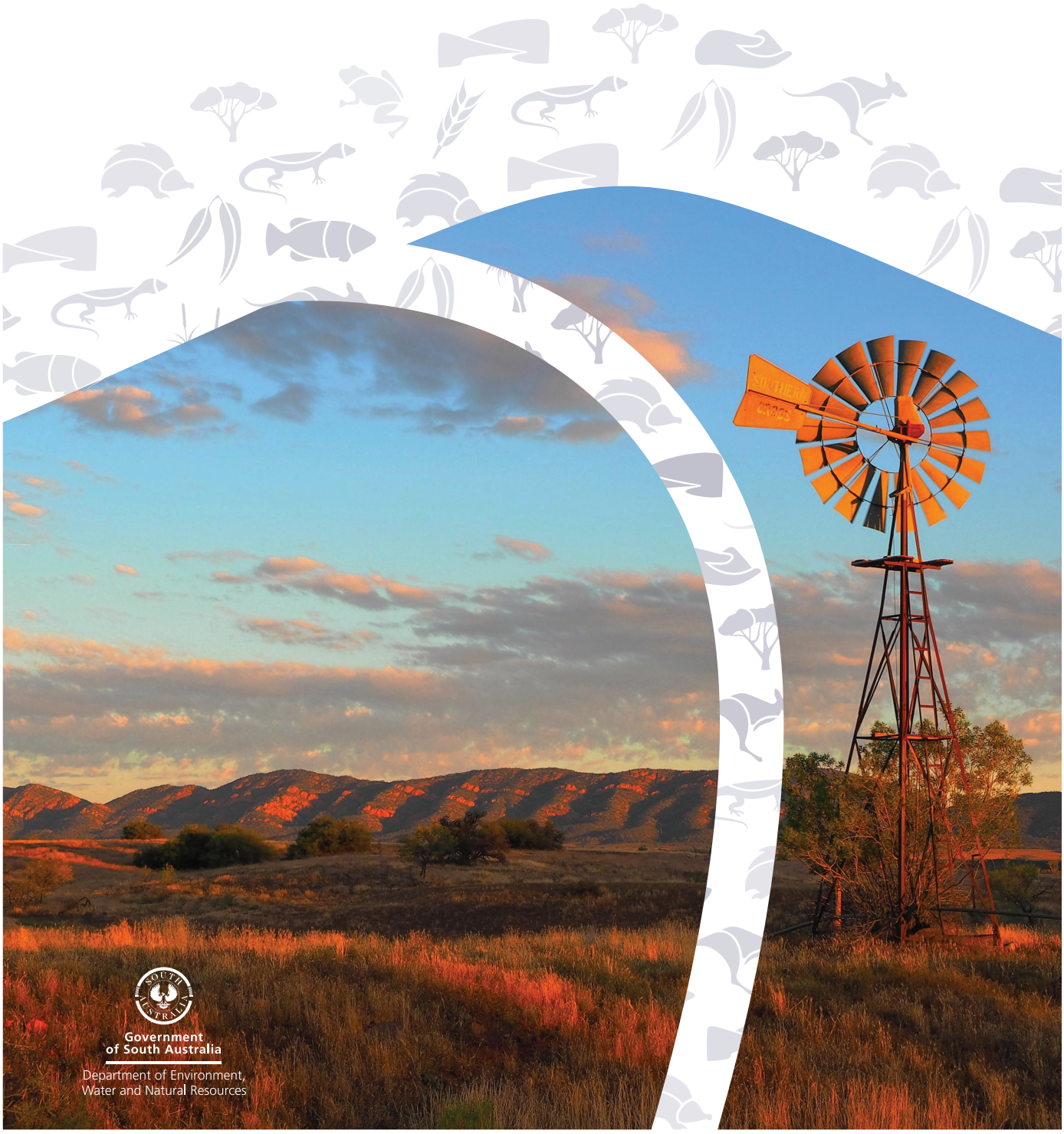
# Southern Basins PWA
# Coffin Bay

## 2016 Groundwater level and salinity status report



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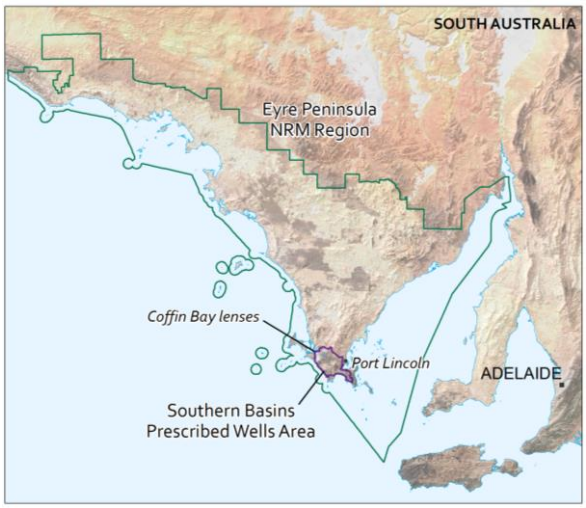
# Regional setting




Within the Eyre Peninsula Natural Resources Management Region, the Southern Basins Prescribed Wells Area (PWA) is located at the southern-most part of the Eyre Peninsula, between the townships of Port Lincoln and Coffin Bay. It is prescribed under South Australia's *Natural Resources Management Act 2004* and a water allocation plan provides for the sustainable use of the groundwater resources. The Coffin Bay fresh groundwater lens (herein "Coffin Bay") is located in the north-west of the Southern Basins PWA.

Within the Southern Basins PWA, there are two main water-bearing sedimentary sequences that overlie basement rocks: the Quaternary limestone aquifer and the underlying Tertiary sands aquifer. The Quaternary limestone aquifer comprises a generally thin veneer of aeolian sediments of the Bridgewater Formation and is continuous across the PWA. The main source of recharge to the Quaternary limestone aquifer is the direct infiltration of local rainfall while the direction of groundwater flow is predominantly toward the nearest coastline.

Groundwater levels and salinities in the Southern Basins PWA are highly dependent on recharge from rainfall and any trends in groundwater level or salinity 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 extractions, and these two elements can cause the groundwater levels to fall and may cause salinities to increase. Conversely, above-average rainfall can result in increases in recharge, decreases in extractions and groundwater levels may rise and salinity stabilise or decline. Historical rainfall data indicate that trends of above or below-average rainfall can last for up to 25 years, and that high-intensity rainfall can result in greater and more-rapid water level (i.e. recharge) responses.

# 2016 Status

Coffin Bay, in the Southern Basins PWA, has been assigned a yellow status for 2016:

