

Marne Saunders Prescribed Water Resources Area

2017 Surface water status report



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2017 Status summary

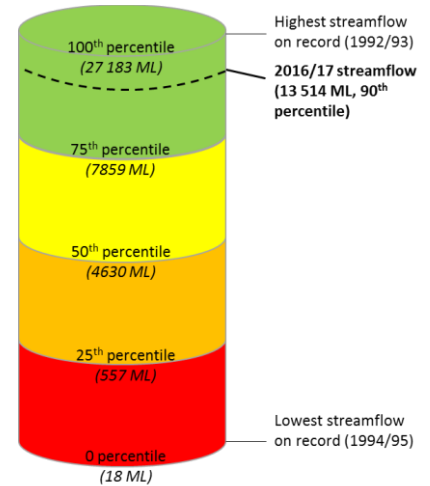
Marne-Saunders PWRA



The Marne Saunders at a whole PWRA scale is assigned a **green** surface water status for 2017, a wet year, with streamflow being much higher than the average observed for the PWRA

Green status means that the total annual streamflow was above the 75th percentile¹ of 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 less than this value. 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.

Rainfall

Figure 1 and 5

Rainfall station	Keyneton rainfall station (M023725) Reporting period: 1973/74-2016/17, in line with streamflow data availability
Annual total ²	610 mm 101 mm above the average annual rainfall of 509 mm (1889/90-2016/17) Neighbouring rainfall stations at Cambrai (M024513) and Mt Pleasant (M023737) recorded 331 mm and 644 mm respectively for the 2016/17 period, the latter of which is located just outside the PWRA, 10 km south-east of Springton. These sites show consistent rainfall trends with the Keyneton station
Monthly rainfall summary	Significant rainfall was recorded in July, September and December 2016, and these months represented 55% of the annual total for 2016/17 September recorded almost 3 times the average monthly rainfall (163 mm compared to 57 mm) Lower than average rainfall was experienced in August, October, and December 2016 and between March and June 2017
Spatial distribution	The spatial distribution of rainfall across the region indicates a decreasing gradient from the west to the east During 2016/17, the whole of the PWRA experienced higher rainfall when compared to the average annual rainfall, with the far western area of the PWRA reaching over 800 mm
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 an increasing trend as a result of the high rainfall experienced in 2016/17

Streamflow

Figure 2 and 6

Streamflow gauging stations	Marne Gorge gauging station (A4260605) on the Marne River (5km west of Cambrai) Streamflow data availability: 1973/74-2016/17 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 Sanderton observed similar conditions over the 2016/17 period
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² For the water-use year 1 July 2016 to 30 June 2017

Annual total ²	Both gauging stations recorded above average annual streamflow in 2016/17. The Saunders Creek gauging station recorded the highest flow on record																
	<table border="1"> <thead> <tr> <th></th> <th>2016/17 streamflow (ML)</th> <th>Average annual streamflow (ML)</th> <th>Percentile Rank</th> </tr> </thead> <tbody> <tr> <td>Marne River</td> <td>13 514</td> <td>5761 (1976-2016)</td> <td>90th</td> </tr> <tr> <td>Saunders Creek</td> <td>1139</td> <td>244 (2009-2016)</td> <td>100th</td> </tr> <tr> <td>Combined</td> <td>14 653</td> <td></td> <td></td> </tr> </tbody> </table>		2016/17 streamflow (ML)	Average annual streamflow (ML)	Percentile Rank	Marne River	13 514	5761 (1976-2016)	90 th	Saunders Creek	1139	244 (2009-2016)	100 th	Combined	14 653		
	2016/17 streamflow (ML)	Average annual streamflow (ML)	Percentile Rank														
Marne River	13 514	5761 (1976-2016)	90 th														
Saunders Creek	1139	244 (2009-2016)	100 th														
Combined	14 653																
Monthly streamflow summary	<p>Historically, the majority of streamflow in the Marne Saunders PWRA occurs between July and October and typically accounts for approximately 87% of the total annual flow in any given year</p> <p>Streamflow between July and October 2016 accounted for over 99% of the flow in 2016/17</p> <p>September flow was almost 7-times the average monthly total (9743 ML compared to 1468 ML)</p>																
Streamflow trend	<p>Long-term trend - Annual streamflow volumes recorded at the Marne Gorge gauging station (1973/74-2016/17) indicate a declining long-term trend</p> <p>Short-term trend - The last five years of streamflow indicate an increasing trend as a result of the high rainfall experienced in 2016/17</p>																

