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Bureau of Meteorology

Special Climate Statement 60—heavy rainfall and flooding in southwest Western Australia

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1 Introduction

Southwest Western Australia typically has hot summers with very low rainfall. The region as a whole averages just 50.4 mm over December to February during the 1961–1990 climatological baseline period. For February, the climatological average is just 18.7 mm, with only five instances of rainfall above 50 mm for the month, and one instance of rainfall over 100 mm (172.17 mm in 1955).

In this context, the region has recorded an extraordinarily wet start to the year. Atmospheric moisture from tropical lows in the north of the State produced a number of significant cloudbands bringing persistent rainfall to the region in late January and early February. This led to many daily and monthly rainfall records being broken.

The unusual rainfall and cloud also saw below average temperatures, with a number of record-low daily maximum temperatures. Widespread flooding was reported across the southwest, with two fatalities related to the flooding, whilst there were significant impacts to communities, infrastructure, and agriculture across the region. The Western Australian Government declared parts of the southwest a natural disaster zone.

It should also be noted that the high rainfall has occurred during a month that is outside the period of the widely reported decline in southwest Western Australian rainfall. The drying trend has occurred over the winter months, when climatological rainfall is higher, and is most pronounced during May and July over southwest Western Australia—with rainfall since 1970 around 19 per cent less than the long-term average. Since 1996, this decline from the long-term average has increased to around 25 per cent.

2 Events details

2.1 Heavy rainfall and low temperatures at the end of January 2017

A cloudband over southwest Western Australia from the end of January to the start of February 2017, associated with a tropical low near the west Pilbara coast, brought significant rainfall to northern and central areas of the South West Land Division, including parts of the Central West, Central Wheat Belt, and Lower West including Perth.

Daily falls between 50 mm and 100 mm were recorded between 29 and 31 January, with the highest daily total being 140.2 mm at Yorkrakine in the Central Wheat Belt on the 29th.

Observed rainfall intensities at Yorkrakine, at durations from 30 minutes to seven days, had a less than 1% probability of exceedance¹ in any given year (Figure 1).

Four-day rainfall totals from 29 January to 1 February 2017 were between 150 mm and 200 mm in the southwest Central Wheat Belt (Figure 2), with Yorkrakine recording the highest official total of 197.5 mm. Frenches – an unofficial station east of Toodyay – recorded a higher total of 217.2 mm over the same period.

A number of sites registered record high January daily and monthly rainfall totals as a result of the event (see the [Western Australia January 2017 monthly climate summary](#) for more details).

¹ Intensity–Frequency–Duration (IFD) design rainfall intensities (mm/h) or design rainfall depths (mm) corresponding to selected standard probabilities, based on the statistical analysis of historical rainfall. The annual exceedance probability is the likelihood of an event occurring or being exceeded within any given year, usually expressed as a percentage. A 1% probability of exceedance denotes a very rare event that is likely to occur, on average, only about once every 100 years.

