Lower Limestone Coast PWA
Unconfined aquifer

2017 Groundwater level and salinity status report

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ISBN 978-1-925805-03-1

Preferred way to cite this publication

DEW (2018). *Lower Limestone Coast PWA unconfined aquifer 2017 Groundwater level and salinity status report,* Government of South Australia, Department for Environment and Water, Adelaide.

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2017 Status summary
Lower Limestone Coast PWA
Unconfined aquifer

Due to the vast area, different land uses and geomorphology of the Lower Limestone Coast Prescribed Wells Area (PWA), the unconfined aquifer has been divided into two resource groups (Figure 4), with a status assigned to each group.

Coastal Plain and Donovans Management Area

The Coastal Plain[1] and Donovans Management Area has been assigned a ***green*** status for 2017 because positive trends have been observed over the past five years.

The status is based on five-year trends: over the period 2013–17, 83% of wells show rising or stable groundwater levels and 77% show decreasing or stable salinities.

Highlands

The Highlands have been assigned a ***yellow*** status for 2017 because minor adverse trends have been observed over the past five years.

The status is based on five-year trends: over the period 2013–17, 56% of wells show declining groundwater levels and all wells show decreasing or stable salinities.

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.

Rainfall

See Figures 1 and 2

Rainfall station	Mount Gambier Aero Bureau of Meteorology (BoM) rainfall station 26021, located approximately 8 km north of Mount Gambier
Annual total[2]	885 mm 164 mm (23%) greater than the five-year and long-term average of 721 mm
Monthly summary	Well-above average rainfall recorded in July, September, January and March Well-below average rainfall recorded in June
Spatial distribution	Rainfall in 2016–17 was well above average across the entire PWA

[1] The assessment of the inter-dunal flats is combined into the coastal plain
[2] For the water-use year 1 July 2016 to 30 June 2017

Water use

See Figure 3

Total allocated volume: 2016–17	679 842 ML
Licensed groundwater extractions*	158 185 ML[3] (23% of total allocation)
Extraction volume comparison	38% less than the previous year 26% less than the five-year average

*Stock and domestic use is not included in licensed extractions

Groundwater level

See Figure 4

Five-year trend: 2013–17	
Coastal Plain and Donovans Management Area	297 out of 444 wells (67%) show rising trends, at rates of 0.02–1.45 m/y (median of 0.08 m/y) 86 wells (19%) are stable 61 wells (14%) show declining trends, at rates of 0.02–0.59 m/y (median of 0.04 m/y); seven of these wells show their lowest level on record
Highlands	9 out of 39 wells (23%) show rising trends, at rates of 0.02–0.11 m/y (median of 0.06 m/y) 8 wells (21%) are stable 22 wells (56%) show declining trends, at rates of 0.02–0.40 m/y (median of 0.09 m/y); four of these wells show their lowest level on record
Local observations	The rises occurred primarily on the Coastal Plain in the Lower South East, where the watertable is shallow and rainfall is higher

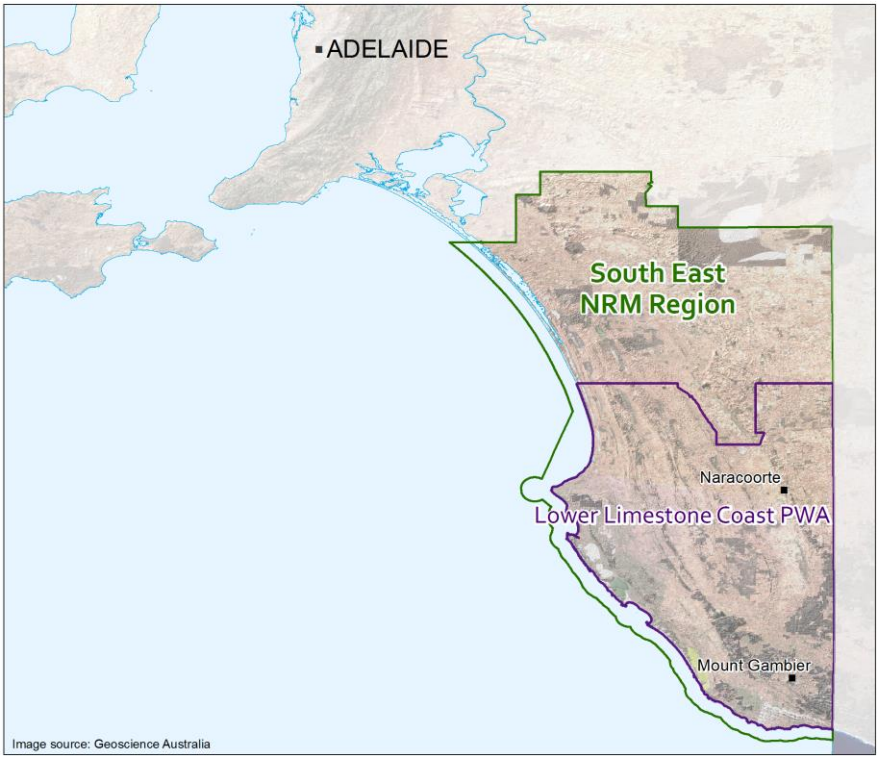
[3] Total licensed extractions are subject to change as extraction data have not yet been verified in full – see More information