Water use

Figure 3

Surface-water use data ²	<p>Water use based on metered data from licensed surface water and watercourses: 469 ML (compared to 460 ML in 2015/16)</p> <p>Watercourse extraction increased from the previous year: 115 ML compared to 39 ML in 2015/16</p> <p>Estimated non-licensed water demand (stock and domestic) water demand is 496 ML (30% of existing stock and domestic dam capacity)</p>
Resource Volume ²	<p>Total resource volume: 15 617 ML</p> <ul style="list-style-type: none"> Combined streamflow recorded at the representative streamflow gauging stations (Marne Gorge and Saunders Creek) in the Marne Saunders PWRA: 14 653 ML. Surface water extraction (licensed and non-licensed): 965 ML. <p>Surface water extraction was approximately 6% of the total resource volume (compared to 94% in 2015/16)</p>

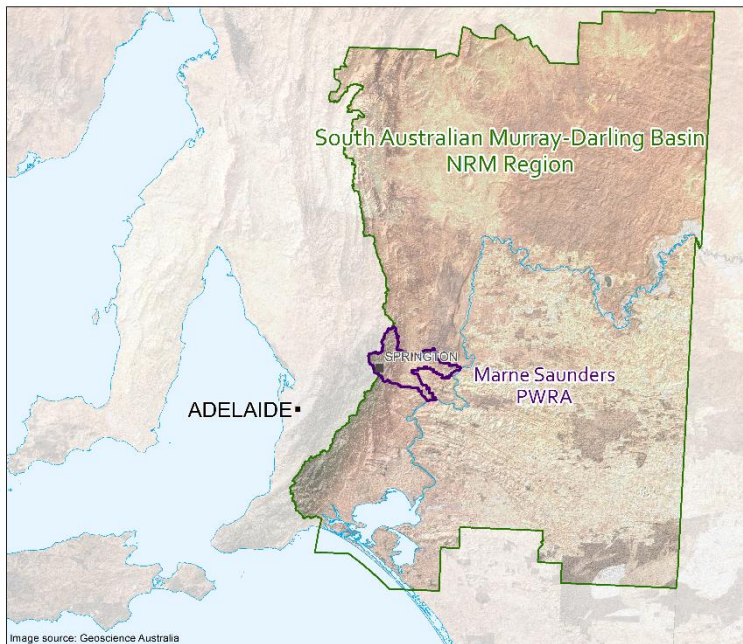
² For the water-use year 1 July 2016 to 30 June 2017

Surface water salinity

Figure 4

Salinity monitoring	Marne Gorge gauging station (A4260605) – data available from 2002 Saunders Creek gauging station (A4261174) gauging station – data available from 2010
General observations	Salinity increases during sustained summer events while decreasing throughout the winter months as a result of higher dilution capacity as flow volumes increase
Salinity – 2016/17 water-use year	Highest salinity recorded at Marne River: 2950 Highest salinity recorded at Saunders Creek: 5768 mg/L
Salinity - 2002/03–2016/17	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 was less than 2500 mg/L for the majority of the salinity data period 70% 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 2006-09 as a result of consecutive years of below average streamflow

Regional setting



The Marne Saunders Prescribed Water Resources Area (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 western part of the region 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, decreased irrigation extractions and salinities may stabilise or decline.