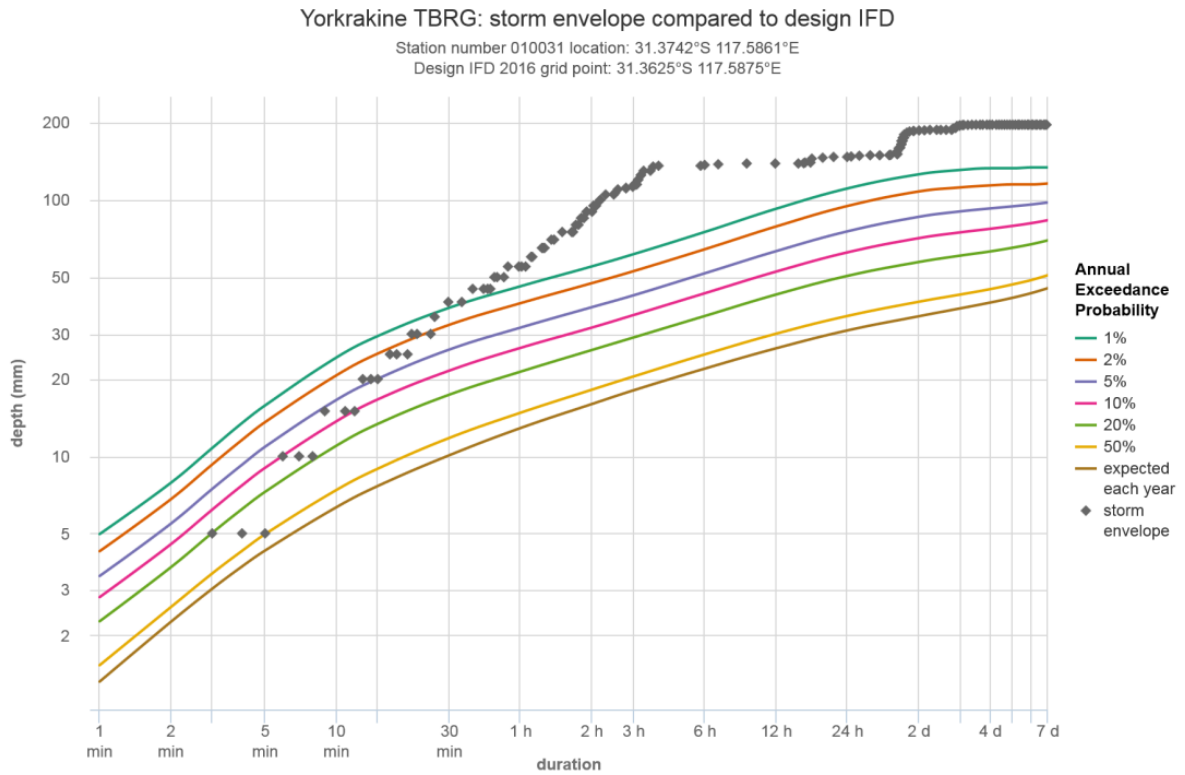


Figure 1. Rainfall Intensity–Frequency–Duration diagram for Yorkkrakine TBRG, comparing the highest rainfall intensities during the event (grey diamonds) to annual exceedance probabilities.

