table 4). All three readings at Yourdamung Lake, Collie, and Collie East exceeded the previous highest daily rainfall for the SWLD in December (Table 5), which coincidentally was recorded exactly one year ago approximately 60 km east-northeast of Yourdamung Lake at Williams. During that event on 13 December 2011, 125.6 mm was recorded (see Special Climate Statement 35, 16 December 2011, for details of this event). The daily total of 210.8 mm at Yourdamung Lake was also the fifth highest daily rainfall recorded in the SWLD for any month (Table 6).

While only minor river flooding was reported in the Collie, Preston, and Murray rivers as a result of the very heavy rainfall, significant flash flooding occurred in Collie with numerous businesses and residences inundated.

The middle level low slowly tracked over northern parts of the SWLD and weakened on the 13<sup>th</sup>. Showers and thunderstorms were reported across the SWLD, and were persistent in the southern Central Wheat Belt as a tornado was reported near Kellerberrin and rainfall totals generally in the 10 to 30 mm range were observed.

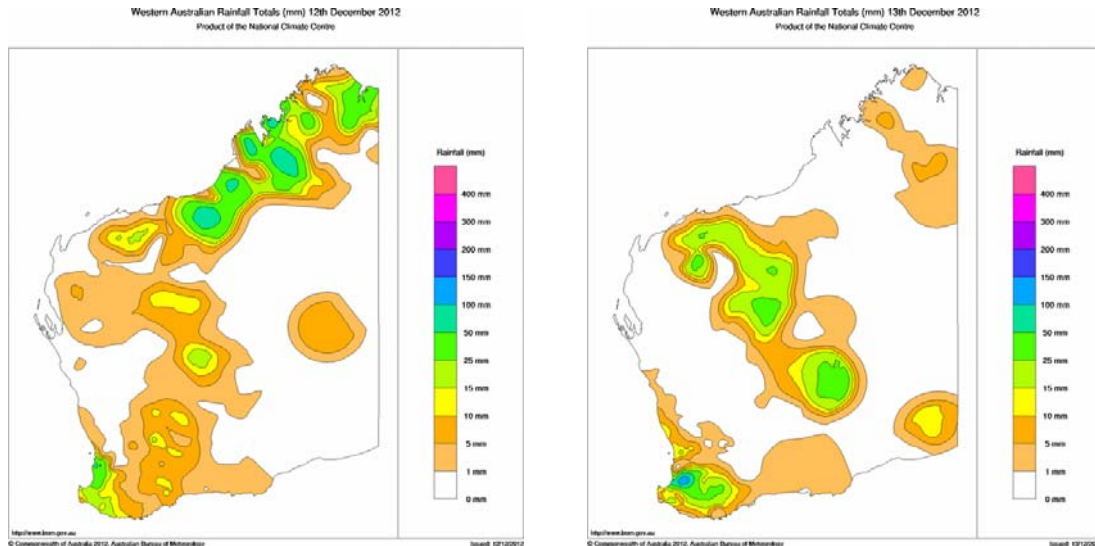
The most extreme rainfalls during the 10 to 13 December 2012 event were concentrated in a relatively small area of the southern Lower West and northern Southwest districts and were not as extensive as those that occurred during the December 2011 event (see Special Climate Statement 35). Perth Metro only received 14.6 mm over the four days (from 0900 WST 10 December to 0900 WST 14 December), although heavier falls occurred in some Perth suburbs, the highest for this period being 69.0 mm at Champion Lakes, near Armadale.

#### Monthly rainfall totals for December

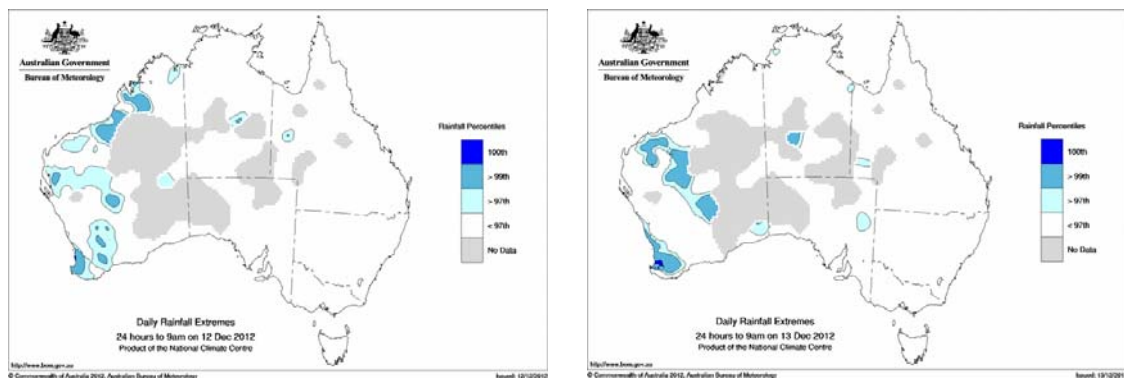
Most of southwest Western Australia has received at least 25 mm of rainfall so far in December (Figure 3a), whilst northern parts of the Southwest and southern parts of the Lower West districts have recorded over 50 mm. As a result, rainfall totals for the month so far are more the twice the average for large parts of southwestern WA (Figure 3b), mainly due to the significant rainfall events during the period from 10 to 13 December. Consequently, a number of sites in southwest WA, mostly in the Southwest district, have already exceeded their highest December monthly rainfall, some by large margins (Table 7).