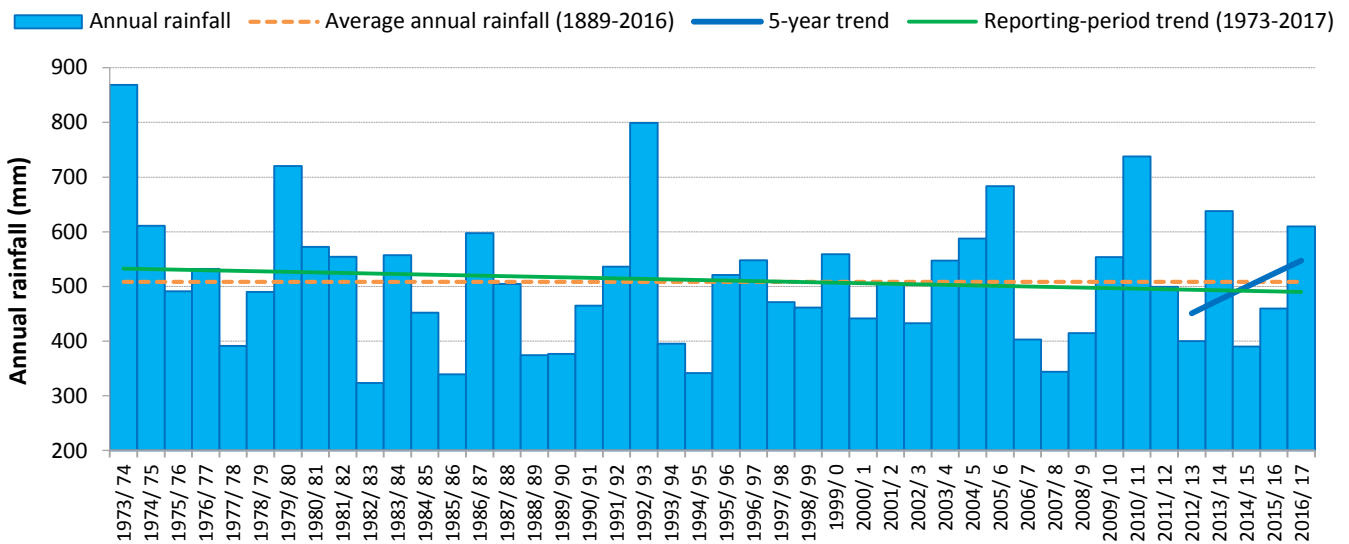


Figure 1. Annual rainfall (mm) for 1973/74–2016/17 at the Keyneton rainfall station (M023725)

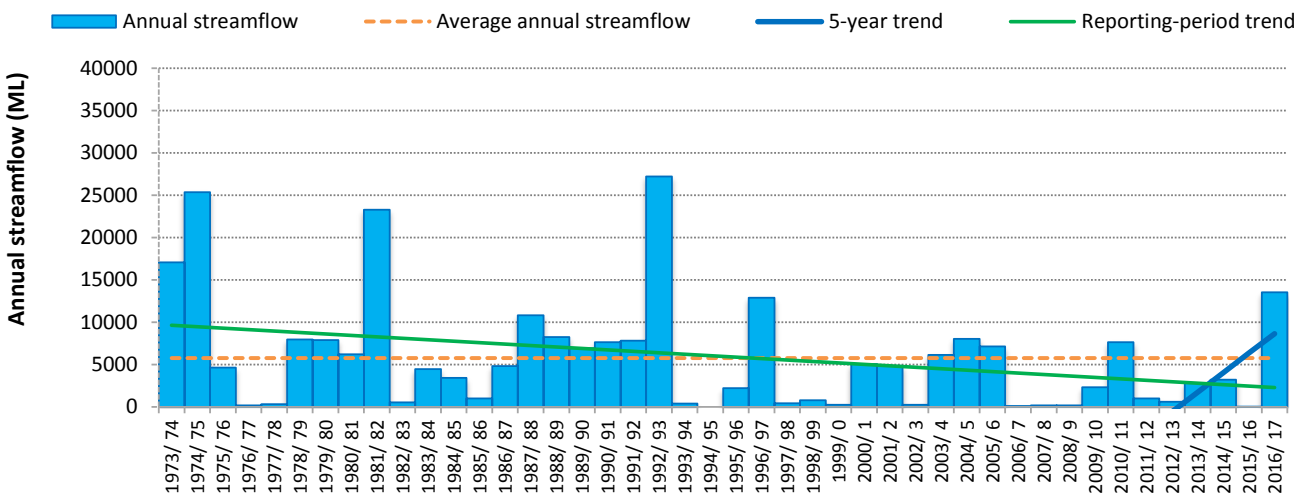


Figure 2. Annual streamflow (ML) for 1973/74–2016/17 at the Marne Gorge gauging station (A4260605)

