Marne Saunders Prescribed Water Resources Area

2018 Surface water status report

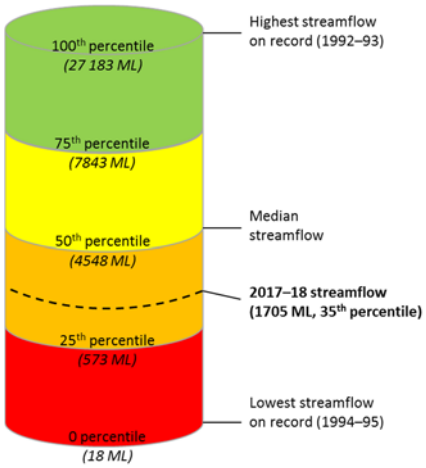
Government of South Australia
Department for Environment and Water

2018 Status summary
Marne Saunders PWRA

The Marne Saunders at a whole PWRA scale is assigned an ***orange*** surface water status for 2018, with streamflow being lower than the average observed for the PWRA.

Orange status means that the total annual streamflow was between the 25th and 50th percentile[1] for the period of data availability.

The status presented is based on the streamflow recorded at the Marne Gorge gauging station.



This status report does not seek to evaluate the sustainable limits of the resource. Nor does it make any recommendations on management or monitoring of the resource. These actions are important, but occur through separate processes such as prescription and water allocation planning.

[1] The nth percentile of a set of data is the value at which n% of the data is below it. For example, if the 75th percentile annual flow is 100 ML, 75% of the years on record had annual flow of less than 100 ML. Median streamflow: 50% of the records were above this value and 50% below.

Rainfall

Figures 1 and 5

Rainfall station	Keyneton rainfall station (M023725) Reporting period: 1973–74 to 2017–18, in line with streamflow data availability
Annual total [2]	469 mm This was 44 mm below the average annual rainfall of 512 mm (1973–74 to 2017–18). Neighbouring rainfall stations at Cambrai (M024513) and Mt Pleasant (M023737) recorded 218 mm and 672 mm respectively for the 2017–18 period, the latter of which is located just outside the Prescribed Water Resources Area (PWRA), 10 km south-east of Springton. These sites show consistent rainfall trends with the Keyneton station.
Monthly rainfall summary	Higher than average rainfall was recorded in July, August and November 2017, and these months represented 56% of the annual total for 2017–18. In August 2017, Keyneton rainfall station recorded almost double the average monthly rainfall (127 mm compared to 70 mm). Lower than average rainfall was experienced in September and October 2017, and in December 2017 to June 2018.
Spatial distribution	The spatial distribution of rainfall across the PWRA indicates a decreasing gradient from the west to the east. During 2017–18, the whole of the PWRA experienced lower rainfall when compared to the average annual rainfall and the five-year average (2013–14 to 2017–18).
Rainfall trend	Long-term trend – Annual rainfall volumes recorded at the Keyneton rainfall station indicate a decreasing long-term trend. Short-term trend – The last five years of rainfall indicate a decreasing trend.

Streamflow

Figures 2 and 6

Streamflow gauging stations	Marne Gorge gauging station (A4260605) on the Marne River (5 km west of Cambrai) Streamflow data availability: 1973–74 to 2017–18 The Marne Gorge gauging station is used to determine the status in this report. Another station, the Saunders Creek gauging station (A4261174) on the Saunders Creek, north of the township of Sanderston observed similar conditions over the 2017–18 period.

[2] For the water-use year 1 July 2017 to 30 June 2018

Annual total[2]	Marne River gauging station recorded streamflow below the average annual streamflow and Saunders Creek gauging station recorded streamflow above the average annual streamflow in 2017–18.

	Average annual streamflow (ML)	2017–18 Streamflow (ML)	Percentile rank
Marne River	5845 (1973–4 to 2016–17)	1705	35th
Saunders Creek	344 (2009–10 to 2016–17)	252	63rd
Combined		1957	

Monthly streamflow summary	Historically, the majority of streamflow in the Marne Saunders PWRA occurs between July and October and typically accounts for approximately 90% of the total annual flow in any given year. Streamflow between July and October 2017 accounted for 100% of the flow in 2017–18. All months were drier than average in 2017–18.
Streamflow trend	Long-term trend – Annual streamflow volumes recorded at the Marne Gorge gauging station (1973–74 to 2017–18) indicate a declining long-term trend. Short-term trend – The last five years of streamflow indicate an increasing trend primarily due to much higher-than-average rainfall in 2016–17.