2016 Status  Minor adverse trends have been observed over the past five years

The 2016 status for Coffin Bay is based on:

- most monitoring wells (83%) show a five-year trend of declining groundwater levels.

Despite the yellow status assigned to Coffin Bay, it is acknowledged that the current declining trend has been influenced by a previous significant rise in groundwater levels during the 2013 water use year as a result of high rainfall. In addition, the low rate of decline in water levels (median of 0.02 m/y) and stable trend in salinities are aknowledged.

**Rainfall**

The Big Swamp rainfall station (BoM Station 18017), located about 20 km east of Coffin Bay, recorded 556 mm of rain in 2015–16. This is just 6 mm below the long-term average and 7 mm greater than the five-year average (Figs 1 and 2). Notable variations over the past five years include: the unusually wet winter of 2013 (June, July and August rainfall totals were each greater than 110 mm); April 2015 total monthly rainfall which was double the long-term average; and total monthly rainfall for February 2016 exceeding the long-term average by a factor of six. There appears to be a trend of increasing rainfall in the west and north-western parts of the PWA when comparing 2015–16 rainfall with five-year and long-term average annual rainfall (Fig. 1).

**Water use**

Within the Southern Basin PWA, the Coffin Bay consumptive pool (Fig. 1) has been predominantly used for the purpose of providing public water supply. Licensed groundwater extractions in the Southern Basins PWA occur predominantly from the fresh groundwater lenses that reside within the Quaternary limestone aquifer. In 2015–16, metered extractions from Coffin Bay totalled 109 ML, a 7% decrease from the previous water-use year but 3% greater than the five-year average extraction (Fig. 3). This rate of extraction represents 72% of the total 2015–16 allocation of 150 ML for Coffin Bay and accounts for just 2% of the total licensed extractions within the Southern Basins PWA.