Groundwater salinity

See Figures 5 and 6

2017 salinity	193–7609 mg/L 152 out of 192 wells (79%) show salinities less than 1500 mg/L, which is the salinity threshold for the irrigation of most crop types
Five-year trend: 2013–17	
Coastal Plain and Donovans Management Area	21 out of 144 wells (15%) show decreasing trends, at rates of 12–155 mg/L/y (median of 47 mg/L/y) 90 wells (62%) are stable 33 wells (23%) show increasing trends, at rates of 5.9–230 mg/L/y (median of 23 mg/L/y)
Highlands	3 out of 26 wells (12%) show decreasing trends, at rates of 12–61 mg/L/y (median of 16 mg/L/y) 23 wells (88%) are stable
Local observations	Two sea water intrusion monitoring wells (CAR061, CAR081) located near the coast in the Donovans Management Area show salinities of around 33 000 mg/L and 14 000 mg/L; salinities have been stable over the past five years. Inland monitoring wells in this area show salinity of less than 2000 mg/L

Regional setting



The Lower Limestone Coast PWA is located in the South East Natural Resources Management Region, the northern boundary being approximately 300 km south-east of Adelaide. It is a regional-scale resource for which groundwater is prescribed under South Australia's *Natural Resources Management Act 2004*. A water allocation plan (WAP) provides for the sustainable management of the groundwater resources.

The Lower Limestone Coast PWA is underlain predominantly by Tertiary sediments of the Gambier Basin, with a continuous transition to similar sediments of the Murray Basin in the northern portion of the PWA. The PWA is characterised by two discrete landforms (Figure 4): (1) a low-lying coastal plain and also the northern and central parts of the PWA that are characterised by north-west trending remnants of old coastal dunes separated by inter-dunal flats (herein referred to as the Coastal Plain and Donovans Management Area), and (2) an area towards the east and north-east that gently rises to 70 m above sea level (herein referred to as Highlands).

The Quaternary Padthaway, Coomandook and Bridgewater Formations form the unconfined aquifer in the northern and central parts of the PWA. In the south of the PWA, the Tertiary Gambier Limestone forms the unconfined aquifer. Beneath the highlands, the unconfined aquifer is contained within the Murray Group Limestone (also of Tertiary age), which is in the Murray Basin and is equivalent to the Gambier Limestone of the Gambier Basin. The main source of recharge to the unconfined aquifer is the direct infiltration of local rainfall. Groundwater flows from the topographic high of the Dundas Plateau (in Victoria), located in western Victoria, to the PWA in a radial direction, westward and southward towards the coast.

Trends in groundwater levels and salinities in the Lower Limestone Coast PWA are primarily climate driven: below-average rainfall results in a reduction in recharge to the aquifers. Below-average summer rainfall can also result in increasing irrigation extractions, and these two elements can cause the groundwater levels to decline and may cause salinities to increase. Conversely, increased rainfall may result in increased recharge and decreased irrigation extraction, which may cause groundwater levels to rise and salinities to stabilise or decrease.

Groundwater levels and salinities have also been affected by the clearance of native vegetation and subsequent land-use change and recycling of irrigation drainage water. The response of groundwater levels of the unconfined aquifer to rainfall varies between the plains and highlands primarily due to the depth to the watertable. Groundwater levels are more responsive to rainfall on the low-lying plains where the watertable is shallow. In the ranges, where the watertable is greater than 10 m below ground surface, the watertable shows a delayed response, with a lag time that is dependent on the depth to the watertable, land use and the permeability of the sediments.

