

# What the Bureau can offer you?

*Climate and water products for groundwater specialists*

***Dr Paul Feikema***

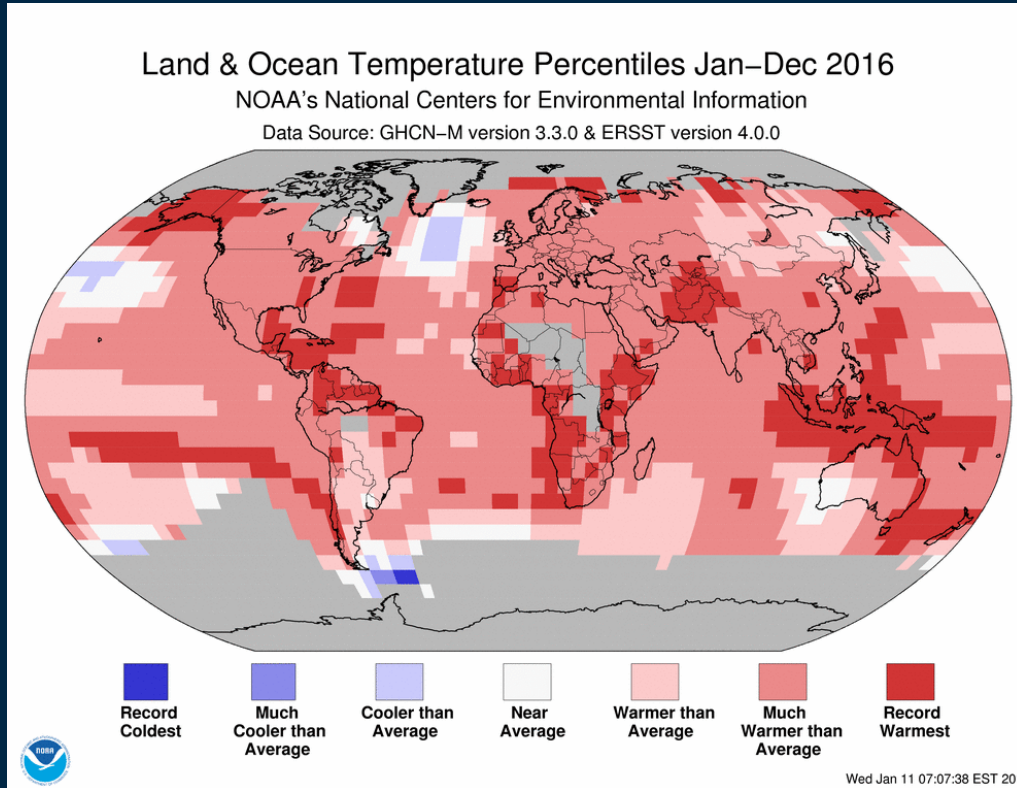
*Bureau of Meteorology*

# Overview

- **Recent conditions**
  - 2016 overview
  - Climate and water
- **Overview of AWRA-L**
- **Seasonal outlooks**
  - Climate drivers
  - Rainfall and temperature
  - Streamflow

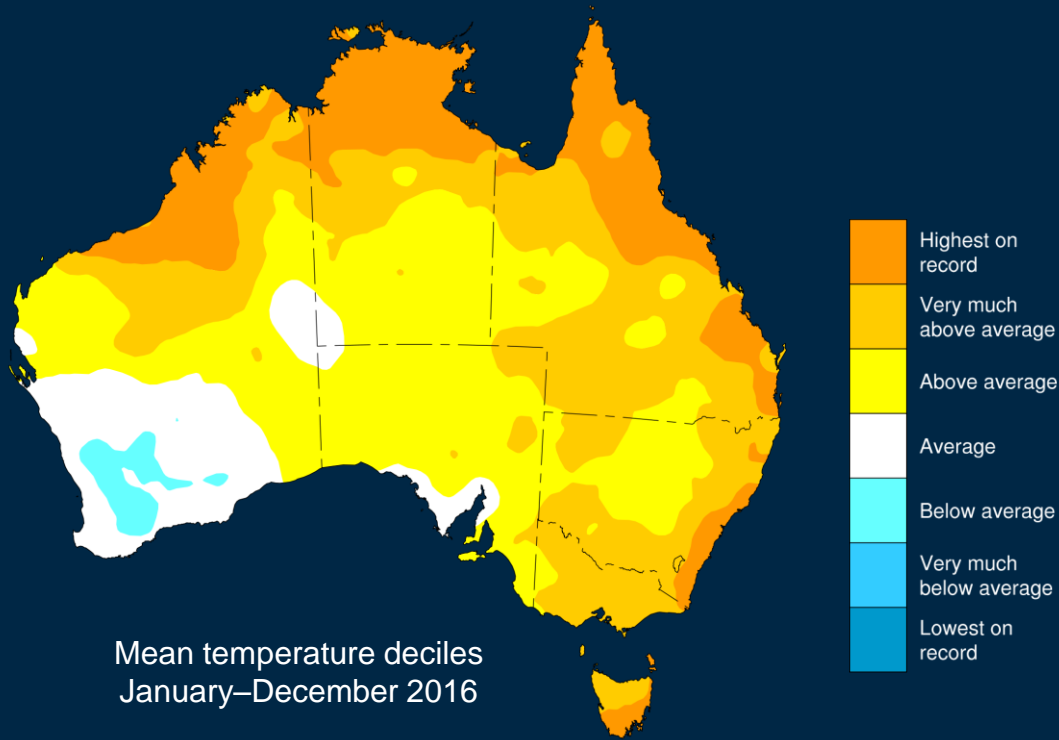


# 2016: warmest year for the globe



- Record warm sea surface temperatures in Australian region in 2016
- End of super 2015–16 El Niño
- Strong negative Indian Ocean Dipole
- Record warmth in Tasman Sea

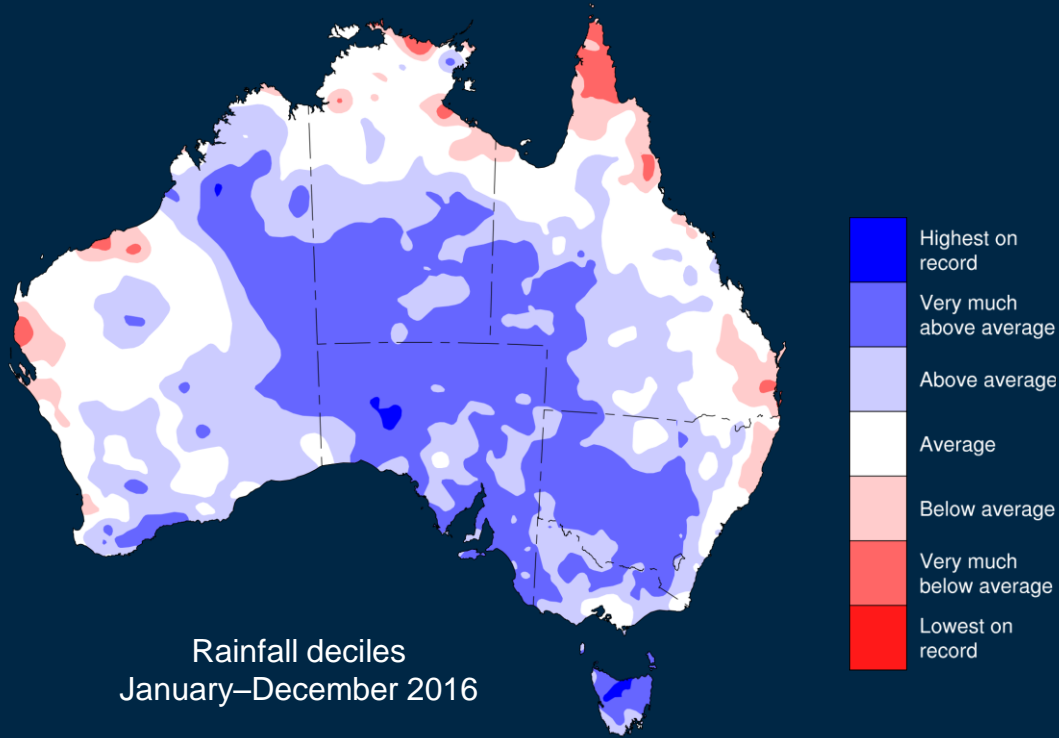
# Annual temperatures 2016



- Australia 4th warmest year on record
  - Tasmania, highest on record
  - Queensland, 3rd highest
  - Northern Territory, 4th highest
  - Victoria, 5th highest
  - New South Wales, 6th highest