**Groundwater levels**

Groundwater levels in Coffin Bay show a positive correlation with Big Swamp rainfall. In the past five years to 2016, 5 out of 6 monitoring wells (83%) declining groundwater levels with a median rate of decline of 0.02 m/y (Fig. 4). The remaining well, located on the western boundary shows a rising trend at a rate of 0.07 m/y.

**Groundwater salinity**

In 2016, salinities ranged between 365 and 1077 mg/L, with (86%) of available wells showing salinities of less than 1000 mg/L (Fig. 5). In the five years to 2016, all monitoring wells show a trend of stable salinity (Fig. 6). One of these wells, LKW039, shows salinity levels greater than 1000 mg/L and over the past five years, they have been slowly rising at a rate of 13 mg/L/y. This well is located 50 m downgradient from, and has a similar depth to, a production well used for town water supply that ceased pumping in 2009 due to rises in salinity that were caused by upconing of deeper groundwater of higher salinity. This upconing of higher salinity groundwater in close proximity to LKW039 is the most likely cause of the slow increase in salinity in this observation well.

# More information

To determine the status of Coffin Bay for 2016, the trends in groundwater levels and salinities over the past five years (2012 to 2016, inclusive) were analysed, in contrast to the year-to-year assessments that have been used in past *Groundwater level and salinity status reports*. 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, please visit the *Water Resource Assessments* page on WaterConnect.

To view the *Southern Basins Prescribed Wells Area Groundwater Level and Salinity Status Report 2011*, which includes background information on hydrogeology, rainfall and relevant groundwater-dependent ecosystems, please visit the *Water Resource Assessments* page on WaterConnect.

To view or download groundwater level and salinity data from observation wells within the Southern Basins PWA, please visit Groundwater Data on WaterConnect.

For further details about the Southern Basins Prescribed Wells Area, please see the *Water Allocation Plan for the Southern Basins and Musgrave Prescribed Wells Areas* on the Natural Resources Eyre Peninsula website.