Water extraction

Figure 3

Surface water extraction[2]	Water extraction based on metered data from licensed surface water and watercourses: 674 ML (compared to 469 ML in 2016–17) Licensed watercourse extraction decreased from the previous year: 52 ML compared to 115 ML in 2016–17 Estimated non-licensed water demand (stock and domestic) water demand is 496 ML (30% of existing stock and domestic dam capacity).
Resource volume[2]	Total resource volume: 3128 ML: • Combined streamflow recorded at the representative streamflow gauging stations (Marne Gorge and Saunders Creek) in the Marne Saunders PWRA: 1958 ML • Surface water extraction (licensed and non-licensed): 1170 ML. Surface water extraction was approximately 37% of the total resource volume in 2017–18 (compared to 6% in 2016–17). The average for 2009–10 to 2017–18 was 37%.

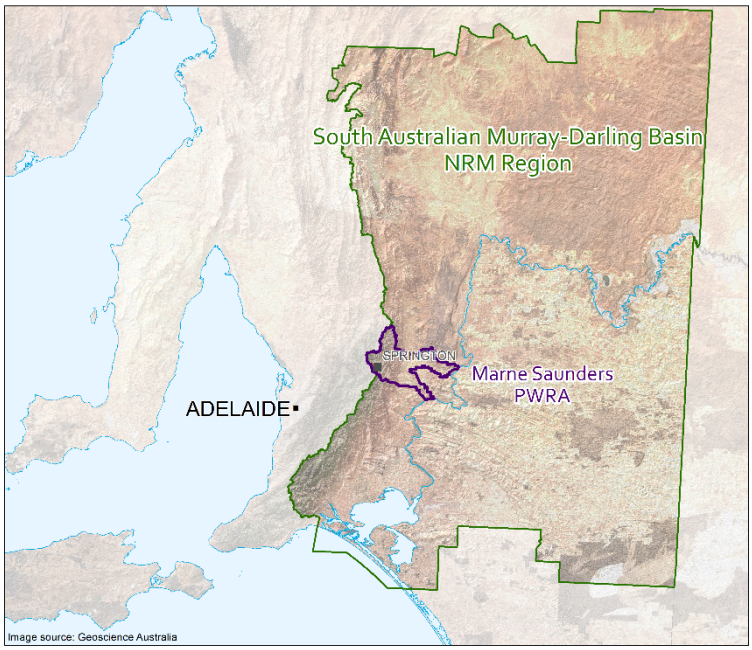
[2] For the water-use year 1 July 2017 to 30 June 2018

Surface water salinity

Figure 4

Salinity monitoring	Marne Gorge gauging station (A4260605) – data available from 2002 Saunders Creek gauging station (A4261174) – data available from 2010
General observations	Salinity increases during sustained dry conditions while decreasing throughout the winter months as a result of higher dilution capacity as flow volumes increase.
Salinity: 2017–18 water-use year	Highest salinity recorded at Marne River: 2625 mg/L (compared to 2950 mg/L in 2016–17) Highest salinity recorded at Saunders Creek: 4107 mg/L (compared to 5768 mg/L in 2016–17)
Salinity: 2002–03 to 2017–18	Marne Gorge gauging station salinity levels are generally lower than those observed at the Saunders Creek gauging station. Salinity recordings at Marne Gorge gauging station were less than 2500 mg/L for the majority of the salinity data period. 61% of salinity data recorded at the Saunders Creek gauging station is greater than 2500 mg/L. Highest recorded salinities at both sites occurred during the millennium drought between 2006–9 as a result of consecutive years of below average streamflow.

Regional setting



The Marne Saunders PWRA is located approximately 70 km north-east of Adelaide. Surface water, watercourses and groundwater resources in the PWRA have been prescribed under South Australia's Natural Resources Management Act 2004. A water allocation plan (WAP) adopted in 2010 provides for the sustainable management of these water resources.