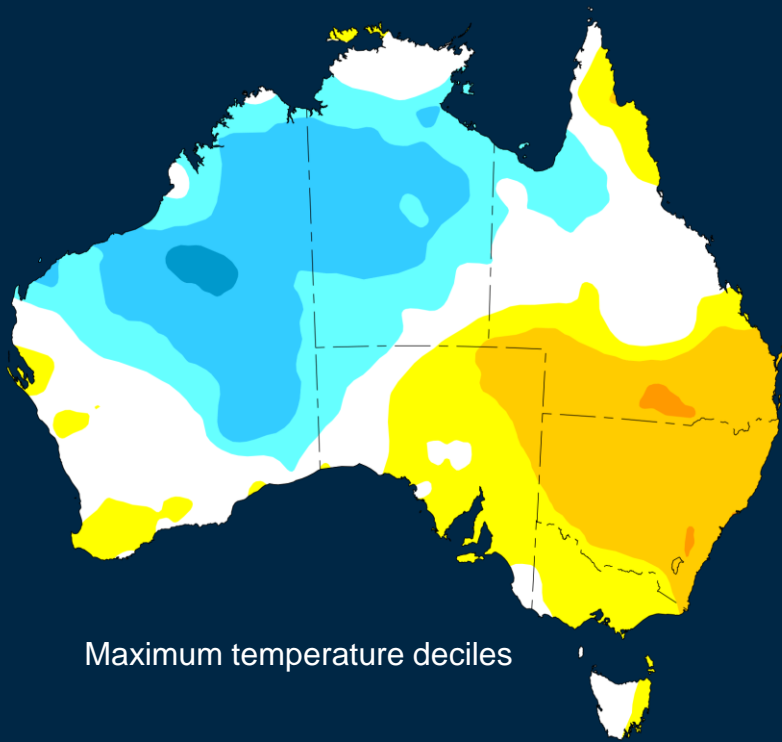
<http://www.bom.gov.au/climate/>

# Annual rainfall 2016

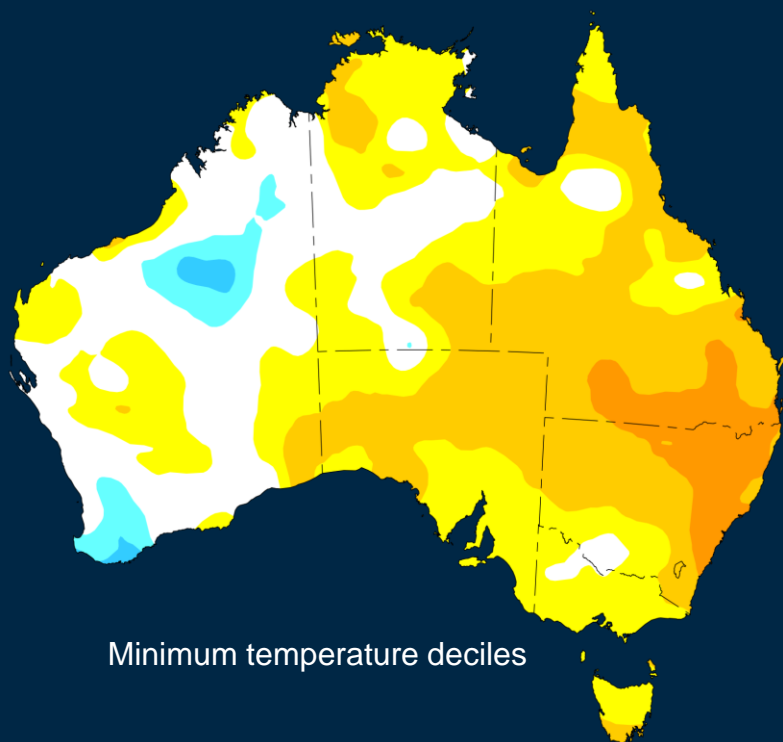
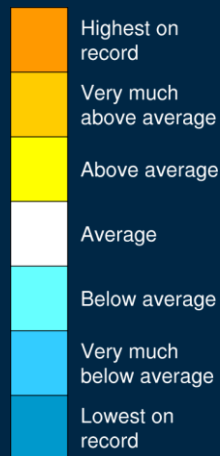


- Nationally-averaged rainfall was 17% above average
- Strong negative Indian Ocean Dipole and record May–September rainfall
- Drier conditions along eastern seaboard

# Temperature: January 2017



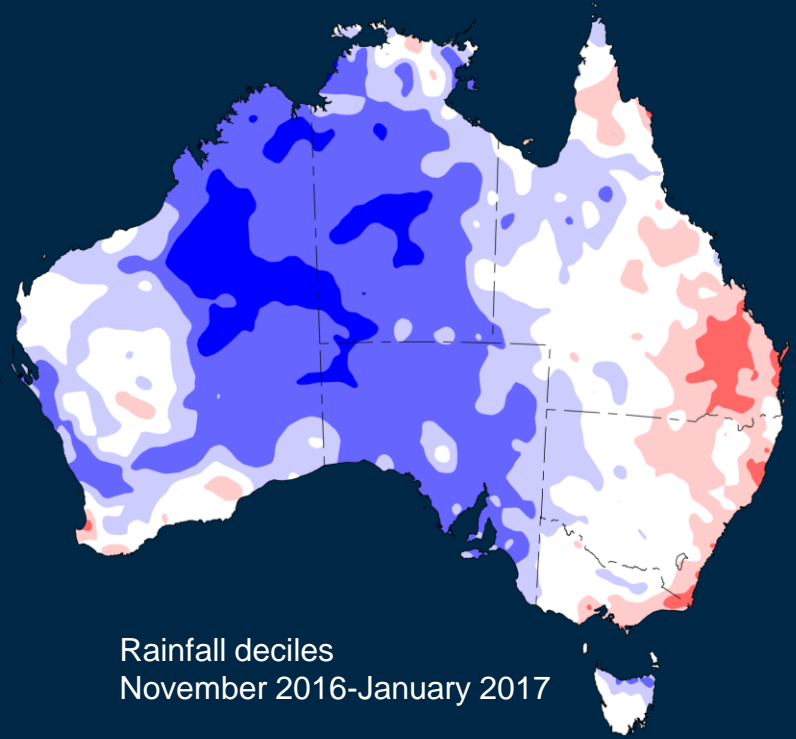
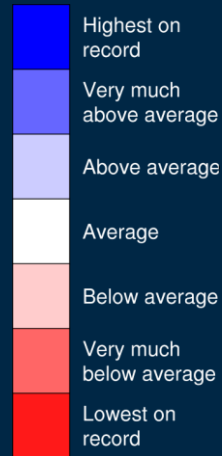
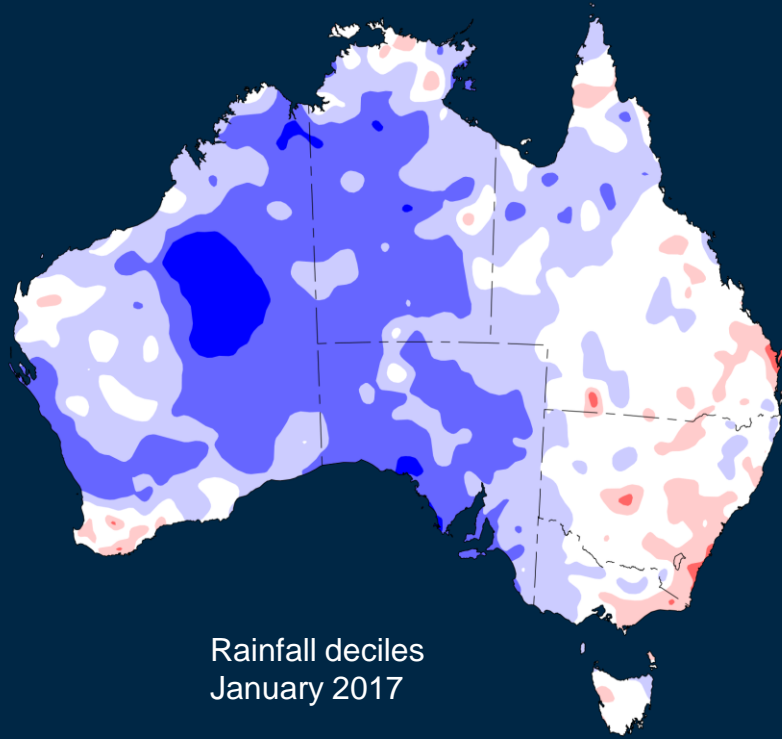
Maximum temperature deciles