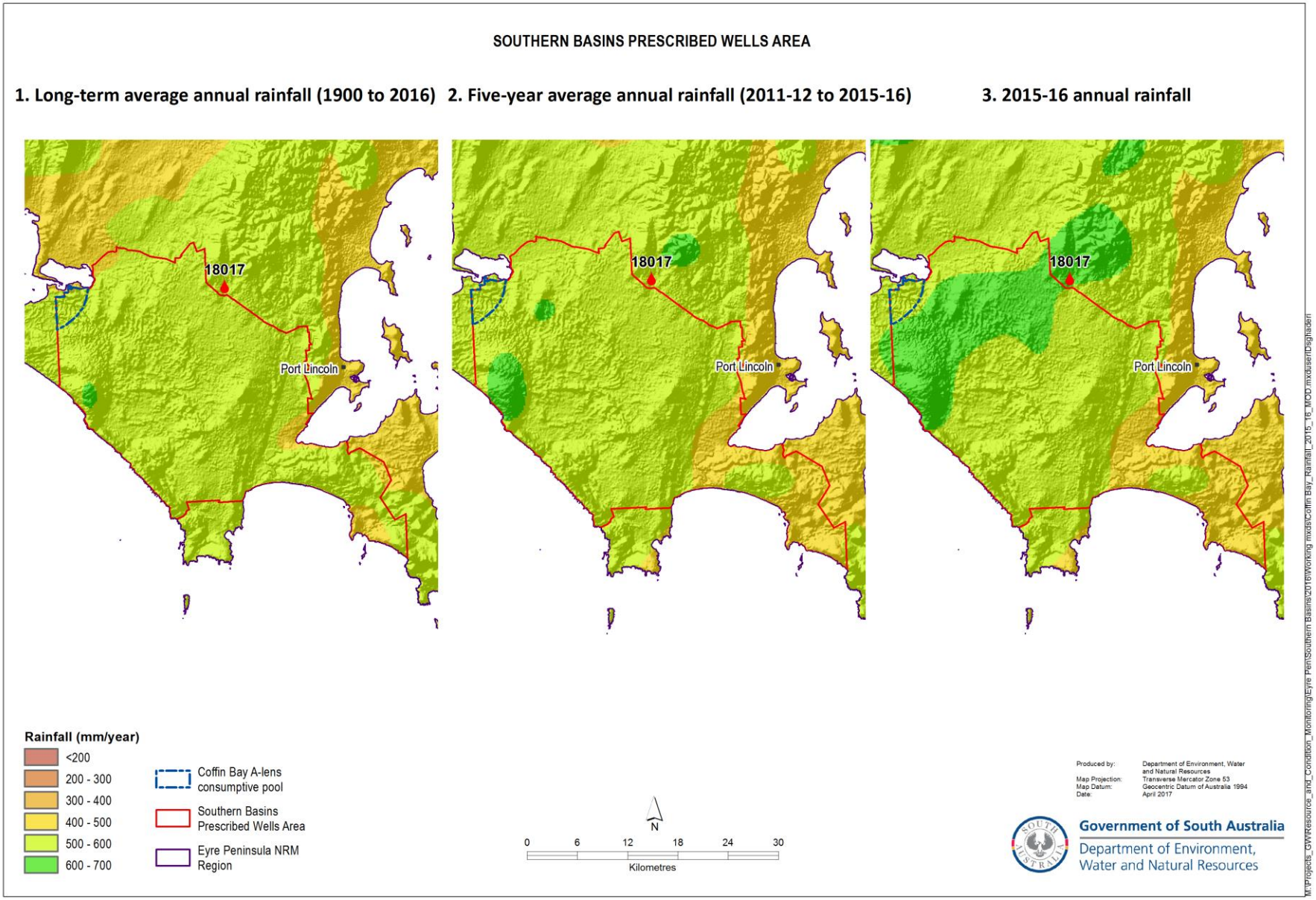



Figure 1. (1) Long-term and (2) five-year average annual rainfall, and (3) annual rainfall for the 2015–16 water-use year in the Southern Basins PWA[1]

[1] 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 www.longpaddock.qld.gov.au/silo

