
LOWER LIMESTONE COAST PWA

UNCONFINED AQUIFER

Groundwater Level and Salinity Status Report

2012



Government of South Australia
Department of Environment,
Water and Natural Resources

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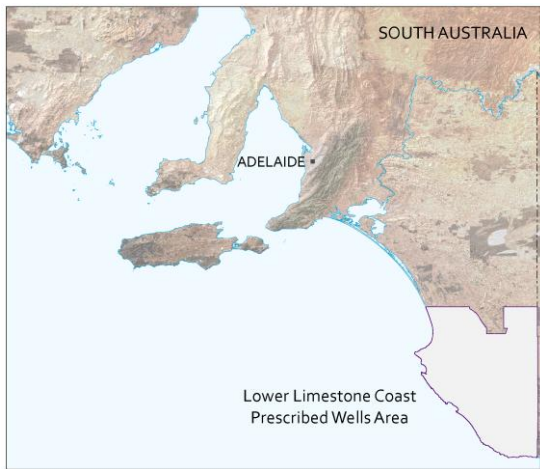
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2012 SUMMARY



The Lower Limestone Coast Prescribed Wells Area (PWA) is located in the South East of South Australia, 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*. Three water allocation plans—Comaum–Caroline, Lacepede Kongorong and Naracoorte Ranges—provide for the sustainable use of the groundwater resources. A single water allocation plan for the Lower Limestone Coast PWA is currently in development.

The Lower Limestone Coast PWA is predominantly underlain 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. Most of the region is characterised by a low-lying coastal plain that gently rises to 70 m above sea level in the eastern and north-eastern parts of the PWA. The northern and central parts of the Lower Limestone Coast PWA are characterised by north-west trending remnants of old coastal dunes separated by inter-dunal flats. There are two aquifer systems located in the region—an unconfined aquifer comprising Quaternary and Tertiary limestones and an underlying confined Tertiary sand aquifer. The Quaternary-aged 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-aged Gambier Limestone forms the unconfined aquifer. Beneath the highlands, the unconfined aquifer is contained within the Tertiary-aged Murray Group limestone aquifer, 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 rainfall and groundwater flow occurs from the topographic high of the Dundas Plateau located in western Victoria. From there, groundwater flows through the PWA in a radial direction westward and southward to the coast.

Verified metered groundwater extraction volumes for the 2011–12 water-use year were not available at the time of writing so are not included in this report.

Analysis of climatic trends in the South East has revealed a general drying trend since the early 1950s. This is reflected in most groundwater hydrographs and a strong relationship has been demonstrated between decreases in average annual rainfall and declining water levels measured in observation wells for both the confined and unconfined aquifers over the last 40 years. The Mount Gambier Aero rainfall station (number 26021) is located about 8 km north of Mount Gambier and recorded nearly 650 mm of rain in 2012. This is more than 70 mm below the long-term average annual rainfall for this station. The month of June received rainfall significantly above its long-term monthly average, but July and September through to December recorded well below-average rainfall, as did January and February (Fig. 1).

Long-term observations of the unconfined aquifer reveal relatively stable groundwater level trends on the inter-dunal flats, with the maximum recovered water levels displaying a broad relationship with rainfall trends. Below-average rainfall coupled with intensive, licensed groundwater extraction and commercial forest plantations has contributed to a consistent decline in groundwater levels on the coastal plain since 1993. Wetter conditions from 2009 to 2011 led to increases in groundwater levels across the coastal plains and inter-dunal flats. In the highlands, long-term observations show rising groundwater levels due to increased recharge caused by the widespread clearance of native vegetation. This rising trend persisted for several years after the prolonged period of below-average rainfall that commenced in 1993; however, the majority of observation wells display a declining trend after the year 2000 or later. This is likely caused by the lag time for recharge to the aquifer by rainfall infiltration as the water table is deep in this area.

In 2012, 274 groundwater level observation wells (58%) display a decline in the maximum recovered groundwater level of up to 1.1 m when compared to 2011 water level data (Fig. 2). An increase of up to 1.0 m was recorded in 191 observation wells (41%) and levels are stable in four wells. Increases in groundwater levels occurred primarily along the coastal plain and inter-dunal flats where the water table is the shallowest. Declines in groundwater levels predominantly occurred along the eastern border of the PWA, with the largest declines recorded between Naracoorte and Penola. The Donovans Management Area remains at risk of seawater intrusion due to an overall decline in groundwater levels in the area. The overall decline in groundwater levels across the Lower Limestone Coast PWA is the likely result of the increase in extractions and below-average rainfall.