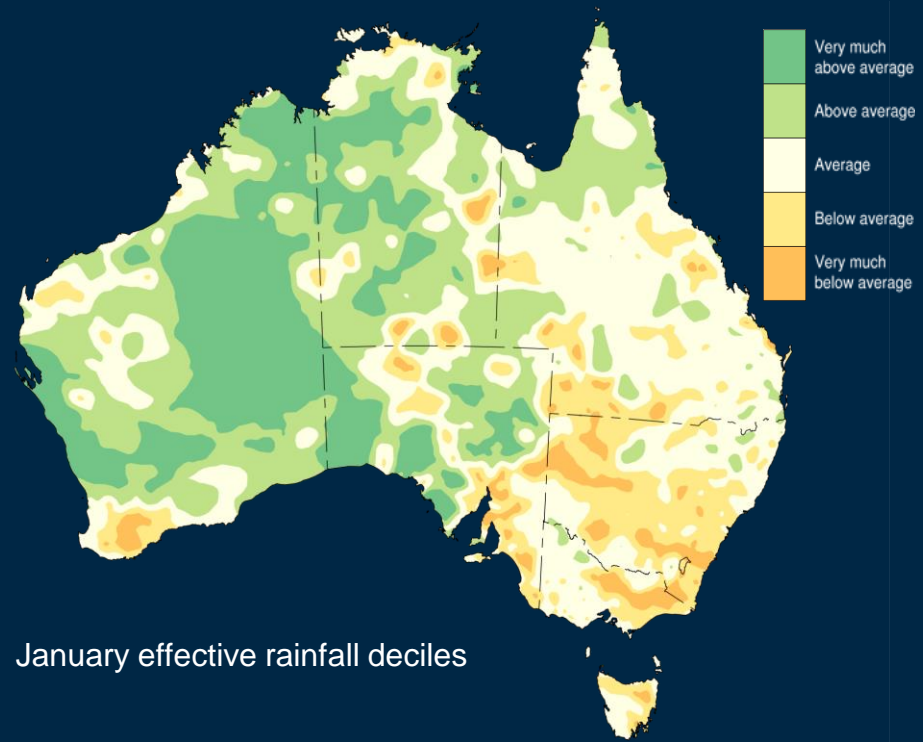
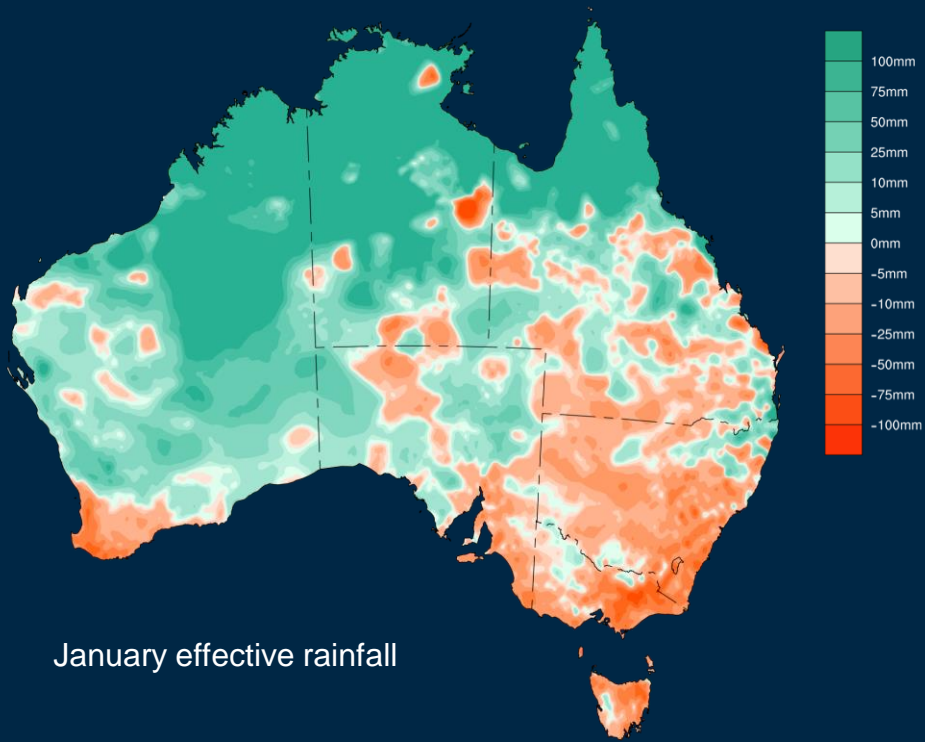
Minimum temperature deciles