The PWRA is located along the northern extent of the Mount Lofty Ranges, and is characterised by undulating hills and valleys with high rainfall, while the east is largely defined by flat plains with localised hills and rocky outcrops throughout with very low rainfall. The main watercourses within the PWRA are the ephemeral Marne River and Saunders Creek, which have their headwaters in the Mount Lofty Ranges, draining in an easterly direction across the plains, where the majority of the flow is lost to groundwater, before discharging into the River Murray.

Surface water resources in the PWRA are highly dependent on rainfall, with trends in streamflow and salinity primarily climate driven, i.e. below-average winter rainfall results in a reduction in annual streamflow volumes. Below-average summer rainfall can also result in increased irrigation extractions, and these two elements can cause salinities to increase by reducing the amount of streamflow available to dilute salts. Conversely, increased rainfall results in increased streamflow volumes and decreased irrigation extractions, and salinities may stabilise or decline.

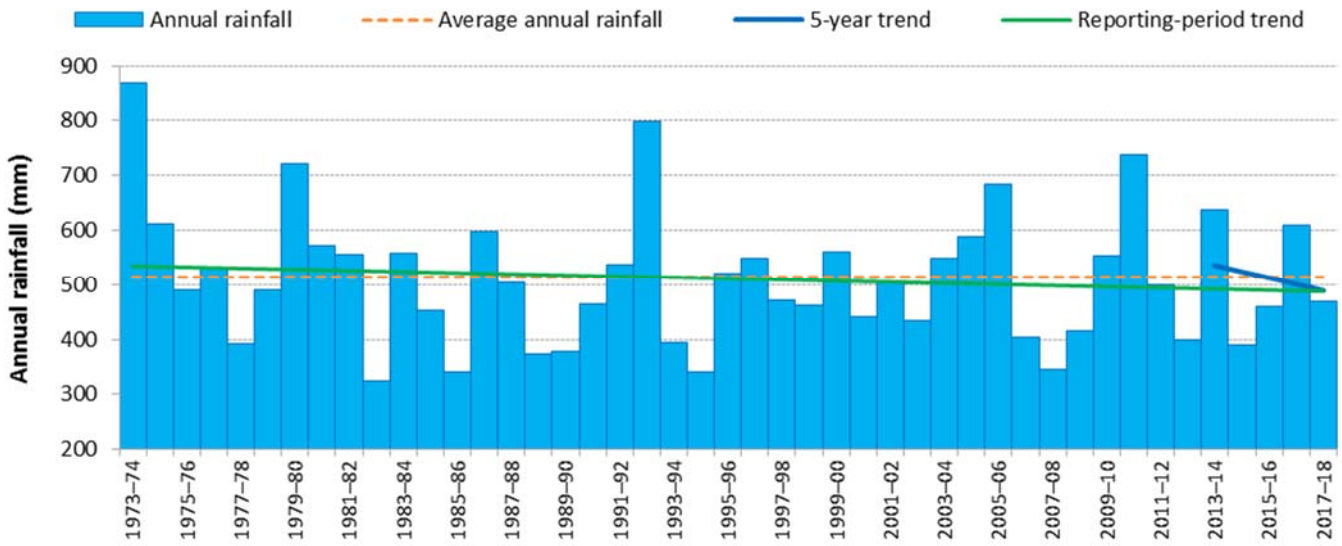


Figure 1. Annual rainfall for 1973–74 to 2017–18 at the Keyneton rainfall station (M023725)