Over large areas of the PWA where stresses on the unconfined aquifer such as intensive irrigation or land use change are absent, long-term salinity trends are reasonably stable. However, trends of increasing salinity have been observed locally in areas of flood irrigation through the recycling of salt by irrigation drainage water and areas of intensive groundwater extraction and native vegetation clearance.

Generally, the water in the unconfined aquifer is of good quality, with 80% of monitored wells recording groundwater salinity of less than 1500 mg/L in 2012 (Fig. 3). Salinity above 1500 mg/L is predominantly found across the northern half of the PWA. A slim majority of observation wells (52%) recorded a decrease in salinity when compared to 2011 salinity data. Wells that recorded a decrease in salinity are located primarily on the inter-dunal flats and those that recorded an increase are found predominantly in the highlands.

Due to the vast area, the different land uses and the geomorphology of the Lower Limestone Coast PWA, the unconfined aquifer has been assigned two different statuses for 2012.

Coastal plain and inter-dunal flats

On the coastal plain and inter-dunal flats, the unconfined aquifer of the Lower Limestone Coast PWA has been assigned a green status for 2012:

2012 STATUS  "No adverse trends, indicating negligible risk to the resource"

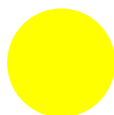
This means that the groundwater status was observed to be stable (i.e. no significant change) or improving over the reporting period. Continuation of these trends favours a very low likelihood of negative impacts on beneficial uses such as drinking water, irrigation or stock watering. The 2012 status for the unconfined aquifer on the coastal plain and inter-dunal flats of the Lower Limestone Coast PWA is supported by:

- an overall increase in the maximum recovered groundwater level in 2012 when compared to 2011 water level data
- an overall decrease in groundwater salinity in 2012 when compared to 2011 salinity data.

The highlands and Donovans Management Area

In the highland area along the eastern border of the PWA and the Donovans Management Area, the unconfined aquifer of the Lower Limestone Coast PWA has been assigned a yellow status for 2012:

2012 STATUS



“Adverse trends indicating low risk to the resource in the medium term”

This means that that observed adverse trends are gradual and if continued, will not lead to a change in the current beneficial uses of the groundwater resource for at least 15 years. The 2012 status for the unconfined aquifer in the highland area of the Lower Limestone Coast PWA is supported by:

- an overall decline in the maximum recovered groundwater level in 2012 when compared to 2011 water level data
- an overall increase in groundwater salinity in 2012 when compared to 2011 salinity data.

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, [visit WaterConnect](#).

To view descriptions of all status symbols, [click here](#).

For further details about the Lower Limestone Coast PWA, please see the [Draft Lower Limestone Coast Water Allocation Plan](#).