# Rainfall

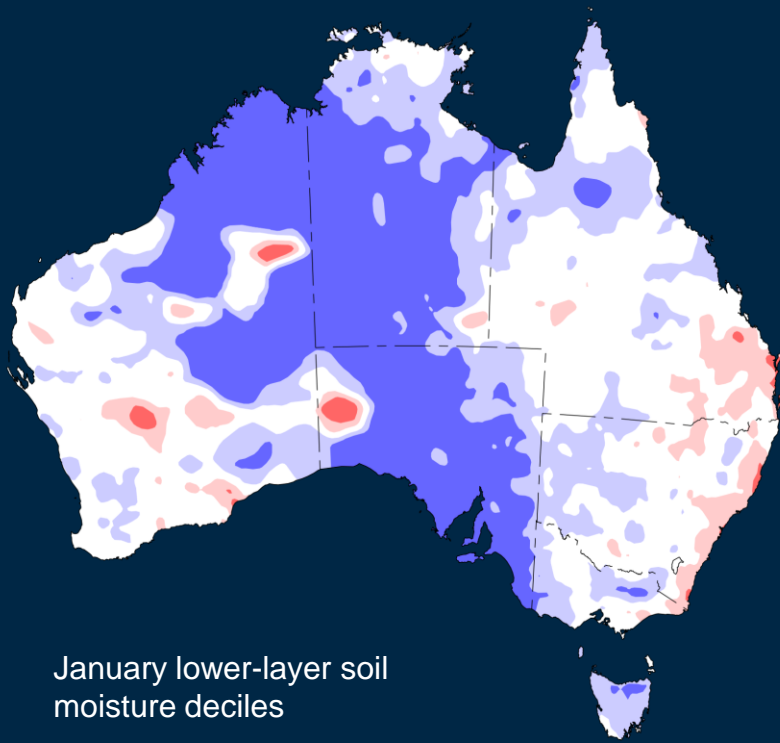


# Effective rainfall

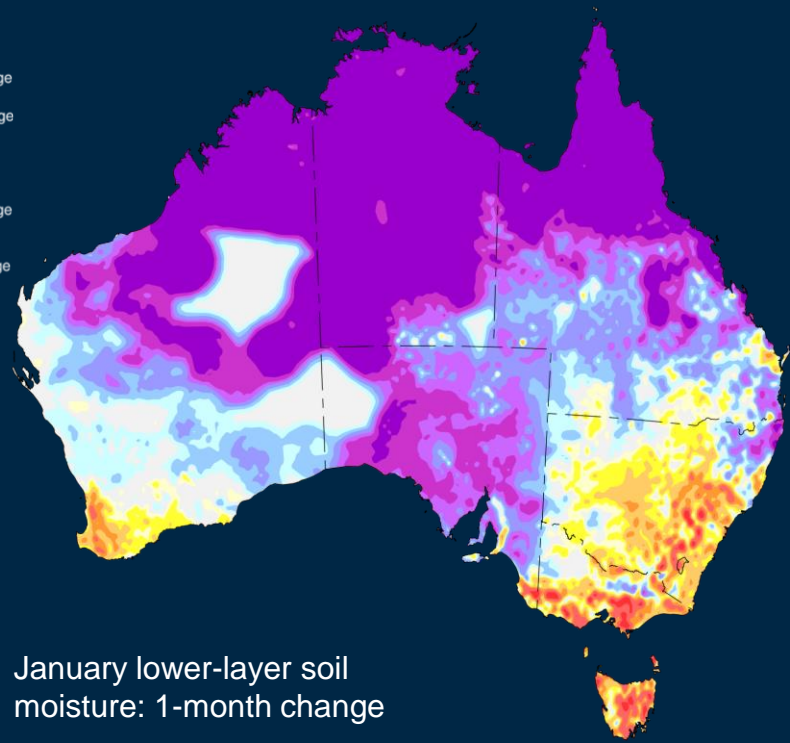
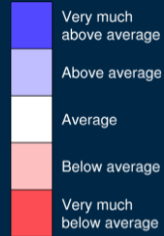




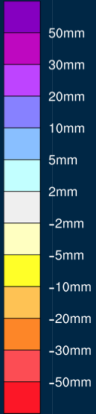
# Lower-layer soil moisture (10–100cm)



January lower-layer soil moisture deciles

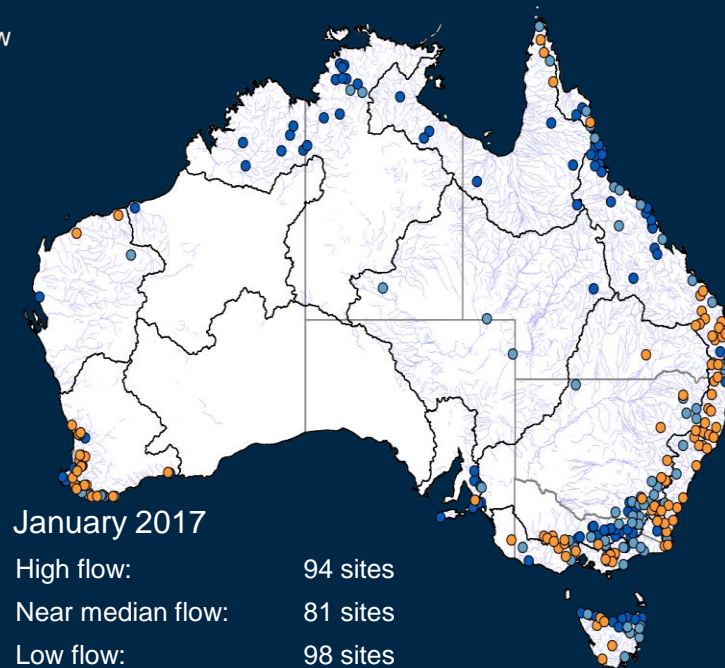
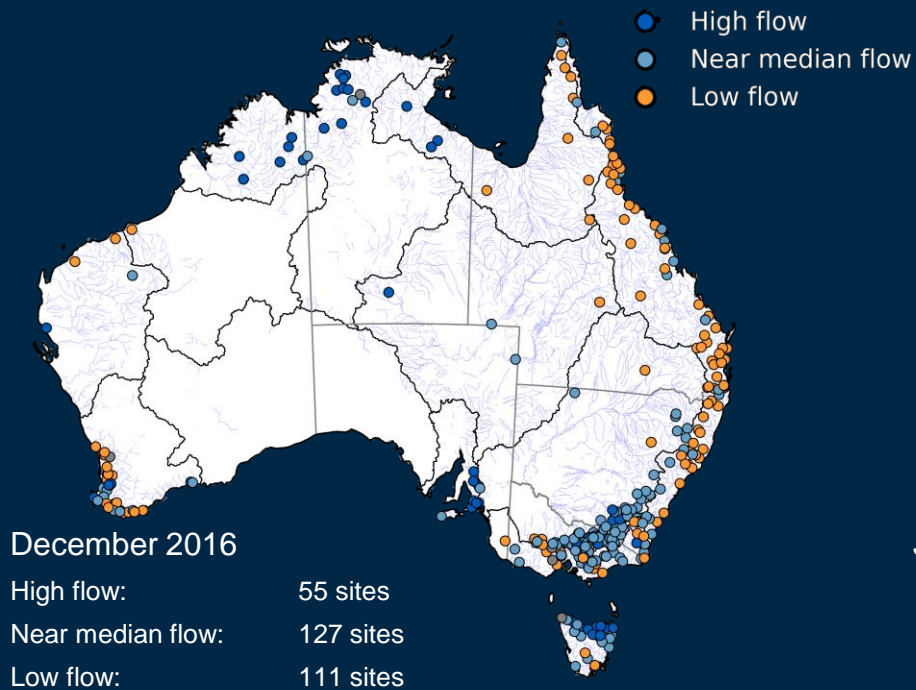