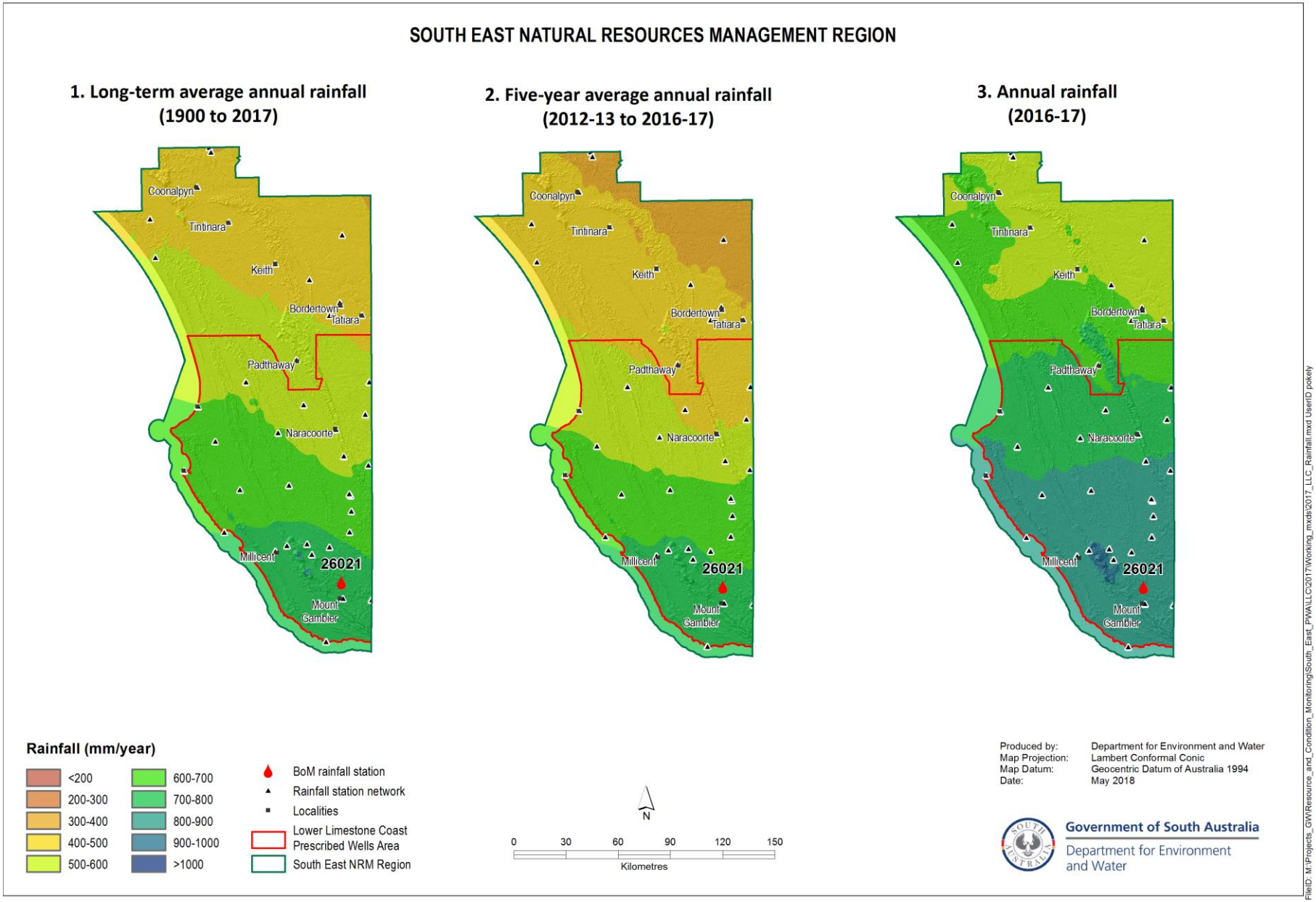


Figure 1. Spatial distribution of (1) Long-term and (2) five-year average annual rainfall, and (3) annual rainfall[4]

[4] Data sources: SILO Patched Point Dataset https://silo.longpaddock.qld.gov.au/ and BoM Australian Water Availability Project (http://www.bom.gov.au/jsp/awap/) – see More information