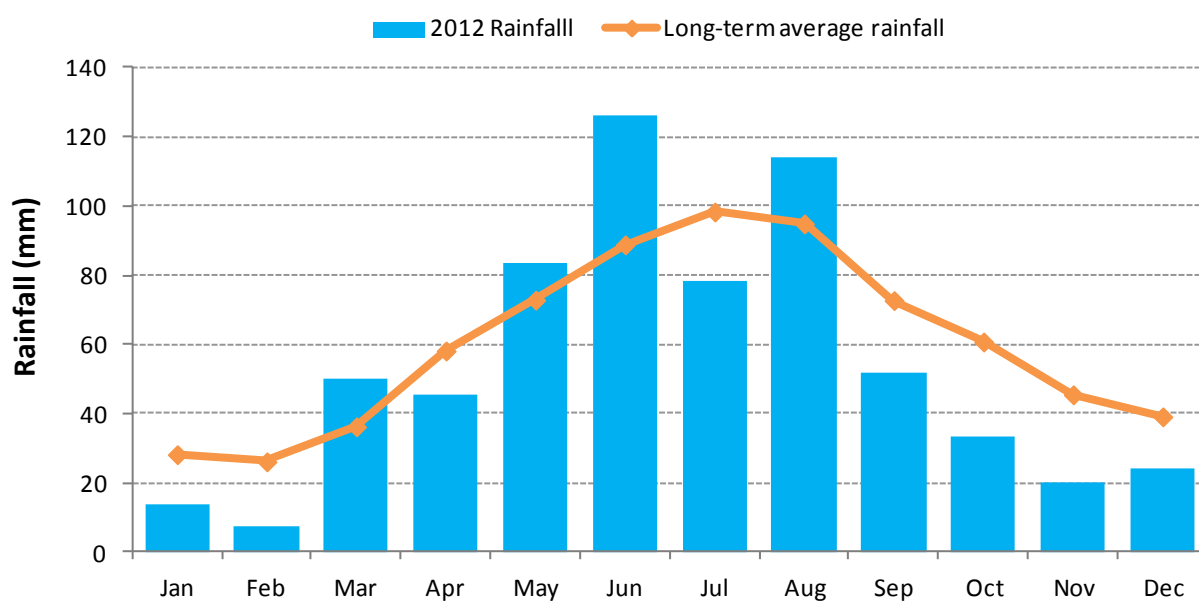


Figure 1. Monthly rainfall (mm) for 2012 and the long-term average monthly rainfall (mm) at the Mount Gambier Aero rainfall station (number 26021) in the Lower Limestone Coast Prescribed Wells Area

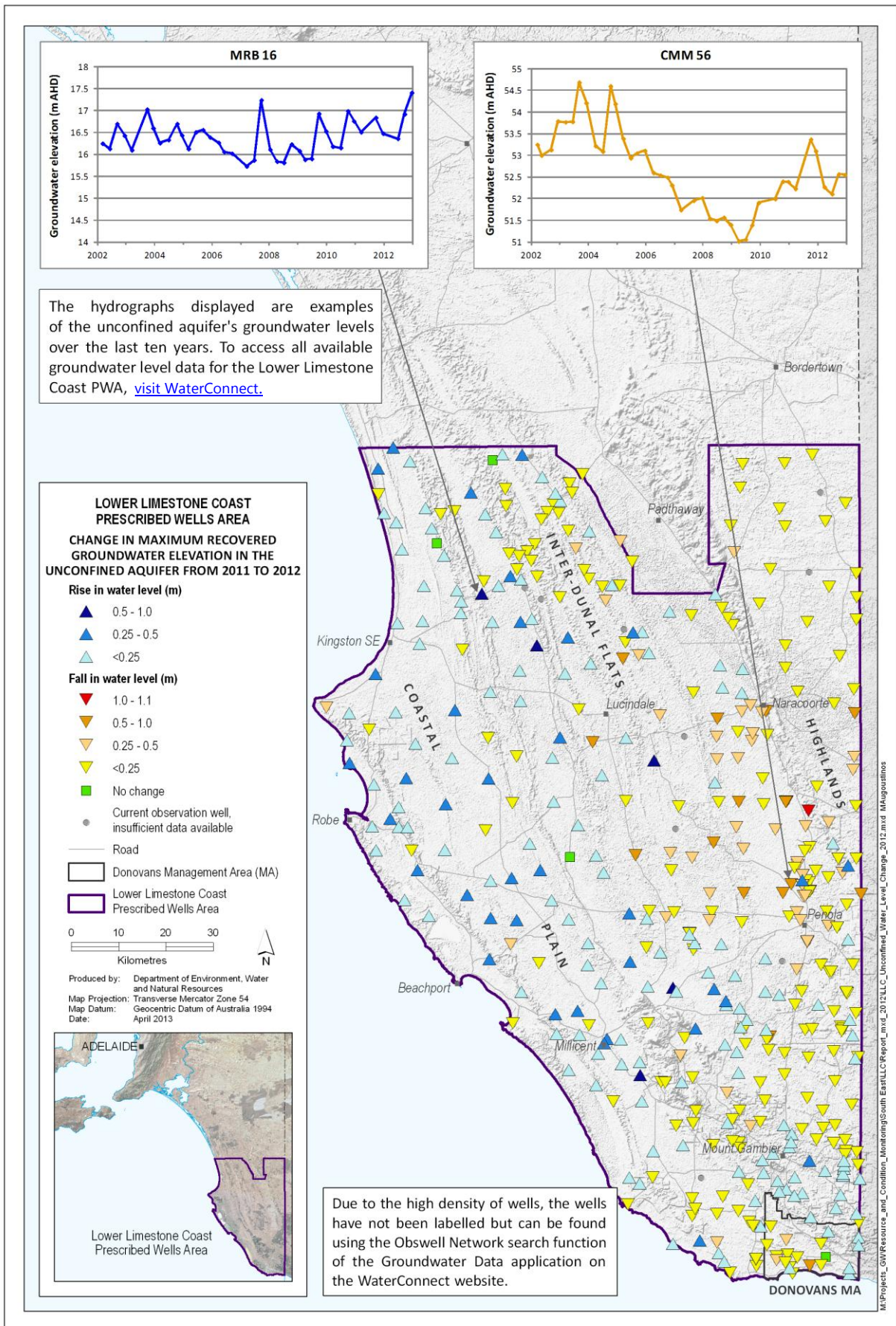


Figure 2. Overall changes in maximum groundwater levels in the unconfined aquifer of the Lower Limestone Coast Prescribed Wells Area from 2011 to 2012