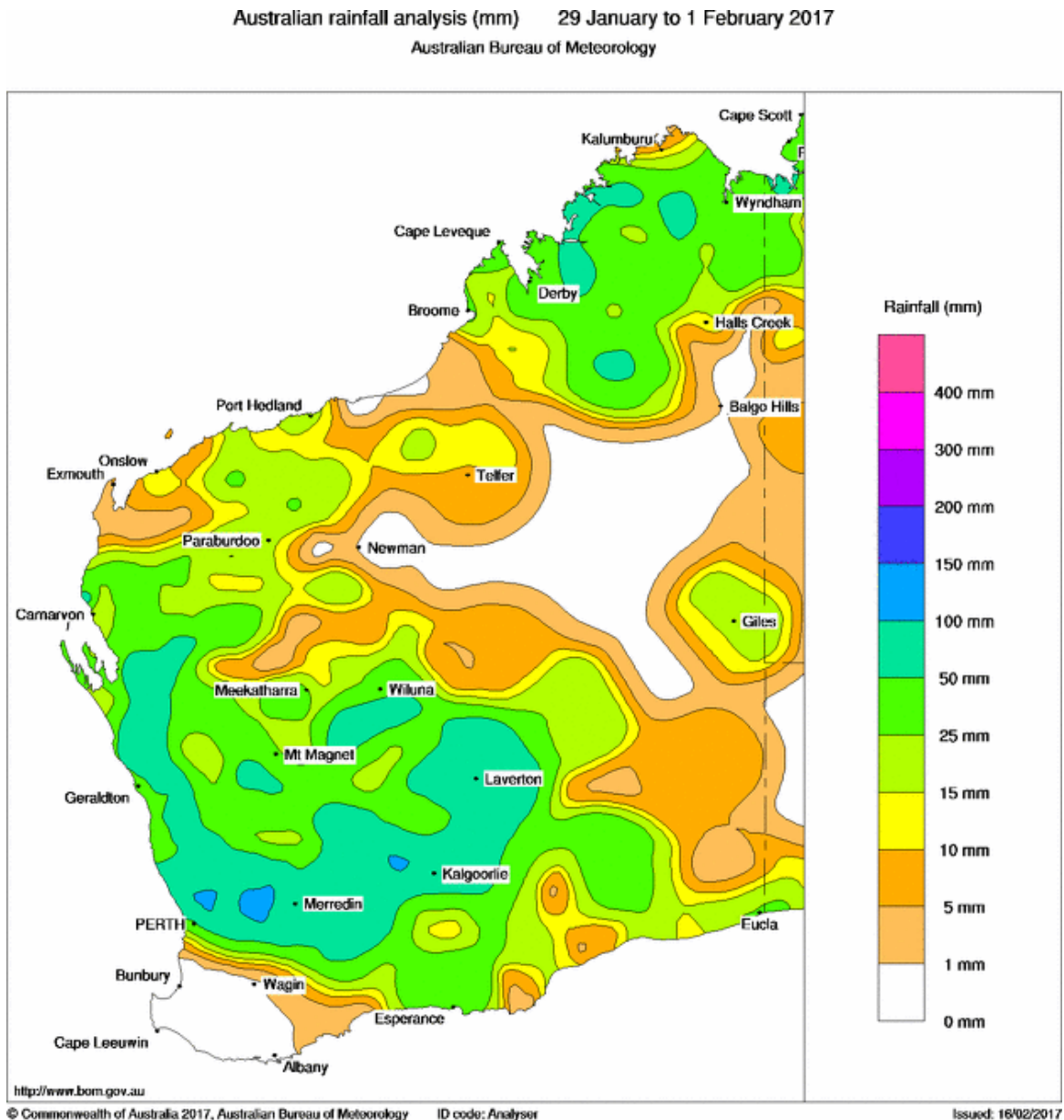


Figure 2. Four-day rainfall totals in Western Australia for 29 January to 1 February 2017.

Large parts of southern Western Australia recorded well-below-average maximum temperatures at the end of January, as a result of the cloudband and persistent rainfall, with maximum temperatures in the 17 to 20 °C range. Several sites in the Lower West, southwest Central Wheat Belt, and northwest Great Southern regions recorded their [lowest January maximum temperatures on record](#).

2.2 Heavy rainfall and flooding in early February 2017

A second tropical low formed to the north of Western Australia early in February. It moved across the Pilbara coast on the 8th, bringing record breaking February daily rainfall to 210.6 mm at Karratha Aerodrome—the second highest amount for any month behind 212.4 mm on 10 January 2006.

A cloudband associated with this tropical low developed over southwest Western Australia and brought widespread rainfall to the region. Daily totals over 50 mm were reported from the 8th to the 11th, whilst at the peak of the event on a number of sites in the Lower West, including Perth and in the Great Southern recorded between 100 mm and 150 mm. Many sites recorded their highest February daily rainfall during the event (Table 1). Perth Metro recorded a daily total of 114.4 mm on 10 February, its second highest daily fall for any month from records going back to 1876—behind 120.6 mm on 9 February 1992. Six-day rainfall totals from 7 to 12 February were between 150 mm and 200 mm (Figure 3), nearly 10 times the monthly average.

Table 1. Sites recording February daily rainfall records in southwest Western Australia as a result of the early February 2017 rainfall event (sites included have at least 40 years of record).