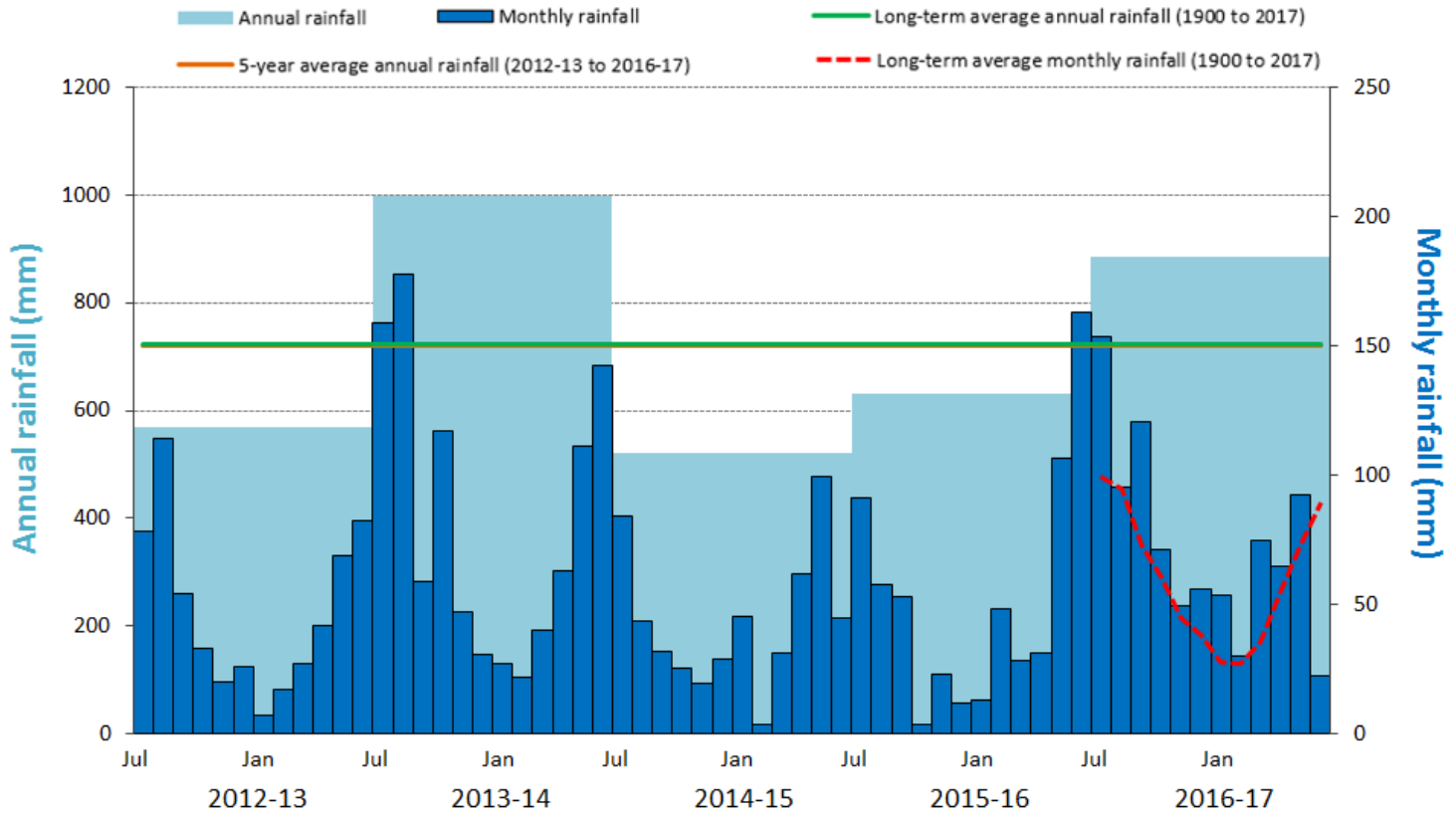


Figure 2. Annual and monthly rainfall for the past five water-use years recorded at Mount Gambier (BoM Station 26021)[5]