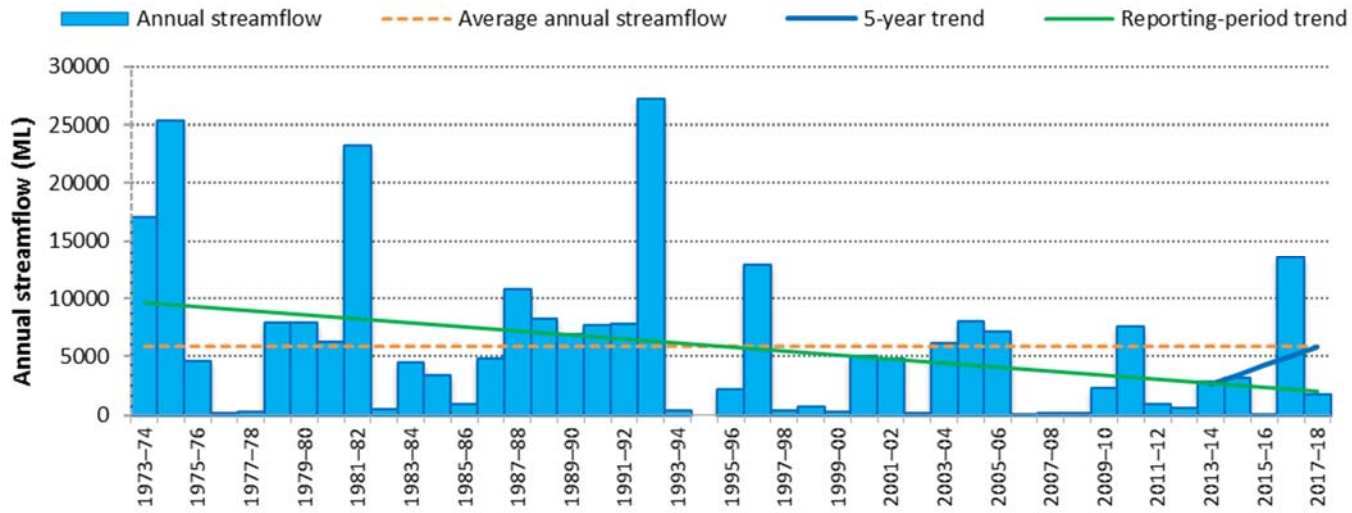


Figure 2. Annual streamflow for 1973–74 to 2017–18 at the Marne Gorge gauging station (A4260605)

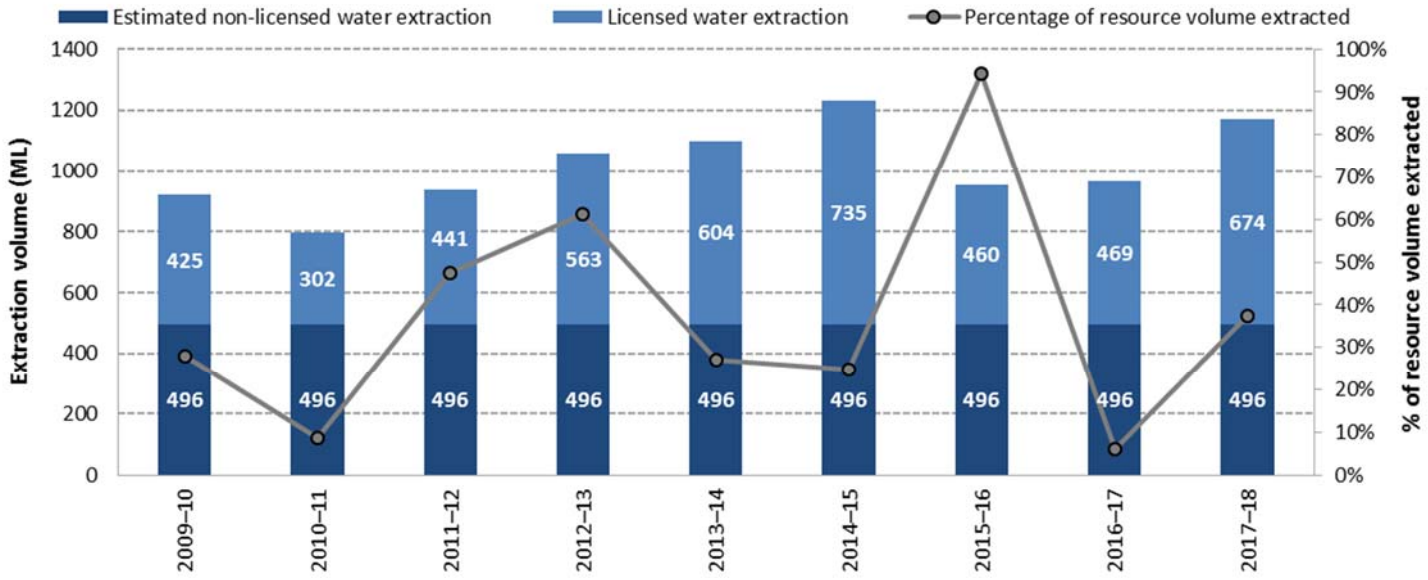


Figure 3. Surface water extraction for 2009–10 to 2017–18 in the Marne Saunders PWRA