Station number	Station name	Value (mm)	Date	Previous record (mm)	Years of record
10515	Beverley	99.4	10th	82.0 (16/2/1955)	119
9507	Bannister	115.0	10th	113.0 (17/2/1955)	115
10524	Brookton	96.6	10th	82.6 (17/2/1955)	110
10519	Borden	90.0	10th	74.9 (17/2/1955)	93
9822	Dalyup Park	90.4	8th	79.6 (28/2/2000)	84
10611	Mount Madden	104.8	11th	91.4 (17/2/1970)	84
9053	Pearce RAAF	58.0	10th	53.0 (22/2/1986)	63
9066	Gidgegannup	67.2	10th	38.6 (9/2/1992)	59
9739	Telina Downs	79.2	9th	56.6 (28/2/1976)	55
9111	Karnet	115.8	10th	82.8 (22/2/1986)	54
10700	Kojonolokan Hills	113.2	10th	64.8 (22/2/1986)	54
9754	Mettler	52.4	11th	50.6 (25/2/1980)	51
10244	Bakers Hill	75.3	10th	37.2 (18/2/1981)	50
9240	Bickley	83.6	10th	66.6 (21/2/1986)	49
9542	Esperance Aero	59.2	8th	53.6 (28/2/1976)	48
9769	Culford	93.2	10th	76.0 (22/2/1986)	47
9815	The Duke	56.8	9th	33.4 (5/2/1997)	40