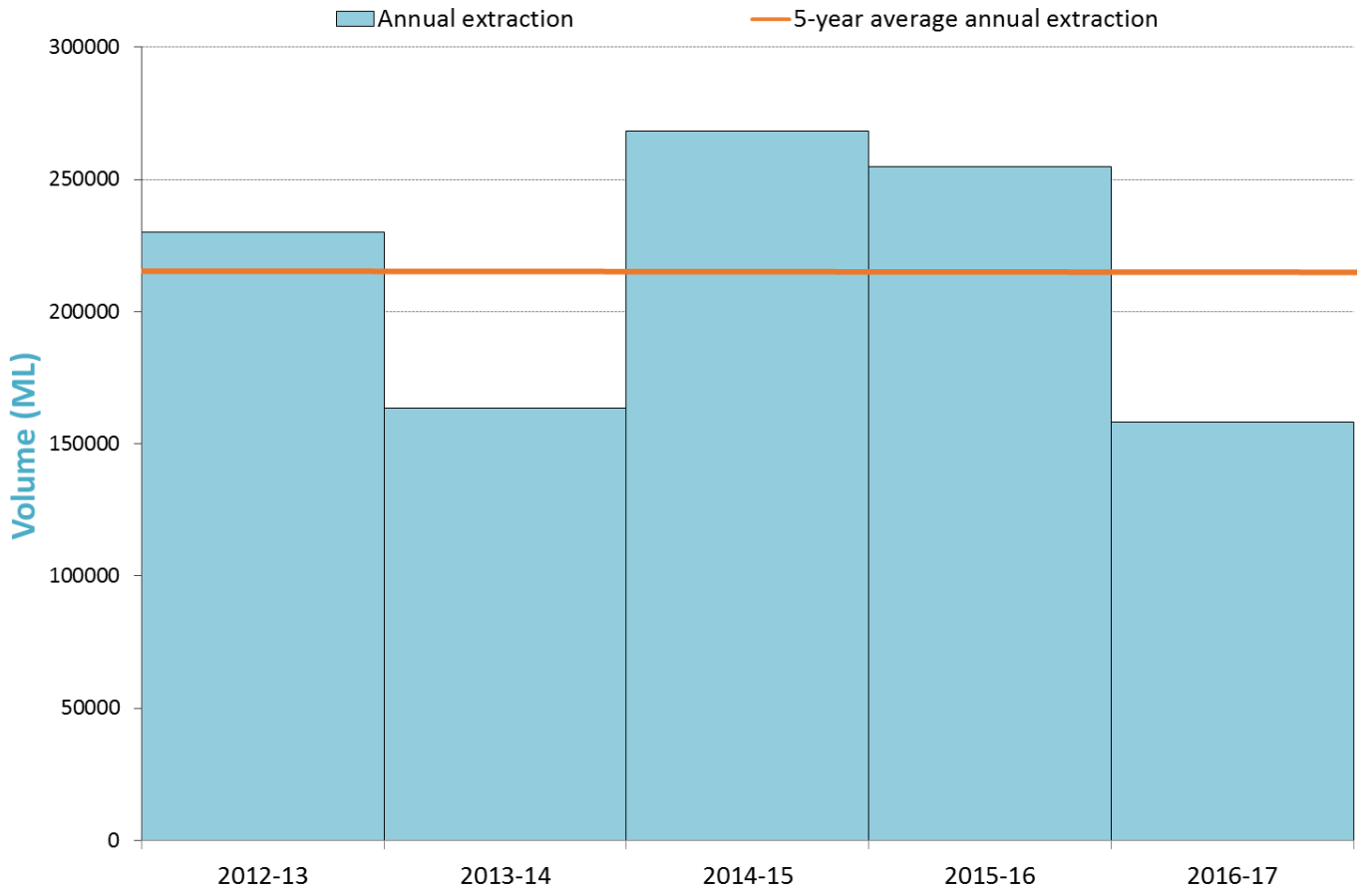


Figure 3. Licensed groundwater extraction volumes[6] for the past five water-use years

[5] Data source: SILO Patched Point Dataset, available https://silo.longpaddock.qld.gov.au/ – see More information
[6] Total licensed extractions are subject to change as extraction data have not yet been verified in full – see More information