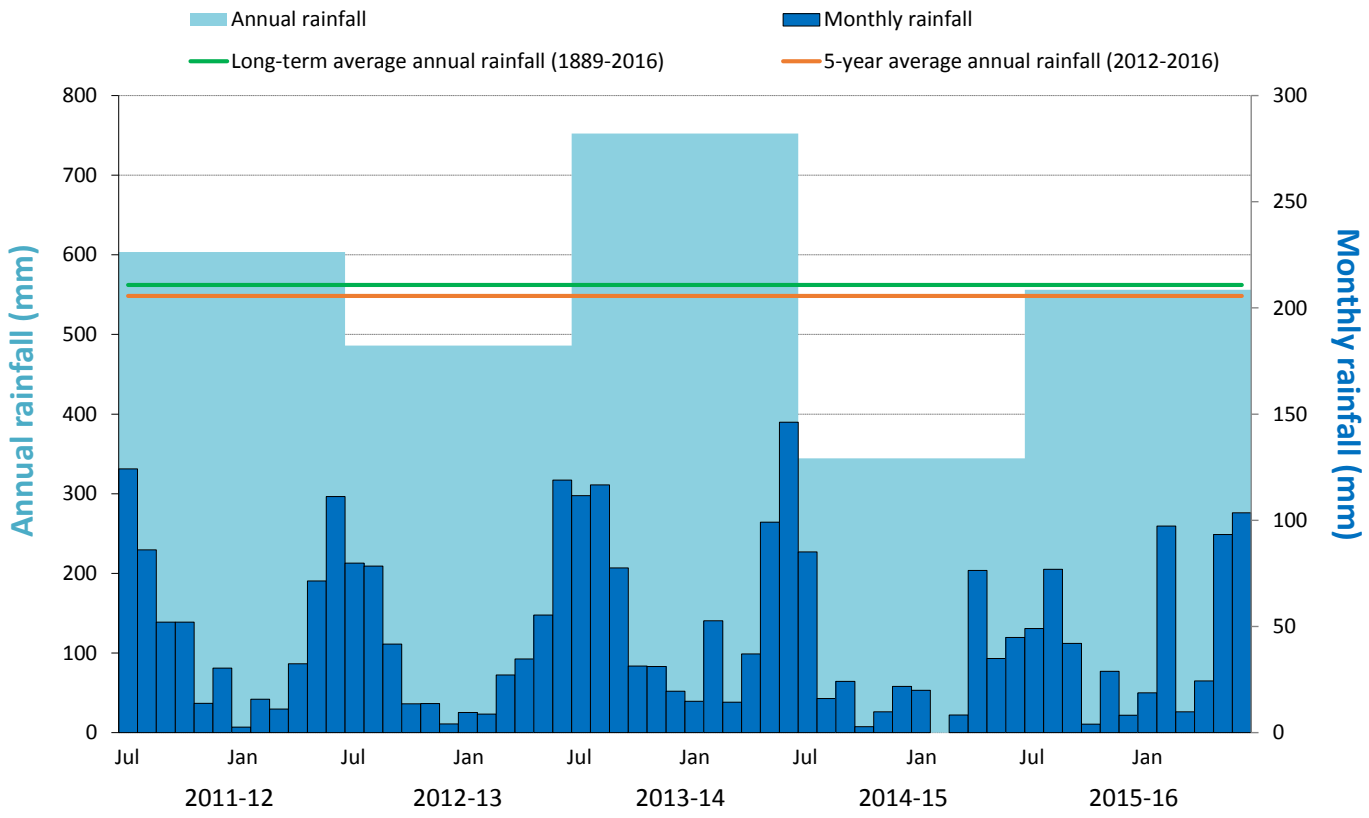



Figure 2. Annual (July–June) and monthly rainfall for the past five water-use years, and the five-year and long-term average annual rainfall recorded at Big Swamp (BoM Station 18017)[2]

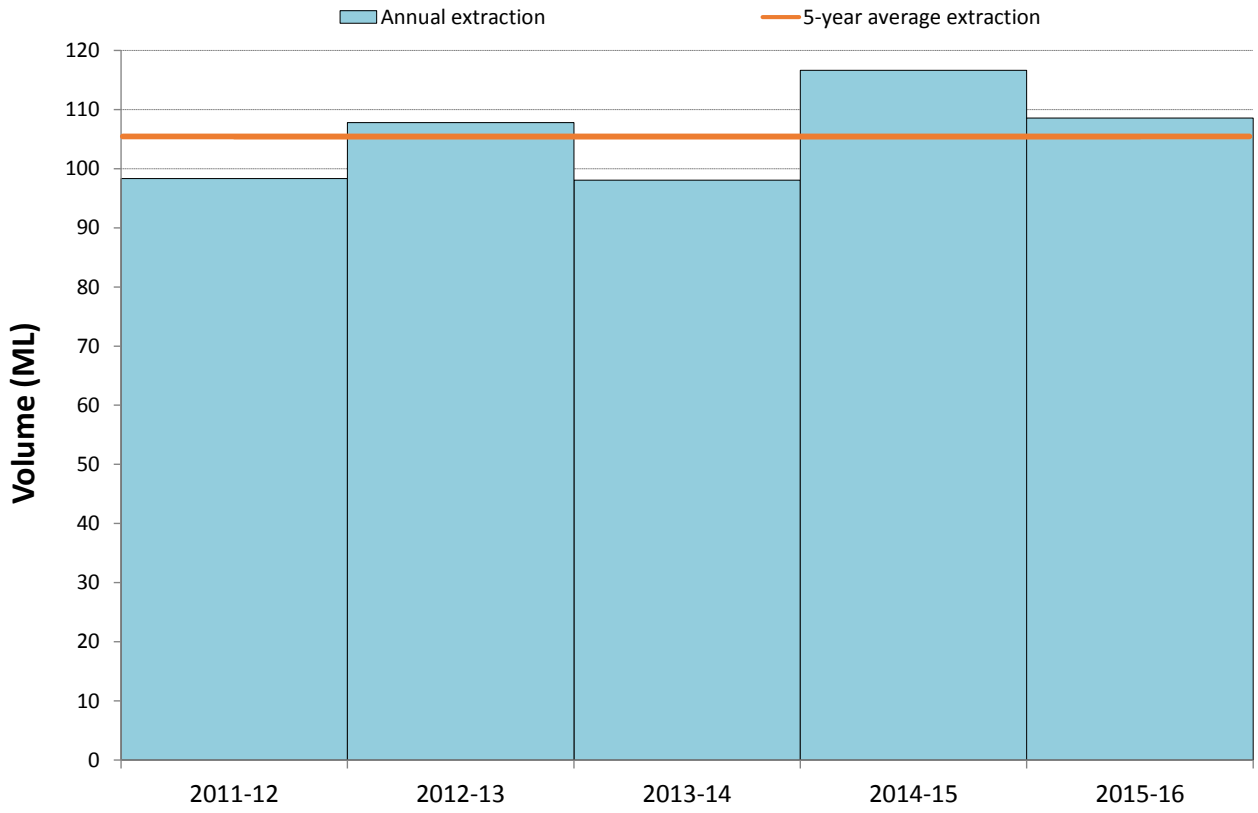



Figure 3. Licensed groundwater extraction volumes for the past five water-use years, for the Coffin Bay in the Southern Basins PWA