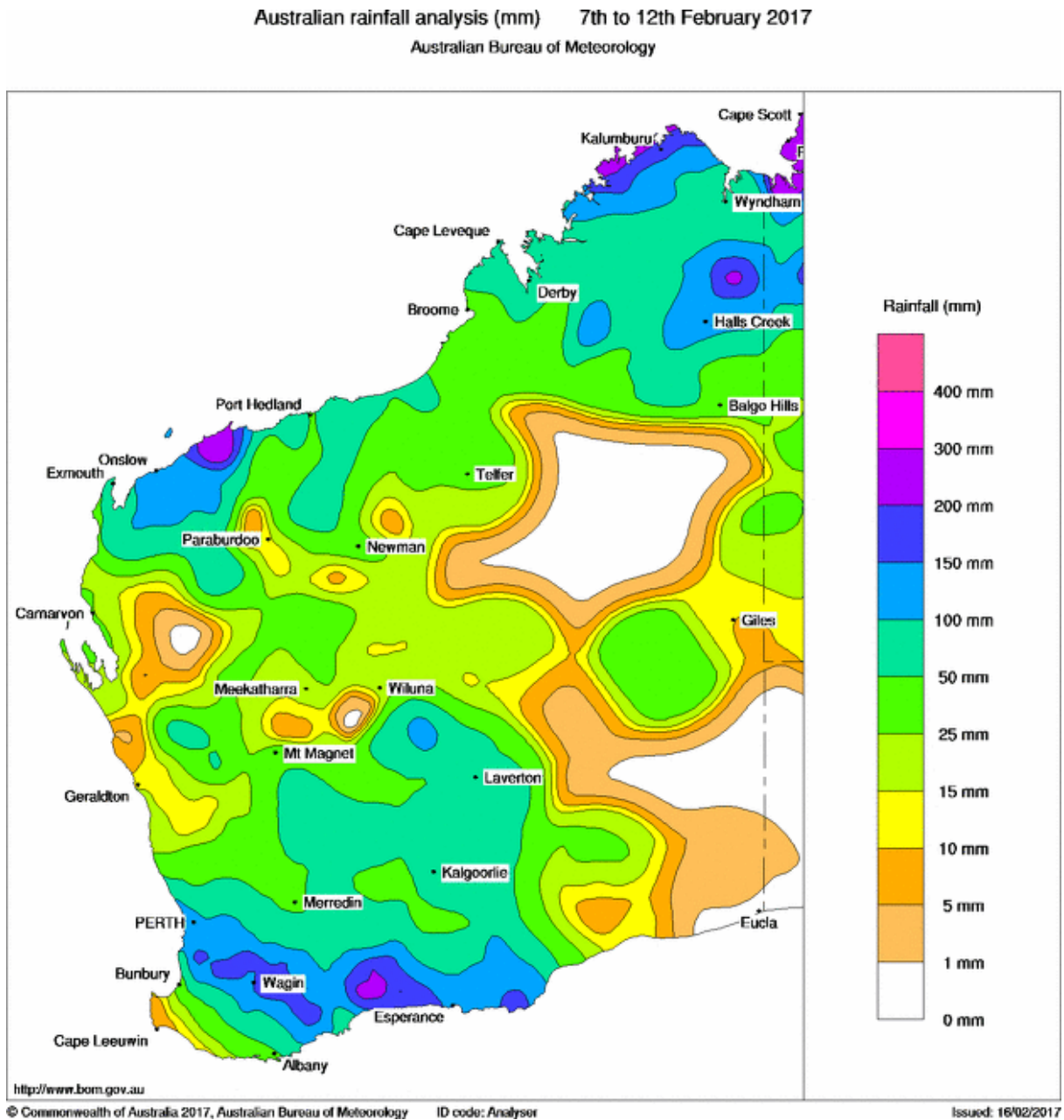


Figure 3. Six-day rainfall totals in Western Australia for the period 7 to 12 February 2017.

As a result of this rainfall event, many sites in the southwest had broken their February monthly rainfall record by the 14th of the month (Table 2).

Table 2. Sites recording February monthly rainfall records in southwest Western Australia in February 2017 (included sites have at least 40 years of record). Data is for rainfall totals up to 14 February—final February totals may change.

Station number	Station name	Value (mm)	Previous record (mm)	Years of Record
10633	Ravensthorpe	240.8	179.3 (2/1955) (Feb) 223.2 (1/2000) (all)	115
6055	Woolgorong	155.1	119.8 (2/2008)	112
10628	Quairading	152.0	143.6 (2/1955)	106
10122	Telenning Hill	144.0	133.9 (2/1955)	99
10520	Boscabel	78.6	74.6 (2/1986)	87
10611	Mount Madden	203.6	133.4 (2/1978)	85
10662	Yealering	152.0	78.2 (2/1986)	82
9626	Pleasant Valley	150.6	118.6 (2/2000)	67
9631	Esperance Downs Research Stn	141.6	87.6 (2/1970)	64
9053	Pearce RAAF	98.4	97.0 (2/1992)	62
10696	Amrista Park	121.4	115.4 (2/1970)	61
9066	Gidgegannup	148.8	64.8 (2/1970)	58
10904	Swanara	131.6	113.5 (2/1978)	56
9111	Karnet	125.3	107.1 (2/1986)	52
10700	Kojonolokan Hills	170.8	80.2 (2/1986)	52
9739	Telina Downs	122.2	88.2 (2/1976)	52
10707	Jerramungup	83.9	81.3 (2/2003)	51
10244	Bakers Hill	156.6	99.4 (2/1986)	49
9772	Erinair	185.2	104.6 (2/1970)	49
9542	Esperance Aero	162.4	97.2 (2/1976)	47
9769	Culford	123.8	100.8 (2/1986)	46
9789	Esperance	123.2	80.3 (2/1970)	46
9752	Denbarker	100.6	62.8 (2/1989)	44
9867	Lorinna	114.2	80.2 (2/1976)	43
10889	Mordetta	128.8	66.0 (2/1976)	42
9922	West Lort River	162.2	105.2 (2/2000)	40

The total rainfall at Ravensthorpe was particularly notable. It recorded 240.8 mm for February—up to the 14th—its wettest February in 116 years of record, and the highest total rainfall for any month at the site. The previous February record was 179.3 mm in 1955, and the previous record for any month was 223.2 mm in January 2000. The town of Ravensthorpe was cut-off by road from surrounding districts due to flooding as a result of the unprecedented rainfall.