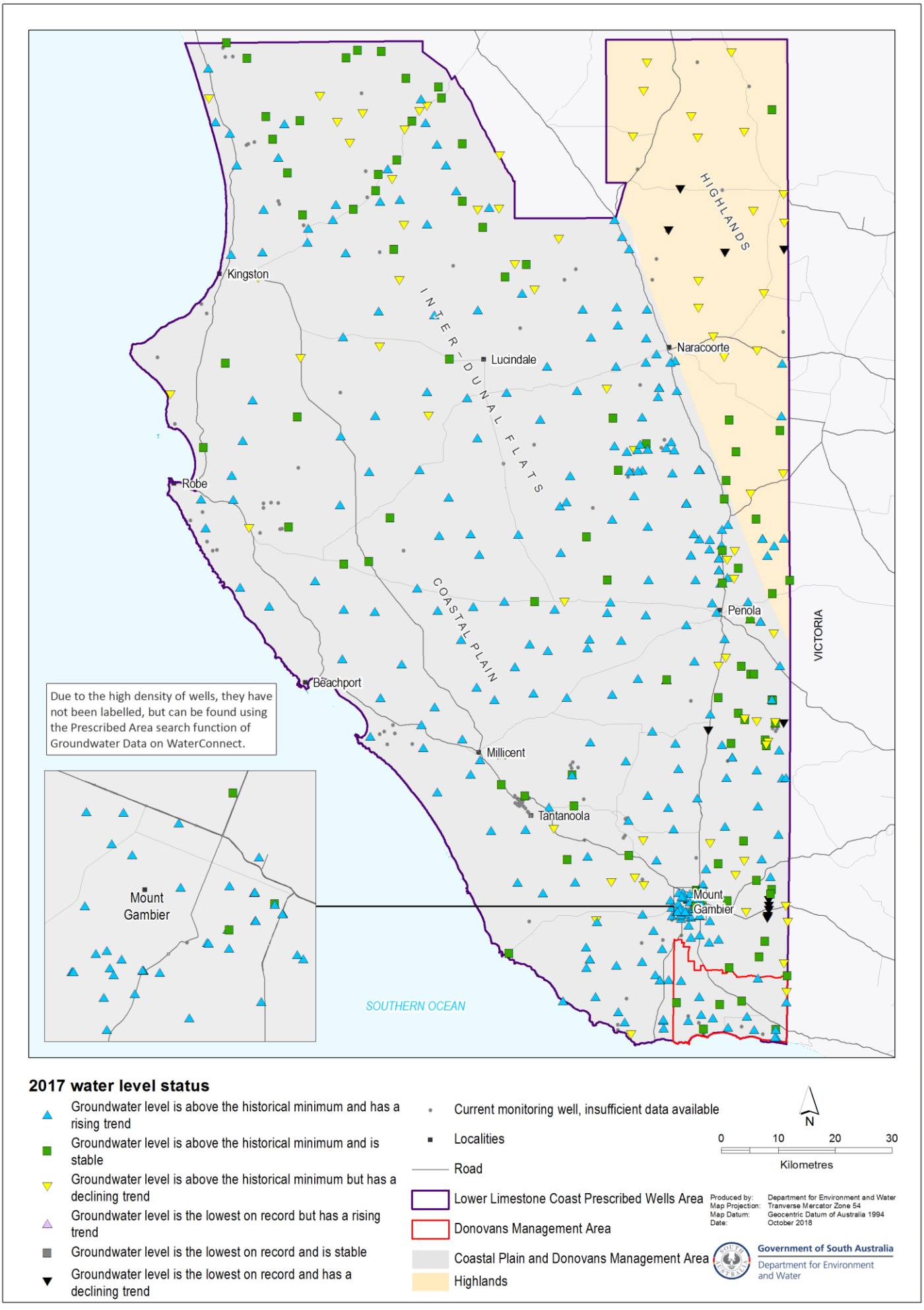


Figure 4. Five-year trends (2013–17) in groundwater levels: unconfined aquifer

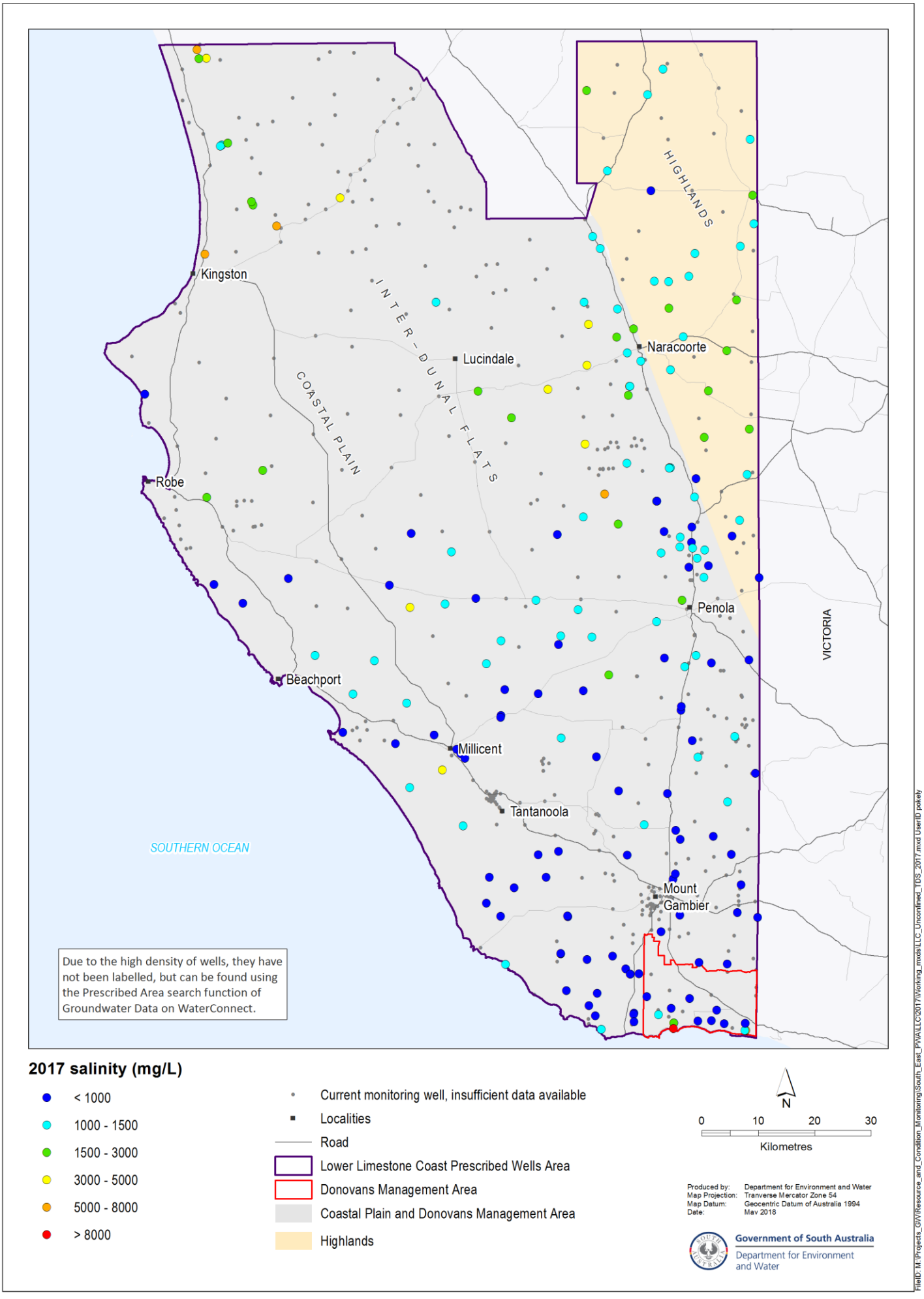


Figure 5. 2017 groundwater salinities: unconfined aquifer

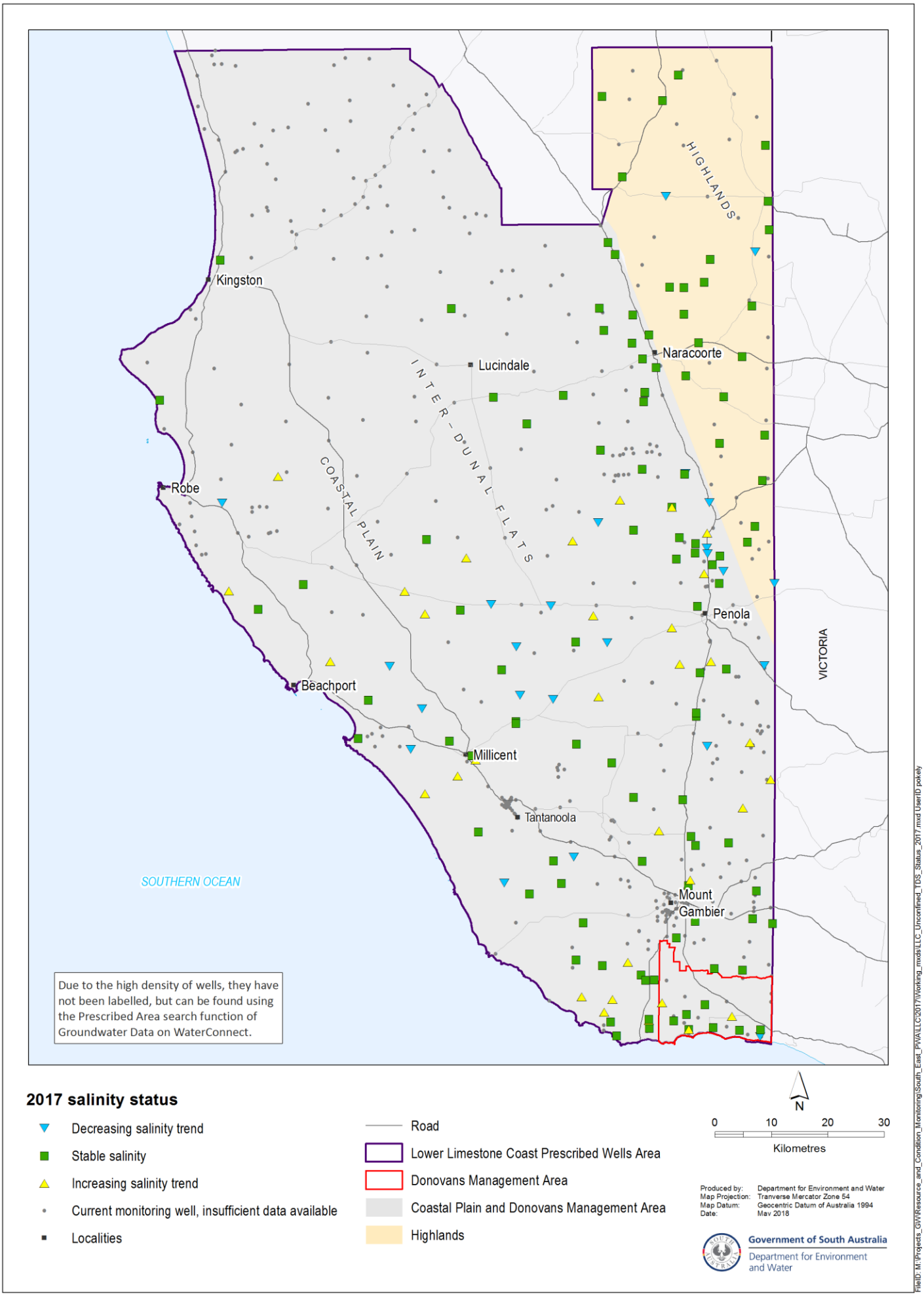


Figure 6. Five-year trends (2013–17) in groundwater salinities: unconfined aquifer

More information

To determine the status of the unconfined aquifer of the Lower Limestone Coast PWA for 2017, the trends in groundwater levels and salinities over the past five years (2013 to 2017, inclusive) were analysed, in contrast to the year-to-year assessments that have been used in *Groundwater level and salinity status reports* published prior to 2015. Please visit the Frequently Asked Questions on the *Water Resource Assessments* page on WaterConnect for more detail on the current method of evaluating the status of groundwater resources.

To view descriptions for all status symbols, and to review the full historical record of the monitoring wells, please visit the *Water Resource Assessments* page on WaterConnect.