[2] 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 www.longpaddock.qld.gov.au/silo.

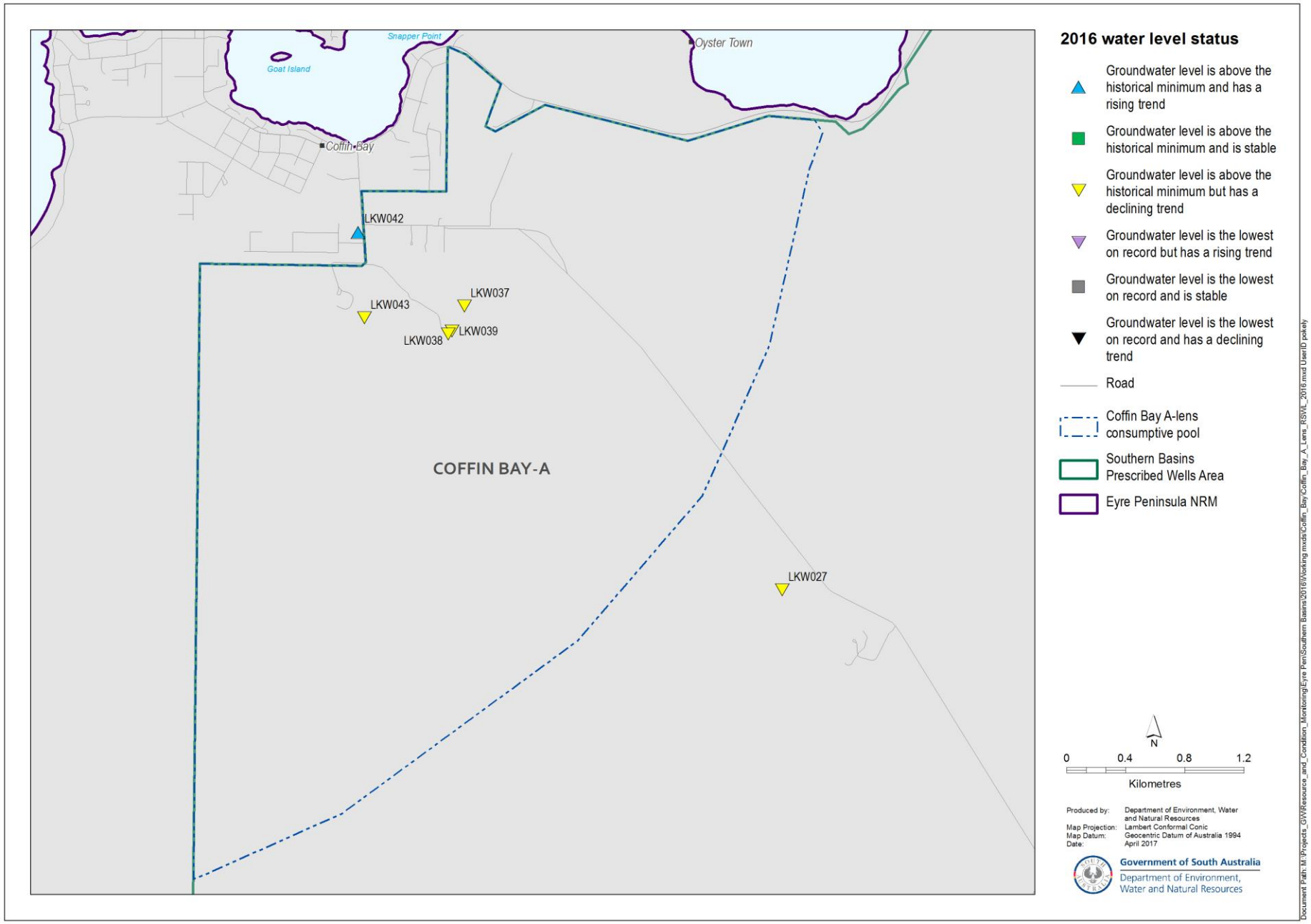



Figure 4. 2016 status of groundwater levels in the Coffin Bay (Southern Basins PWA), based on the five-year water level trend from 2012 to 2016