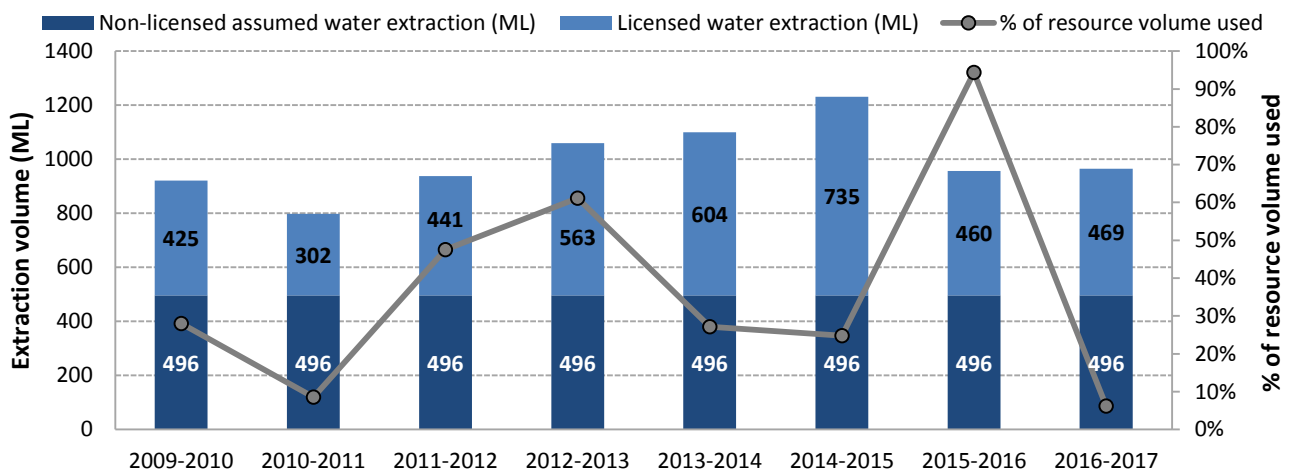


Figure 3. Surface water use as a percentage of total resource volume available for 2009/10–2016/17 in the Marne Saunders PWRA