Averaged across the Lower Southwest (southwest of a line from Jurien Bay to Bremer Bay), December 2012 is currently the fifth wettest December on record, with an area average of 42.3 mm. The record of 68.1 millimetres was set in December 1913, whilst the second wettest was last year (2011), the fourth wettest was 2001, and the sixth wettest was 2007, suggesting a remarkable sequence of wet Decembers in the last decade or so. The very wet December in the Lower Southwest follows a very much above average November (11<sup>th</sup> wettest on record), resulting in a November-December total of 94.9 mm, which currently ranks third wettest from comparable records that commenced in 1900.

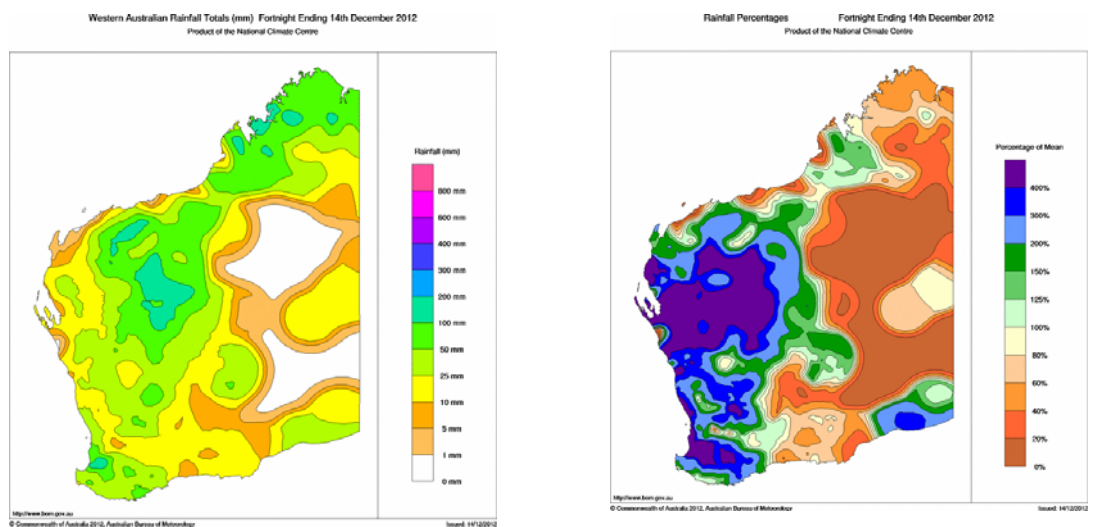
Across the entire SWLD, it is already the third wettest November-December on record, with a current total of 80.1 mm only behind the 1983 record of 99.6 mm, and last year (2011) with 86.7 mm.



**Figure 1. Daily rainfall for Western Australia for the 24 hours to 0900 WST on (a) 12 December 2012 (left) and (b) 13 December 2012 (right).**



**Figure 2. Extreme rainfalls on (a) 12 December 2012 (left) and (b) 13 December 2012 (right). Dark blue shows the area where December daily rainfall records were set.**



**Figure 3. (a) Rainfall in Western Australia for the period 1-14 December 2012 (left). (b) Percentage of the long-term December monthly average received in the period 1-14 December 2012 (right).**

Station number	Name	District	Daily rainfall (mm)
509576	Harvey (DAFWA)	Southwest	109.2
509562	Myalup (DAFWA)	Southwest	88.2
009513	Brunswick Junction	Southwest	77.6
009657	Roelands	Southwest	75.2
509544	Saddleback Road Bridge	Great Southern	75.0
009977	Mandurah	Lower West	74.2
509370	Sandalwood	Southwest	66.4
509082	Sandy Road	Great Southern	64.0
009812	Harvey	Southwest	62.8
009982	Henty Brook	Southwest	53.4
109501	Mount William	Southwest	50.8
009260	Mount Solus	Lower West	48.8
009912	Ferguson Valley	Southwest	43.6
009976	Pinjarra South	Lower West	43.2
009039	Serpentine	Lower West	42.8
009965	Bunbury	Southwest	42.8
109507	Ferguson Valley Alert	Southwest	42.8
009503	Boyanup	Southwest	41.8
509577	Donnybrook (DAFWA)	Southwest	40.6