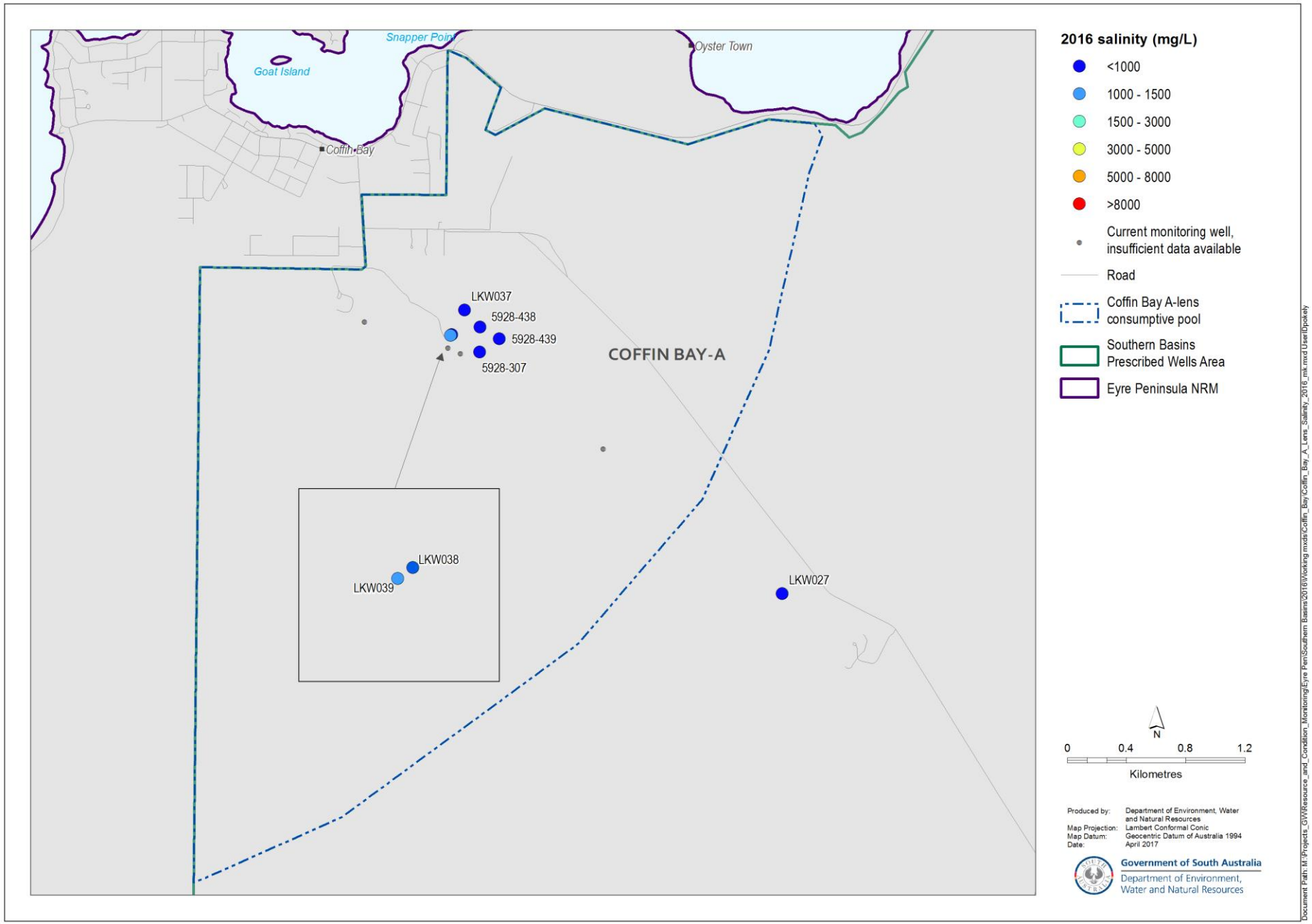



Figure 5. 2016 groundwater salinity of the Coffin Bay (Southern Basins PWA)