Rainfall data for February, up to the 14th, when averaged across southwest Western Australia, suggests that February 2017 and summer 2016–17 will be one of the wettest on record. February rainfall for the South West Land Division ranks as the second wettest February since comparable records commenced in 1900, only behind February 1955. The Lower Southwest region (southwest of a line from Jurien Bay to Bremer Bay) is also ranked second wettest, behind February 1955. Note that these ranks are based on preliminary data, and may change when the complete February data is available at the end of the month.

Perth Metro recorded near average rainfall in December (10.2 mm), however January 2017 was its sixth wettest January (45.4 mm), and February, to the 14th, has seen a total of 134.8 mm, the second wettest, behind February 1955 (166.3 mm). Total summer rainfall so far for Perth Metro is 190.4 mm, the wettest summer on record, exceeding the previous record of 180.4 mm in summer 1954–55.

The rainfall in early February saw particularly low maximum temperatures from the 8th to 12th across the southwest with the lowest maxima typically in the range of 16 °C to 18 °C. February 9 was particularly cool with the lowest maxima of the event recorded with temperatures between 14 °C and 16 °C. Bickley, in the Perth Hills, recorded the lowest maximum of 13.7 °C, the second lowest maximum temperature on record in Western Australia in February—behind 13.3 °C at Mount Barker on 17 February 1914. Many sites in the southwest recorded their lowest February maximum temperature on record on the 9th or 10th (Table 3).

Table 3. Sites recording February low daily maximum temperature records in southwest Western Australia in February 2017 (sites included have at least 40 years of record).

Station number	Station name	Value (°C)	Date	Previous record (°C)	Years of Record
9225/9034	Perth Metro	17.4	9th	19.0 (17/02/1914)	119
10111	Northam	15.7	9th	17.5 (17/2/1981)	110
10614	Narrogin	14.7	9th	15.3 (25/2/1991)	99
9021	Perth Airport	17.1	9th	19.8 (25/2/1991)	73
9519	Cape Naturaliste	18.2	10th	18.3 (15/2/1990)	61
9053	Pearce RAAF	17.5	9th	18.8 (17/2/1981)	57
9111	Karnet	15.4	9th	15.5 (25/2/1991)	51
9114	Lancelin	17.6	9th	20.1 (14/2/1982)	51
9037	Badgingarra Research Stn	19.6	9th	21.0 (25/2/1991)	50
10524	Brookton	15.7	9th	17.4 (25/2/1991)	50
8137	Wongan Hills	18.2	9th	19.1 (26/2/1995)	50
9789	Esperance	17.7	8th	18.2 (5/2/1973)	48
9131	Jurien Bay	19.6	9th	21.5 (15/2/1990)	48
10515	Beverley	15.4	9th	17.7 (17/2/1981)	47
10647	Wagin	15.7	9th	15.7 (25/2/1991)	43

3 Impacts

The combination of very high rainfall totals across both events brought flooding to large parts of southwest Western Australia, with major flooding reported in the Avon catchment, and minor flooding in the Swan downstream from the Avon, as well as major flooding in the Esperance Coast Basin and Blackwood River catchment.

The flooding caused significant road damage, particularly in the Esperance Coast Basin, with the Phillips River Bridge, on the South Coast Highway to the west of the town of Ravensthorpe, destroyed. Ravensthorpe was consequently cut-off by road from surrounding districts with the Phillips River being impassable and other access roads to the town cut-off by flood waters. Two fatalities were reported as a result of two separate incidents where motor vehicles were washed off roads when trying to cross flooded rivers. The flooding significantly impacted on agriculture in the region with stock rescued from flood waters as large areas of farmland were inundated. Swan Valley vineyards near Perth were submerged with whole grape crops expected to be lost, and potential future impacts expected as a result of disease and waterlogged soils. The [Western Australian Government](#) declared a natural disaster for the region with 69 Local Government districts in the South West Land Division eligible for disaster assistance. The full cost of the event for impacted communities across the southwest may not be known for some time after the event.

References and further information

This statement is based on data available as of 14 February 2017. These data are subject to the Bureau's quality control processes. It is expected that additional data will be received over the coming weeks and the Statement will be updated if required.