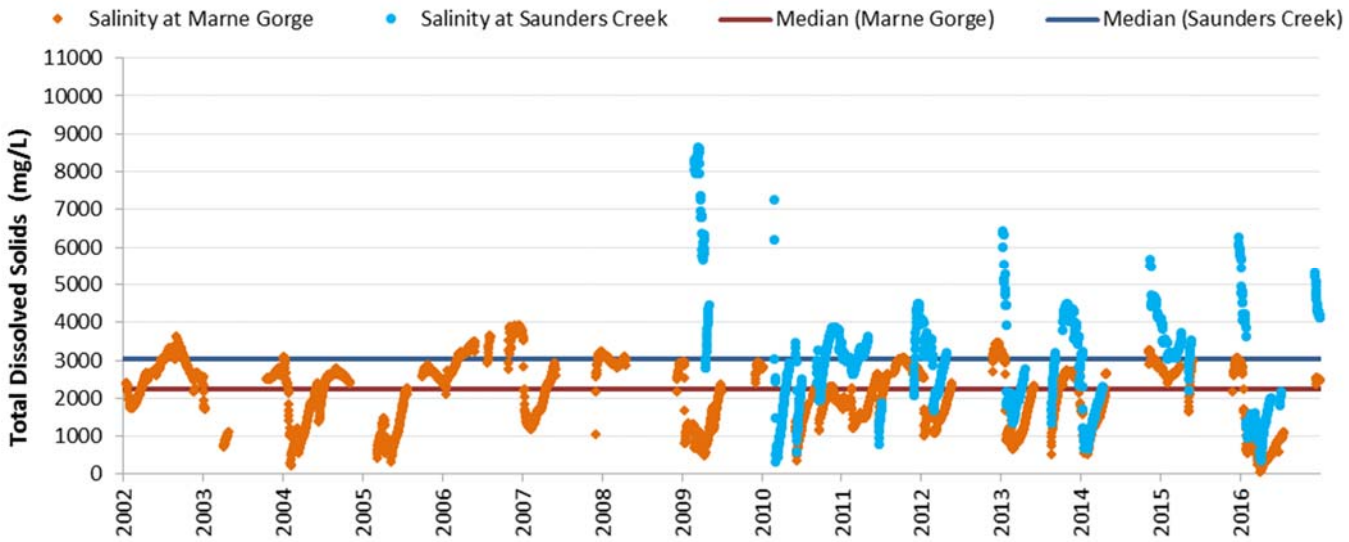


Figure 4. Marne Saunders PWRA and salinity data for 2002 to 2018 at Marne Gorge (A4260605) and 2009 to 2018 at Saunders Creek (A4261174) gauging stations