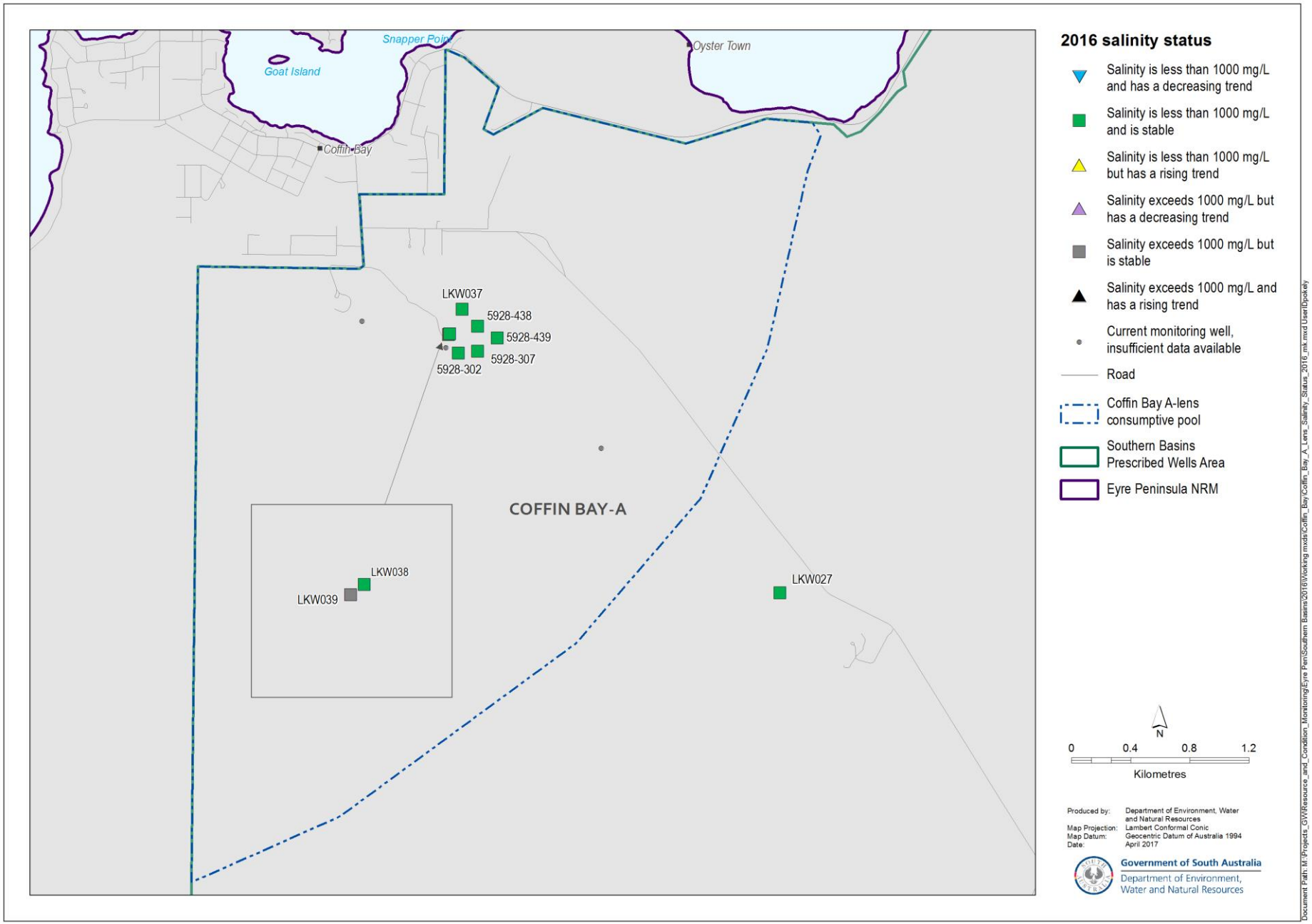



Figure 6. 2016 status of groundwater salinity in the Coffin Bay (Southern Basins PWA), based on the five-year trend from 2012 to 2016

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