January lower-layer soil moisture: 1-month change



<http://www.bom.gov.au/water/landscape/>

# Observed streamflow

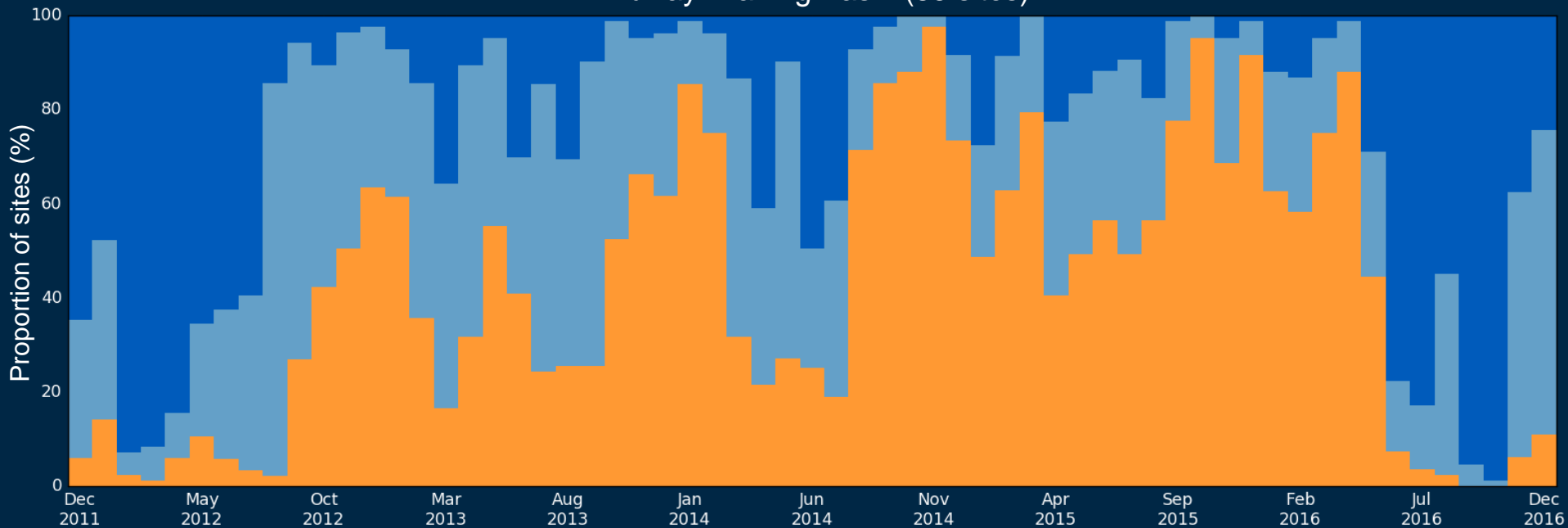


<http://www.bom.gov.au/waterdata/>

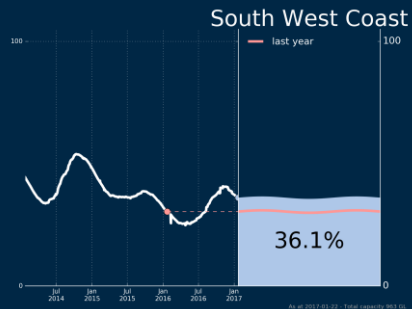
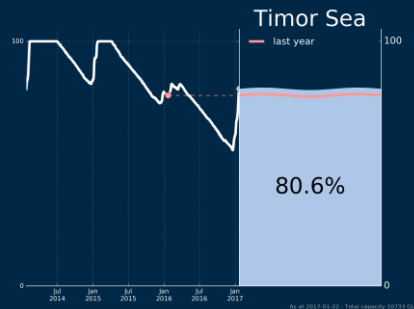
# Streamflow trend 2012–2016

- High flow
- Near median flow
- Low flow

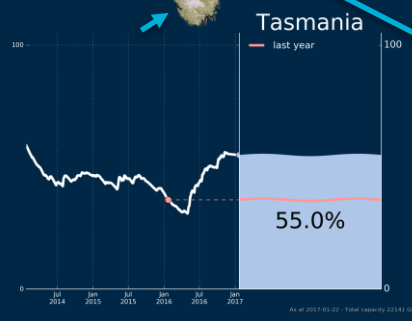
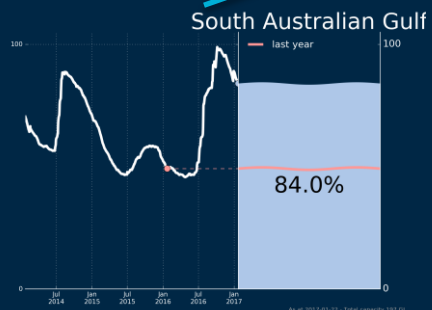
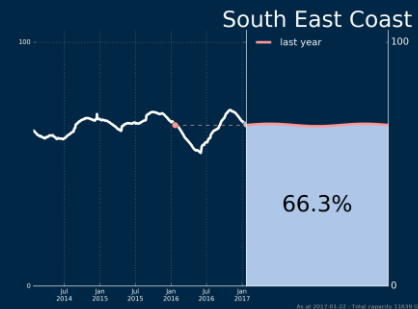
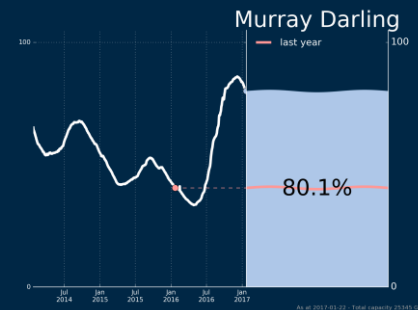
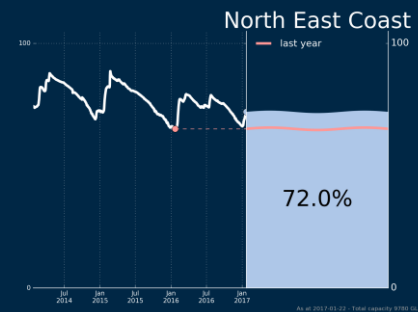
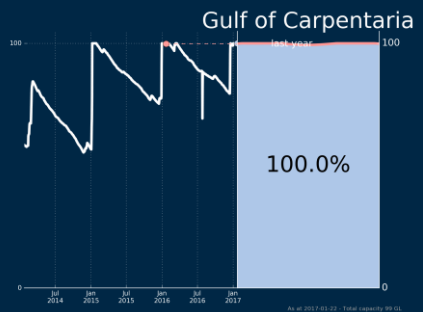
Murray–Darling Basin (85 sites)



# Water storage levels



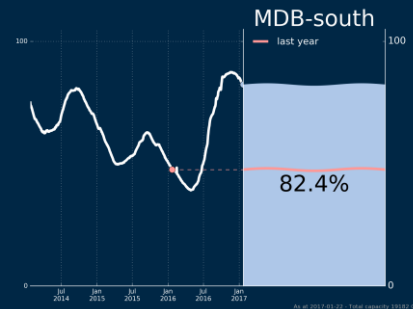
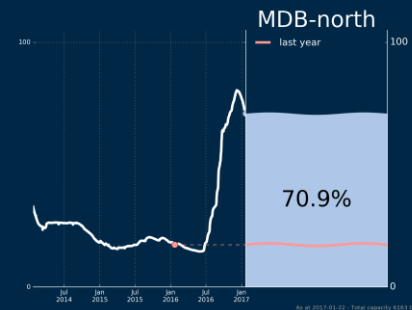
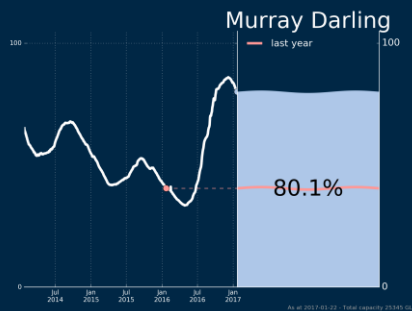
Storage level last year