**Table 1. Highest daily rainfall totals in southwest WA on 12 December 2012.**

Station number	Name	District	Daily rainfall (mm)	Previous record (mm)	Date	Years of record
009513	Brunswick Junction	Southwest	77.6	33.1	28/12/1984	104
009657	Roelands	Southwest	75.2	37.8	31/12/1959	71

**Table 2. Stations with 30 years of record or more that registered their highest December daily rainfall on 12 December 2012.**

Station number	Name	District	Daily rainfall (mm)
009960	Yourdamung Lake	Southwest	210.8
009628	Collie	Southwest	157.2
009994	Collie East	Southwest	135.8
009695	Dardanup	Southwest	92.0
009982	Henty Brook	Southwest	89.8
009912	Ferguson Valley	Southwest	87.0
109507	Ferguson Valley Alert	Southwest	81.2
009965	Bunbury	Southwest	72.4
009503	Boyanup	Southwest	68.8
009990	Boyanup North	Southwest	61.6

**Table 3. Highest daily rainfall totals in southwest WA on 13 December 2012.**

Station number	Name	District	Daily rainfall (mm)	Previous record (mm)	Date	Years of record
009628	Collie	Southwest	157.2	42.0	24/12/1987	106
009503	Boyanup	Southwest	68.8	45.0	04/12/2001	102
009912	Ferguson Valley	Southwest	87.0	33.0	04/12/2001	41

**Table 4. Stations with 30 years of record or more that registered their highest December daily rainfall on 13 December 2012.**

Station number	Name	District	Rainfall total (mm)	Date
<b>009960</b>	<b>Yourdamung Lake</b>	<b>Southwest</b>	<b>210.8</b>	<b>13/12/2012</b>
<b>009628</b>	<b>Collie</b>	<b>Southwest</b>	<b>157.2</b>	<b>13/12/2012</b>
<b>009994</b>	<b>Collie East</b>	<b>Southwest</b>	<b>135.8</b>	<b>13/12/2012</b>
010655	Williams	Great Southern	125.6	13/12/2011
010536	Corrigin	Great Southern	117.6	3/12/1940
010635	Riverdale	Great Southern	112.0	24/12/1987
009837	Wellstead	South Coastal	111.4	5/12/2001
<b>509576</b>	<b>Harvey (DAFWA)</b>	<b>Southwest</b>	<b>109.2</b>	<b>12/12/2012</b>
010696	Amrista Park	Great Southern	109.0	7/12/2011
010629	Quanaminning	Great Southern	105.7	20/12/1913

**Table 5. Highest daily rainfall totals in December on record in the SWLD. The 2012 event totals are in bold.**

Station number	Name	District	Rainfall total (mm)	Date
009523	Illalangi	South Coastal	239.8	10/03/1917
009194	Medina	Lower West	230.0	9/02/1992
010530	Chamingup	Great Southern	225.0	22/01/1982
009064	Kwinana BP Refinery	Lower West	212.1	9/02/1992
<b>009960</b>	<b>Yourdamung Lake</b>	<b>Southwest</b>	<b>210.8</b>	<b>13/12/2012</b>
010641	Maybrook	Great Southern	210.0	22/01/1982
009526	North Dandalup	Southwest	203.7	17/02/1955
009615	Warriup	South Coastal	201.2	5/06/2005
009520	Cape Riche	South Coastal	200.7	30/10/1910

**Table 6. Highest daily rainfall totals on record in the SWLD. The 2012 event total is in bold.**

Station number	Name	District	December 2012 to date rainfall (mm)	December average (mm)	Previous highest December total on record (mm)	Year	Years of record
009628	Collie	Southwest	170.4	16.0	80.6	1913	113
009503	Boyanup	Southwest	116.2	15.1	82.2	1913	111
009619	Wilgarrup	Southwest	81.6	21.1	81.3	1944	108
009513	Brunswick Junction	Southwest	100.4	14.8	64.3	1944	103
009657	Roelands	Southwest	132.2	14.7	61.2	1944	70
009642	Wokalup	Southwest	60.8	14.9	54.4	1951	59
009912	Ferguson Valley	Southwest	136.8	14.7	68.4	2001	40
009127	Mosman Park	Lower West	41.2	5.6	33.9	1991	34

**Table 7. Stations with 30 years of record or more that have registered their highest December monthly rainfall up to 14 December 2012.**

Contacts for further information

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