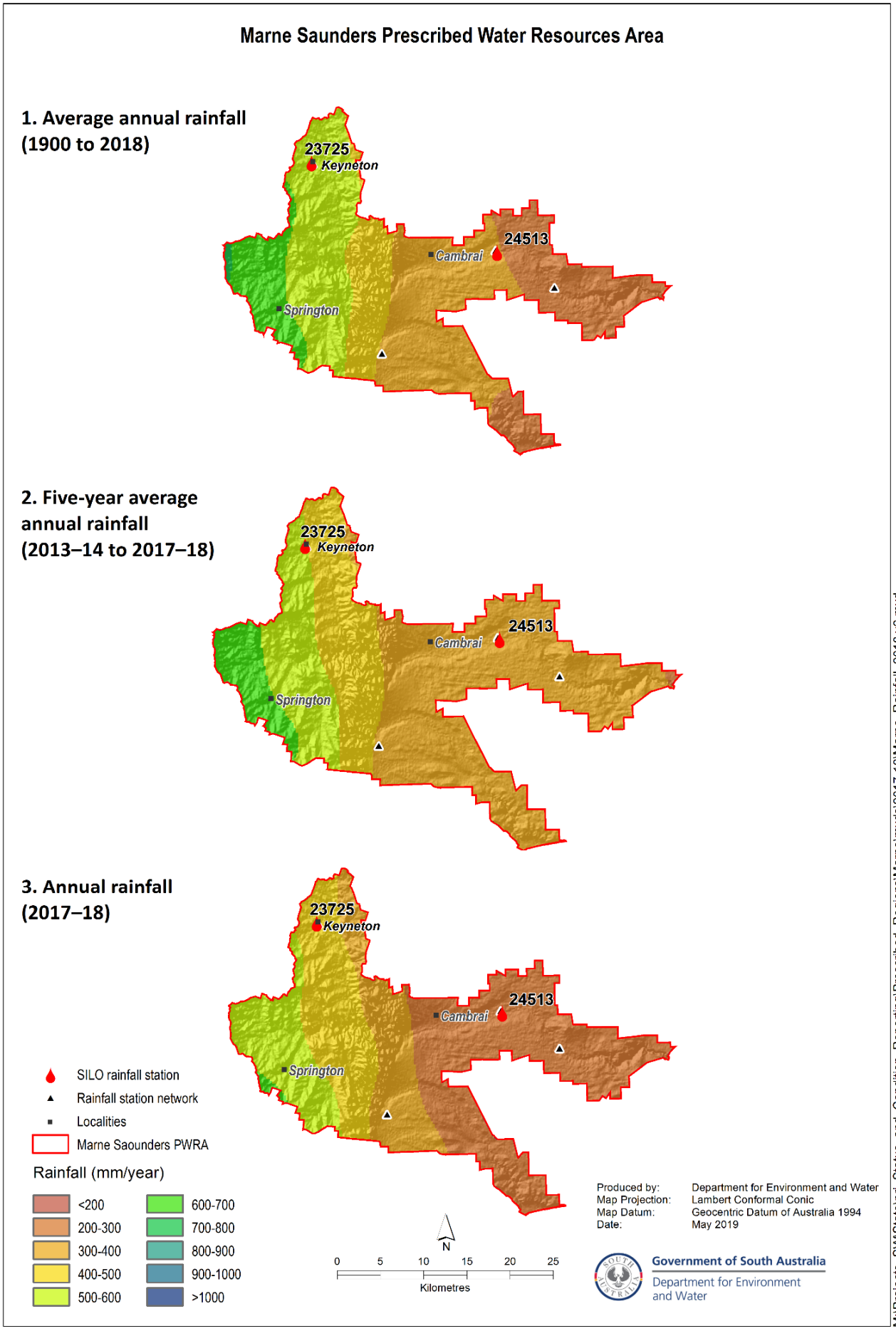


Figure 5. (1) Average annual rainfall (2) five-year average annual rainfall and (3) annual rainfall for 2017–18 in the Marne Saunders PWRA[3]

[3] Data sources: SILO interpolated point and gridded datasets, available at https://legacy.longpaddock.qld.gov.au/silo/.