January 2017

# Water storage levels

## Murray–Darling Basin



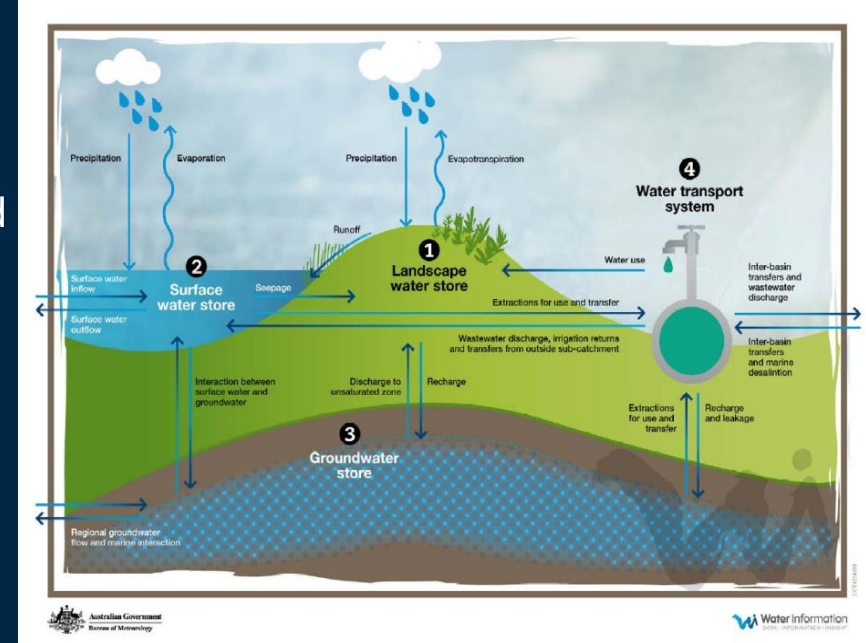
Storage level last year

<http://water.bom.gov.au/waterstorage/awris/>

# Water balance framework

Assessing water resources and accounting for their availability and use

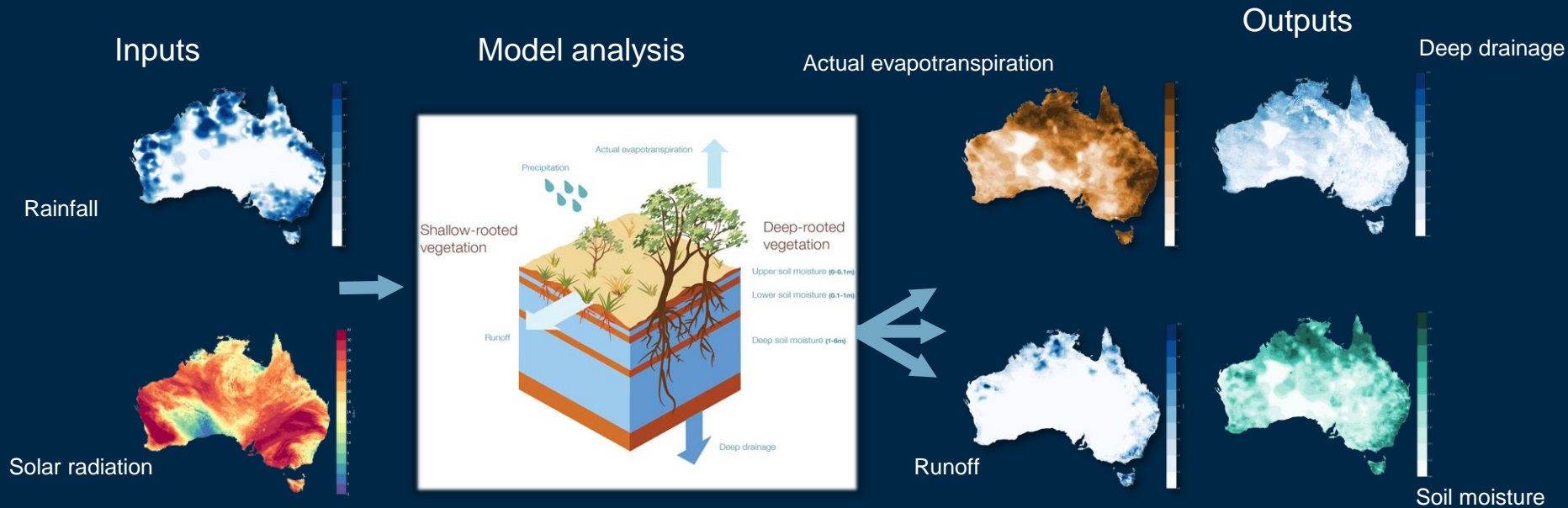
- **national water balance modelling system** that:
  - quantifies **retrospective** water **storage** and water **flux** terms and their respective **uncertainties**,
  - from **observation** and **modelled** data, using state-of-the-art science and technology; and
  - provides seamless water balance information and data.





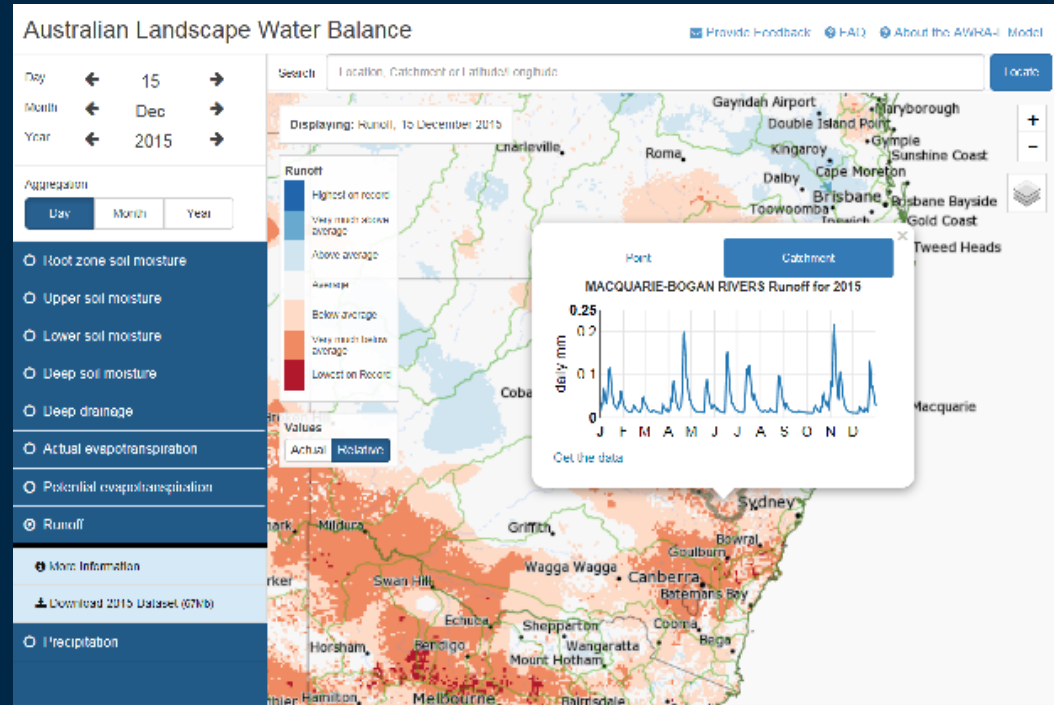
# Operational continental landscape water balance model

AWRA-L: national, daily time-step, 5 km resolution



# Australian Landscape Water Balance web application

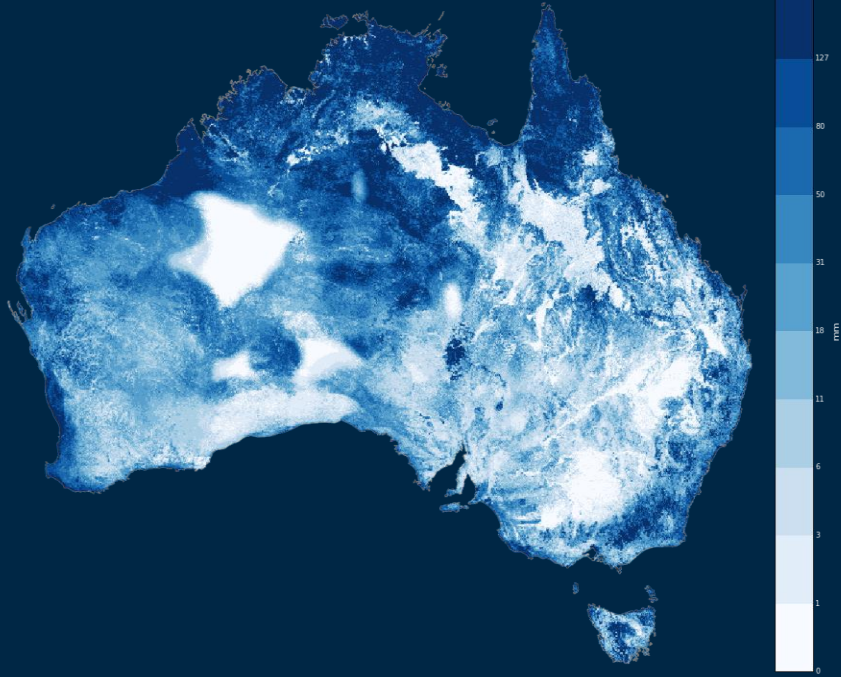
- A unique service!
- Updated daily
- See all variables at daily, monthly or annual time slices
- Download the grids at a resolution of 5km x 5km
- Past 10 years data available to all
- Registered users access >100 years and tailored products