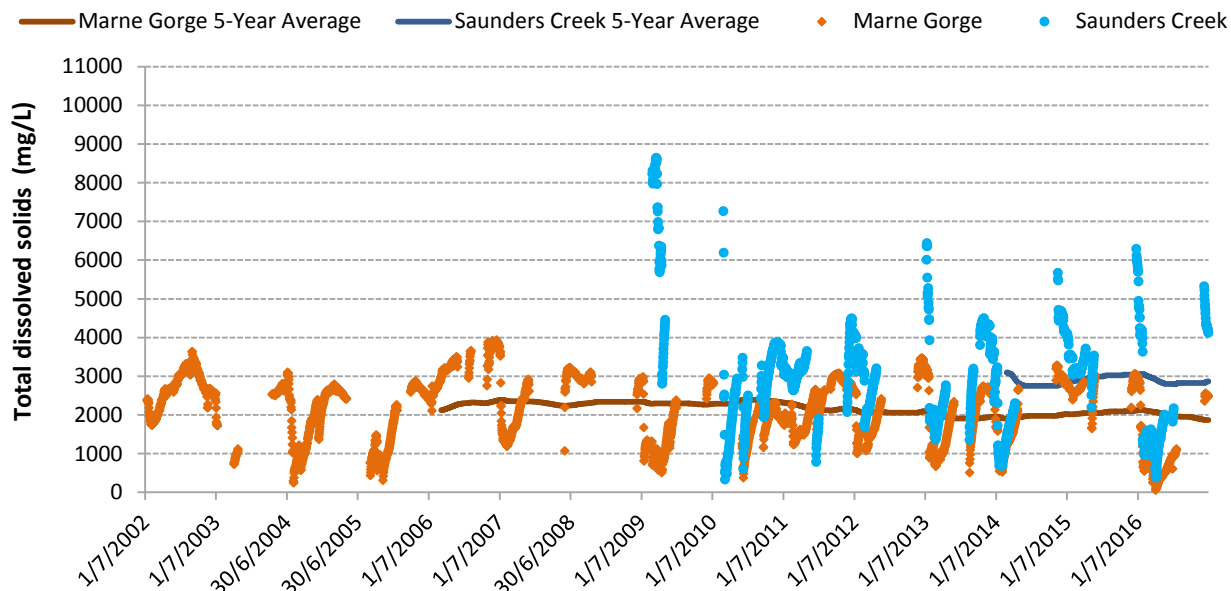
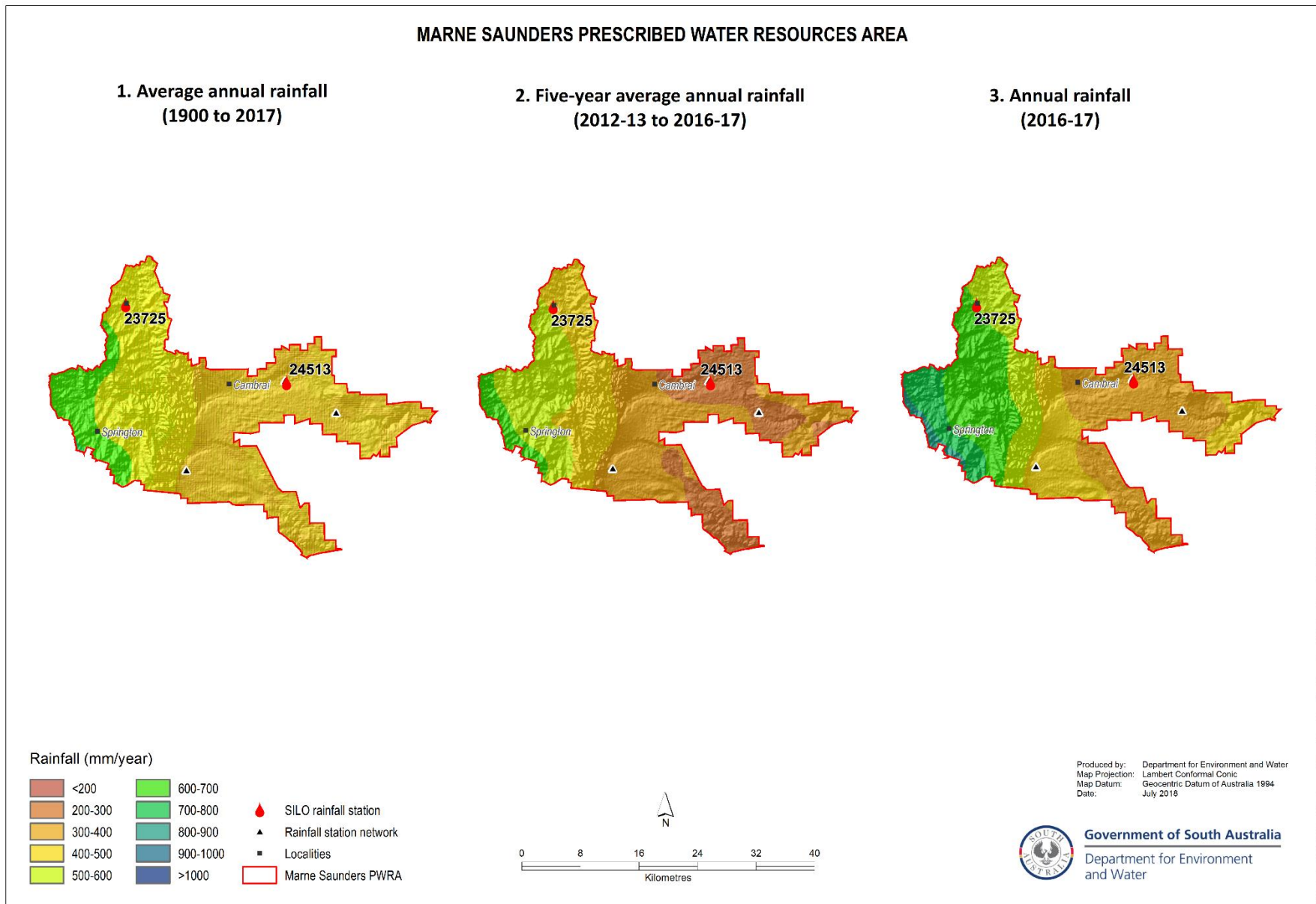


Figure 4. Marne Saunders PWRA and salinity data (TDS mg/L) for 2002/03-2016/17 at Marne Gorge (A4260605) and 2009/10-2016/17 at Saunders Creek (A4261174) gauging stations



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Figure 5. (1) Average annual rainfall (2) five-year average annual rainfall and (3) annual rainfall for the 2016/17 in the Marne Saunders PWRA³

³ Data sources: SILO Patched Point Dataset <https://legacy.longpaddock.qld.gov.au/silo/> and BoM Australian Water Availability Project (<http://www.bom.gov.au/jsp/awap/>)