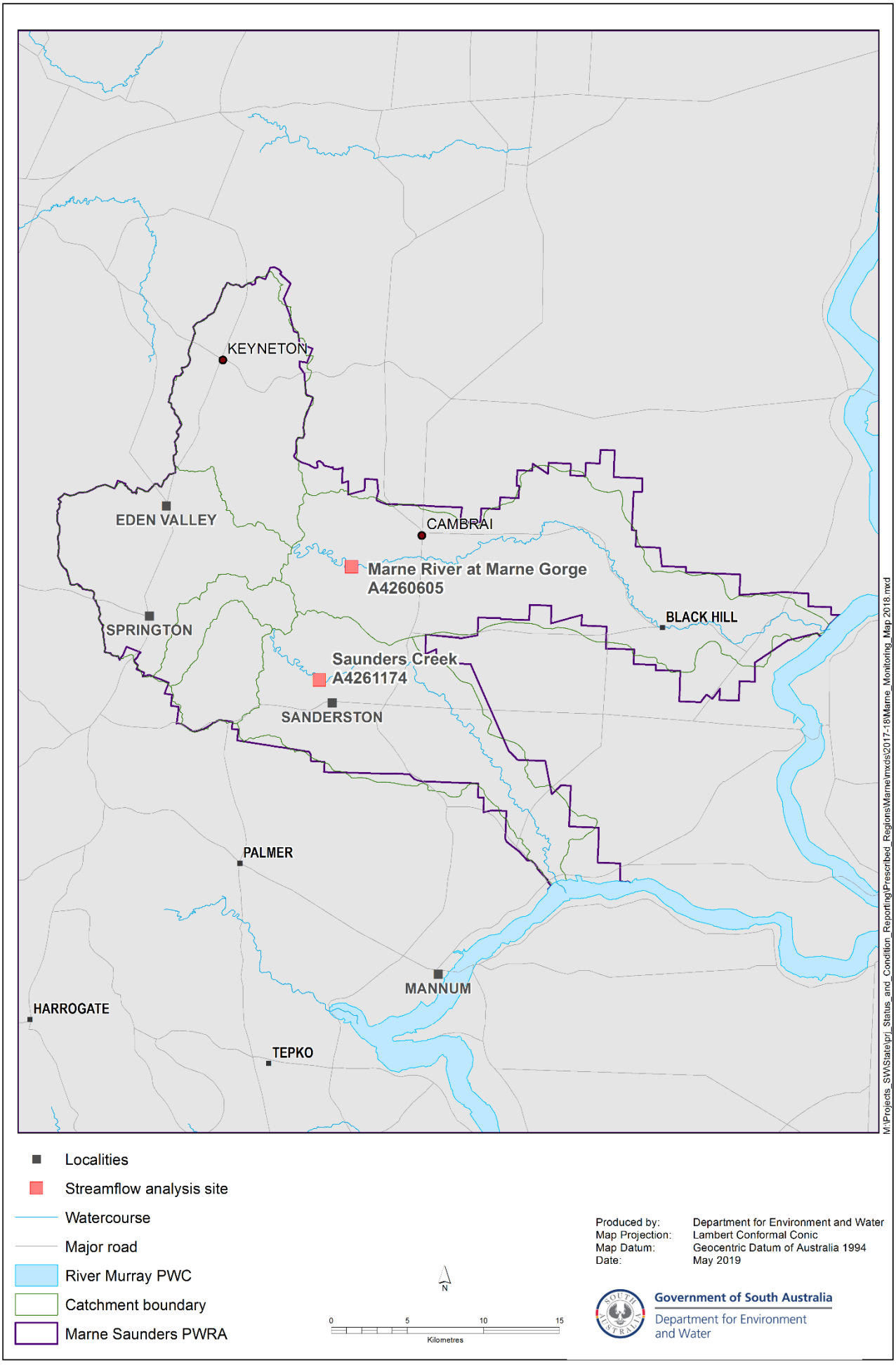


Figure 6. Streamflow gauging stations in the Marne Saunders PWRA

More information

The status of the Marne Saunders PWRA was determined by expressing the annual Marne Gorge streamflow for 2017–2018 as a percentile of the total annual streamflow for the period (1973–74 to 2017–18).

The total 2017–18 streamflow from the Marne Gorge gauging station (1705 ML) represents the 35th percentile, i.e. 35% of the long-term historic annual streamflow totals were less than the streamflow observed in 2017–18.

To view descriptions for all status symbols, and to review the full historical record of the gauging stations (streamflow and salinity), please visit the *Water Resource Assessments* page at www.waterconnect.sa.gov.au.

Further information may be found among the Frequently Asked Questions on the *Water Resource Assessments* page of www.waterconnect.sa.gov.au.

Rainfall data used in this report are sourced from the SILO interpolated point and gridded datasets, which are calculated from Bureau of Meteorology daily and monthly rainfall measurements and are available online at https://legacy.longpaddock.qld.gov.au/silo/.

To view the *Marne Saunders PWRA Surface water status report 2010–11*, which includes background information on rainfall, streamflow, salinity, water extraction and relevant water-dependent ecosystems, please visit the *Water Resource Assessments* page on www.waterconnect.sa.gov.au.

Streamflow and salinity data are available via WaterConnect at www.waterconnect.sa.gov.au.

For further details about the *Marne Saunders PWRA*, please see the *Water Allocation Plan* for the Marne Saunders PWRA on the Natural Resources SA Murray-Darling Basin website at http://www.naturalresources.sa.gov.au/samurraydarlingbasin/home.

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