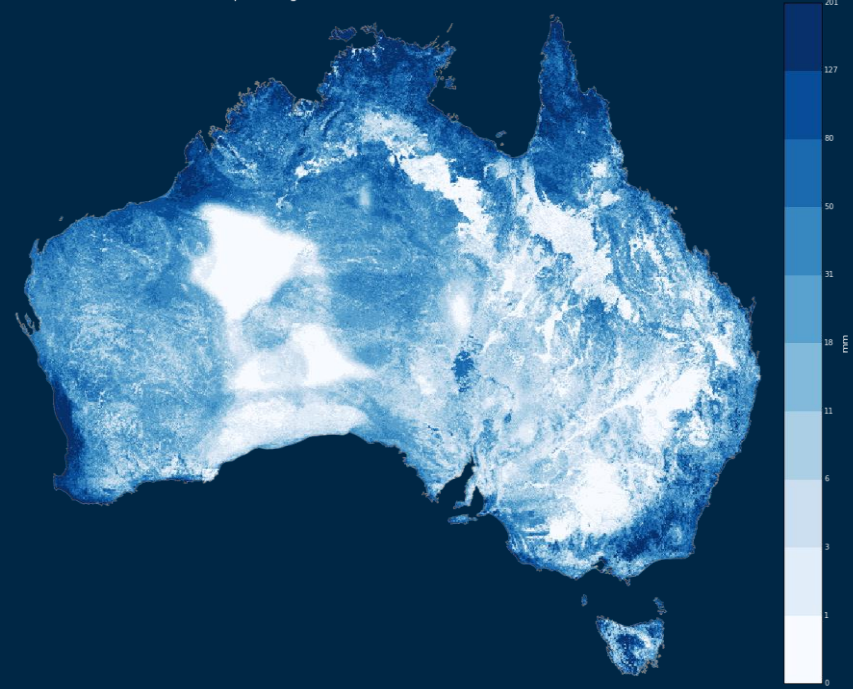
<http://www.bom.gov.au/water/landscape>

# AWRA-L Deep Drainage

Deep drainage - annual total 2011



Deep drainage - mean annual total for 1911 - 2015

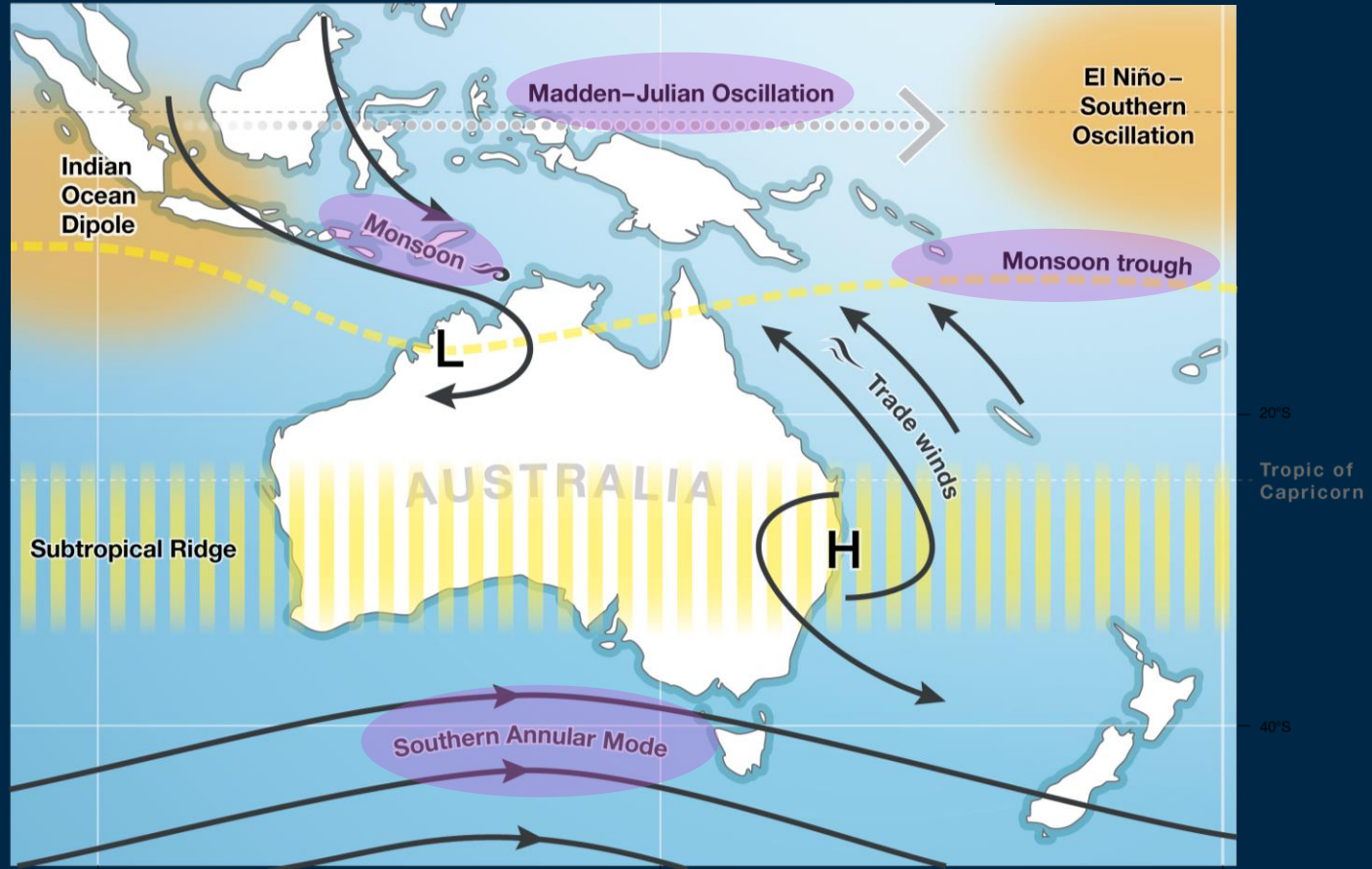


# Outlook

- **Seasonal outlooks**
  - Climate drivers
  - Rainfall and temperature
  - Streamflow

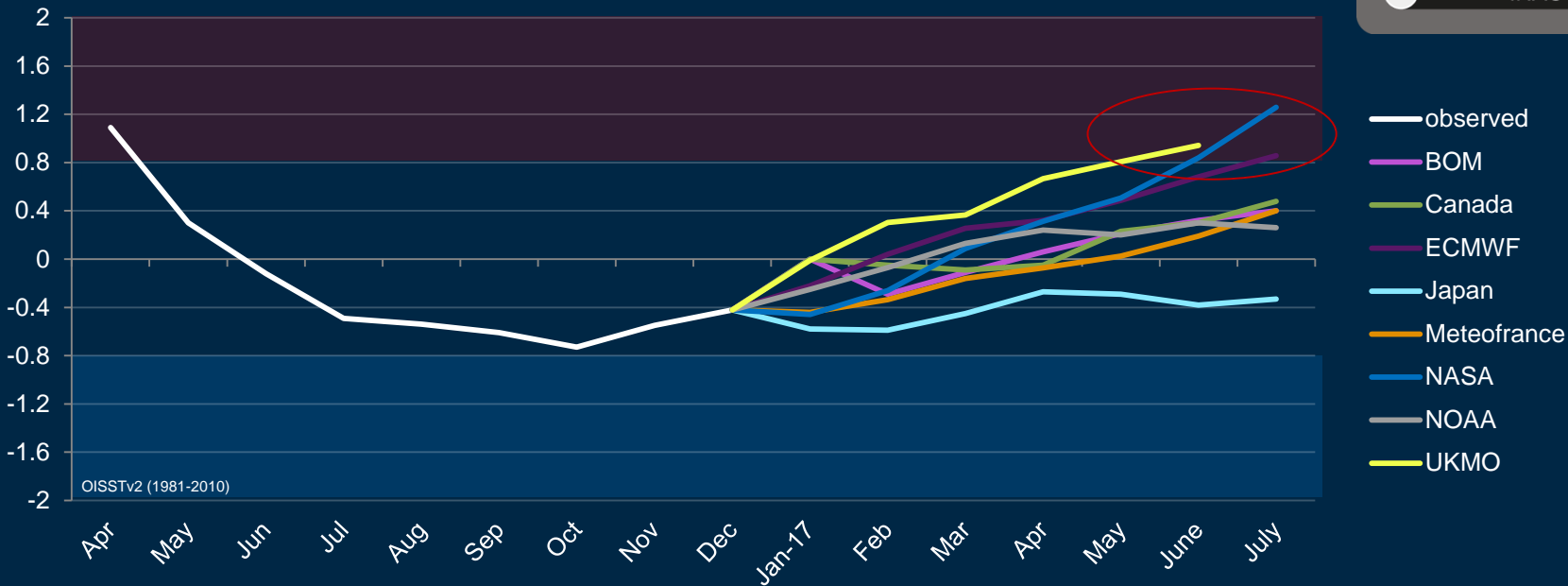
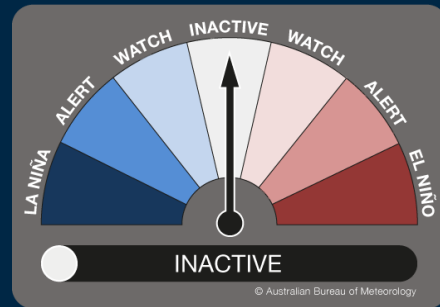