For additional information related to monitoring wells nomenclature, please refer to the *Well Details* page on WaterConnect.

The licensed groundwater use for the 2016–17 water-use year is based on the best data available as of April 2018 and may be subject to change, as some extraction volumes may be in the process of being verified.

For information completeness and consistency across all the groundwater level and salinity status reports, the legend on each map herein shows the full range of water level and salinity status that could possibly be reported. However, the measured data that appear on each map may not span this full range.

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

The status of the confined groundwater resource is published in a separate report *Prescribed Wells Areas of the South East confined aquifer 2017 Groundwater level and salinity status report*. Please visit the Water Resource Assessments page on WaterConnect to view this report.

To view the Lower Limestone Coast PWA groundwater level and salinity status report 2011, which includes background information on hydrogeology, rainfall and relevant groundwater-dependent ecosystems, please visit WaterConnect. To view all past published *Groundwater level and salinity status reports*, please visit the Water Resource Assessments page on WaterConnect.

To download groundwater level and salinity data from monitoring wells within the Lower Limestone Coast PWA, please visit the *Groundwater Data* page under the Data Systems tab on WaterConnect.

For further details on the Lower Limestone Coast PWA, please see the *Lower Limestone Coast Water Allocation Plan* available on the Natural Resources South East website.

Units of Measurement

mm	millimetre
ML	megalitre
m/y	metres per year
mg/L	milligrams per litre
mg/L/y	milligrams per litre per year
mm/y	millimetres per year

Government of South Australia

Department for Environment and Water

Published 2018
www.environment.sa.gov.au