Lower Limestone Coast PWA

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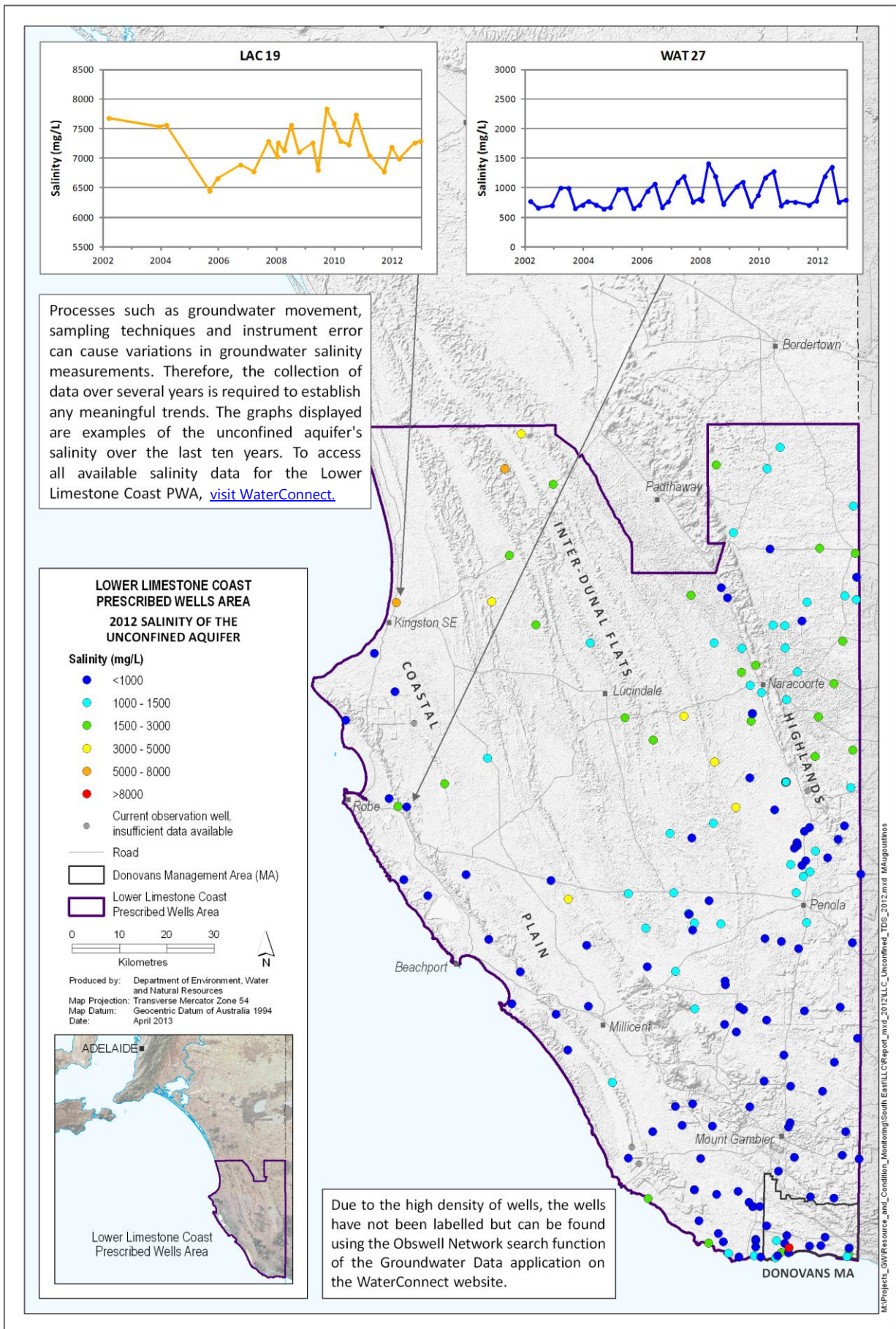


Figure 3. Groundwater salinity of the unconfined aquifer in the Lower Limestone Coast Prescribed Wells Area for 2012
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