Rainfall and streamflow summary – May 2011
Water Resource Assessment Branch

Introduction

The following rainfall and streamflow summary for May 2011 is based on information from the Department of Water, Bureau of Meteorology, Department of Agriculture and Food and the Water Corporation. This summary is produced monthly from May to October.

Rainfall for May was average (compared to the 1900 to present period) for most of the state, and below average for the south west region. The rainfall outlook for the next three months indicates that below average rainfall is expected for South West WA and average rainfall for the rest of the state.

Five of the thirteen streamflow gauging stations analysed in South West WA recorded the lowest flow on record for May. Above average streamflow was recorded only at Young River. The year to date streamflow showed six of the thirteen sites have experienced the lowest flow volumes on record (Figure 1). Only Collie River and Young River recorded above average streamflow from January to May.

Figure 1 Year to date rainfall for Western Australia and year to date streamflow for South West Western Australia (January to May 2011)
(Rainfall map courtesy of Bureau of Meteorology website, copyright Commonwealth of Australia reproduced by permission.)
Rainfall

The rainfall deciles for Western Australia are shown in Figure 2 with much of the state experiencing average rainfall (compared with the period 1900 to present) for May. Across South West WA below average to very much below average rainfall occurred, with only isolated areas across WA receiving above average rainfall for May.

Figure 2 Monthly rainfall deciles (May 2011) for WA
(Courtesy of Bureau of Meteorology, copyright Commonwealth of Australia reproduced by permission.)
Figure 3 shows the year to date rainfall (January to May 2011) as a percentage of average annual rainfall. Year to date rainfall in the South West of Western Australia is zero to 40 per cent of the average rainfall for the entire year. The Goldfields and Kimberley regions have experienced rainfalls greater than the annual average.

Figure 3 Year to date rainfall (January to May 2011) for WA as a percentage of the 1961-1990 mean annual rainfall
(Courtesy of Bureau of Meteorology, copyright Commonwealth of Australia reproduced by permission.)
Data from 22 rainfall stations located across South West WA are summarised to show the current rainfall condition across the region in comparison to historical rainfall since 1975. The period post 1975 is used because there has been an observed reduction in rainfall and runoff in the south west from 1975 in comparison to long-term averages.

Figure 4 indicates that the May rainfall is below to well below average over most of the south west. Average rainfall was recorded at various locations across the south west, with the lowest May rainfall on record occurring at Pemberton and Greenbushes.
The January to May rainfall for most areas south of Perth recorded average rainfall for the year to date (Figure 5). Perth recorded below to well below average rainfall for the January to May period. Geraldton and Donnybrook are the only two stations to record above average rainfall for the year to date.

**Figure 5 - Year to date rainfall deciles (January to May 2011) for South West WA**
The year to date rainfall for Perth, with reference to the 1975 to 2010 period minimum, maximum and percentile rainfall is shown in Figure 6. Perth (Mount Lawley, 009225) recorded 74 mm of rainfall during May, which is 19 mm below the average for May from 1975 to 2010. This rainfall brought the cumulative rainfall total (January to May) to 124 mm, which is just above the 20th percentile rainfall for the year to date.

**Figure 6** Year to date rainfall (January to May 2011) for Perth (Mt Lawley, 009225) with reference to the 1975-2010 period minimum, maximum and percentile rainfalls
Rainfall outlook

The Bureau of Meteorology’s seasonal forecast indicates the outlook for total rainfall over the August quarter (June to August) for Western Australia (Figure 7). The chance of exceeding the median rainfall for June to August over the South West is low, between 25 and 30 per cent. For the rest of Western Australia there is a 45 per cent chance that rainfall over the August quarter will be above the historical median.

The Department of Agriculture and Food’s Growing Season Outlook indicates that warm sea surface temperatures west of WA and cool waters north of Australia have set up a pattern suggesting early season rainfall is likely to be below average (Bowran et al., 2011).

Figure 7 Probability of exceeding median rainfall (1900-2005) for June to August 2011 across Western Australia
(Courtesy of Bureau of Meteorology, copyright Commonwealth of Australia reproduced by permission)

Streamflow
Thirteen telemetered streamflow gauges across the South West of WA were analysed for the month of May (Figure 8) and the year to date (Figure 9). The climate and catchment characteristics to the east of the Pallinup River result in a different hydrological response from those to the west.

Five of the streamflow stations recorded the lowest flow on record. Below to well below average flow was recorded at the Hotham, Carbunup, Deep and Frankland Rivers and Thomson Brook. Average flow was recorded at Pallinup and Collie Rivers.

Figure 8 Monthly streamflow deciles (May 2011) for South West WA
Six streamflow gauges across the South West WA recorded the lowest year to date streamflow total on record (1975 to 2010). Below to well below average flows occurred at Pallinup, Frankland, Carbunup, and Hotham Rivers (Figure 9). The Collie River gauging station recorded an above average flow total from January to May. This is because there was a rain event in January in the Collie River catchment which generated well above average streamflow.

Figure 9 Year to date streamflow deciles (January to May 2011) for South West WA
At the 1 June 2011, the total volume of water stored in the dams supplying water to the Integrated Water Supply System (IWSS) was 140 GL, which is approximately 22 per cent of the total capacity (Figure 10). As a comparison, at this time last year storages were at 220 GL, which is an 80 GL difference.

Based on historical observations of inflow and IWSS water supply since 1999, there is an 80 per cent probability of the total storage being 164 GL and a 50 per cent probability of the total storage being 242 GL by the 31\textsuperscript{st} October 2011.

From 1 May, an estimated 500 mm ± 10\% of rainfall at Jarrahdale is needed to start streamflow into the northern IWSS reservoirs (10 of the 12 IWSS reservoirs). Rainfall to date at Jarrahdale is 129 mm.

Figure 10 Total volume of water stored in the Integrated Water Supply System reservoirs (Water Corporation)
Groundwater

The Gnangara Mound is an important source of water for public water supply, irrigated agriculture, parks and gardens, industry and groundwater dependant ecosystems in Perth and IWSS supplied areas. Groundwater levels across the Gnangara Mound have been in decline for the last thirty years. Figure 11 shows historical monthly average Gnangara groundwater levels. Groundwater levels shown on the graph are based on data recorded from over 50 bores located across the mound's superficial aquifer. These measurements were averaged to produce a single average groundwater level for each month.

The level for May 2011 is the lowest May average groundwater level on record (since 1997). Currently the average groundwater level is approximately 0.3 m lower than the previous May minimum that occurred last year.

From 1 January, an estimated 800 mm ± 10% of rainfall at Perth Airport is needed to recharge Gnangara groundwater levels to those recorded at the end of last winter. Rainfall to date at Perth Airport is 87.6 mm.

Figure 11 Average groundwater level across the Gnangara Mound (Department of Water). Groundwater levels shown on the graph are based on data recorded from over 50 bores located across the mound’s superficial aquifer. These measurements were averaged to produce a single average figure for each month.
Appendices

Appendix A – legend definitions

Serious deficiency – rainfall in the lowest 10% of historical totals, but not in the lowest 5%

Severe deficiency – rainfalls in the lowest 5% of historical totals

Lowest on record – lowest since at least 1900 when the rainfall data analysis began (for streamflow lowest since 1975)

Well below average – rainfalls in the lowest 10% of historical totals

Below average – rainfalls in the lowest 30% of historical totals, but not in the lowest 10%

Average – rainfalls in the middle 40% of historical totals

Above average – rainfalls in the highest 30% of historical totals, but not in the highest 10%

Well above average – rainfalls in the highest 10% of historical totals

References