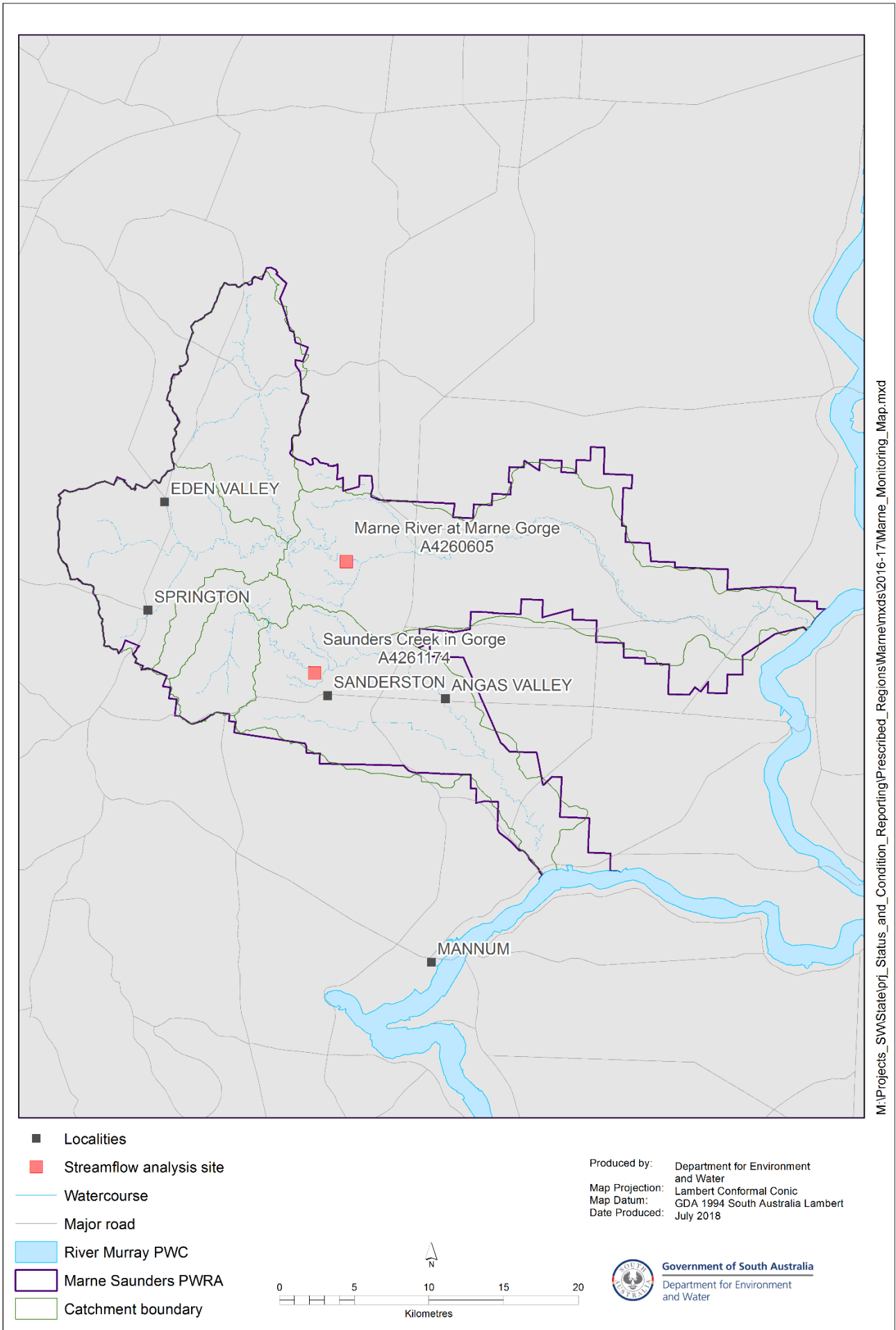


Figure 6. Streamflow gauging stations in the Marne Saunders PWRA

More information

The status of the Marne Saunders was determined by expressing the annual Marne Gorge streamflow for 2016/2017 as a percentile of the total annual streamflow for the period (1973/74–2016/17).

The total 2016/17 streamflow from the Marne Gorge gauging station (13 514 ML) represents the 90th percentile, i.e. 90% of the long-term historic annual streamflow totals were lesser than the streamflow observed in 2016/17.

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 on [WaterConnect](#).

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 is sourced from the SILO Patched Point Dataset, which uses original Bureau of Meteorology daily rainfall measurements and is available online at <https://legacy.longpaddock.qld.gov.au/silo/>. Rainfall maps have been compiled using daily gridded data produced by the BoM Australian Water Availability Project (<http://www.bom.gov.au/jsp/awap/>).

To view the *Marne Saunders PWRA Surface water status report 2010–11*, which includes background information on rainfall, streamflow, salinity, water use and relevant water-dependent ecosystems, please visit the *Water Resource Assessments* page on [WaterConnect](#).

Streamflow and salinity data are available via WaterConnect: 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: <http://www.naturalresources.sa.gov.au/samurraydarlingbasin/home>.



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