# State of climate drivers



# El Niño–Southern Oscillation outlook

International model outlooks for NINO3.4



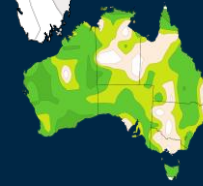
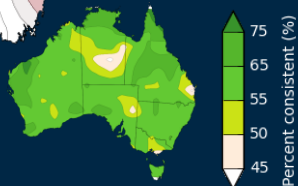
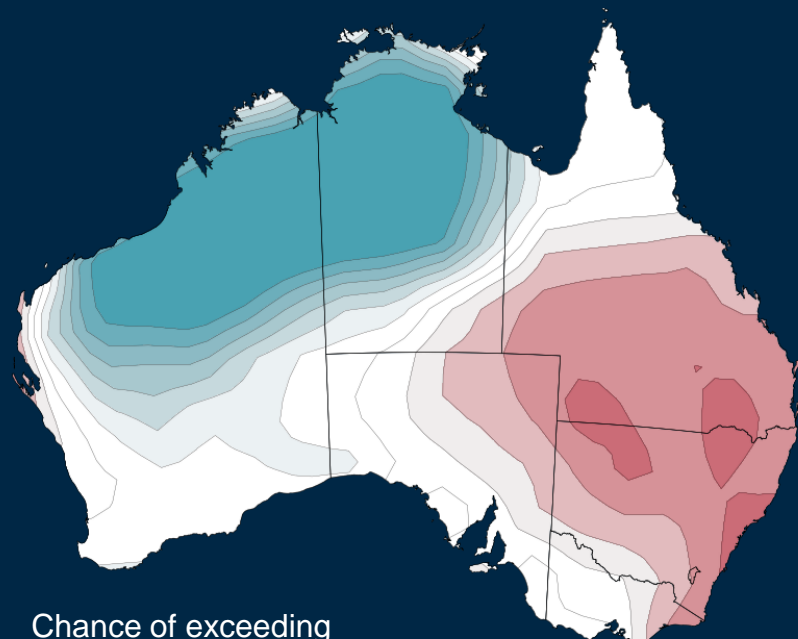
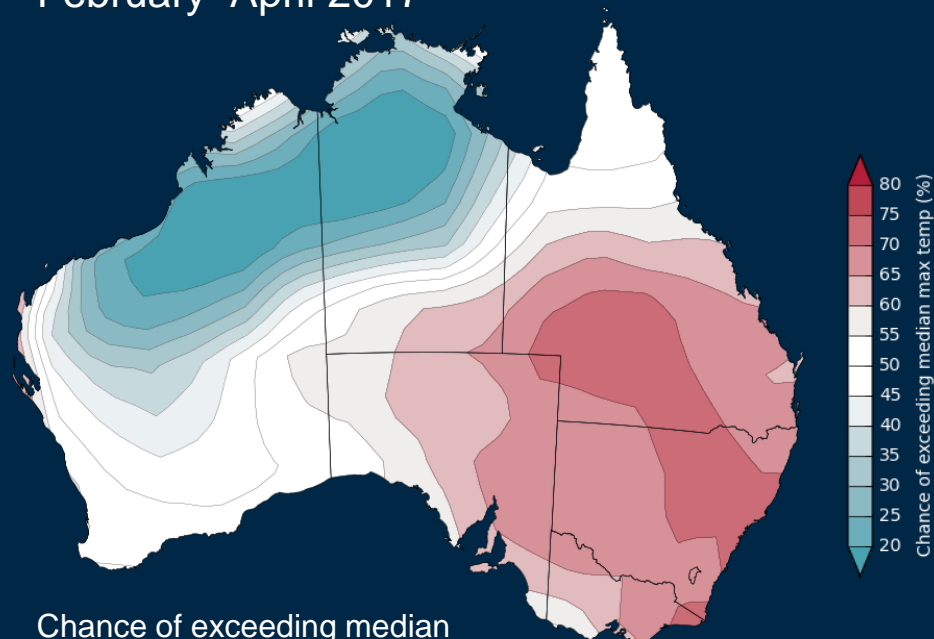
NINO3.4 latest weekly value:  $-0.3^{\circ}\text{C}$



# Temperature outlook

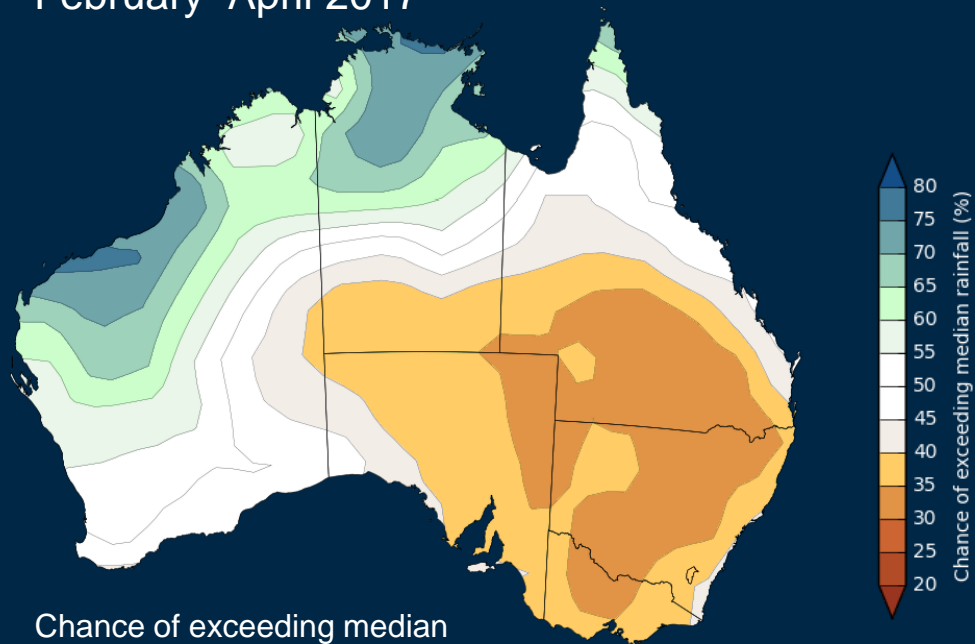
February–April 2017

<http://www.bom.gov.au/climate/outlooks>

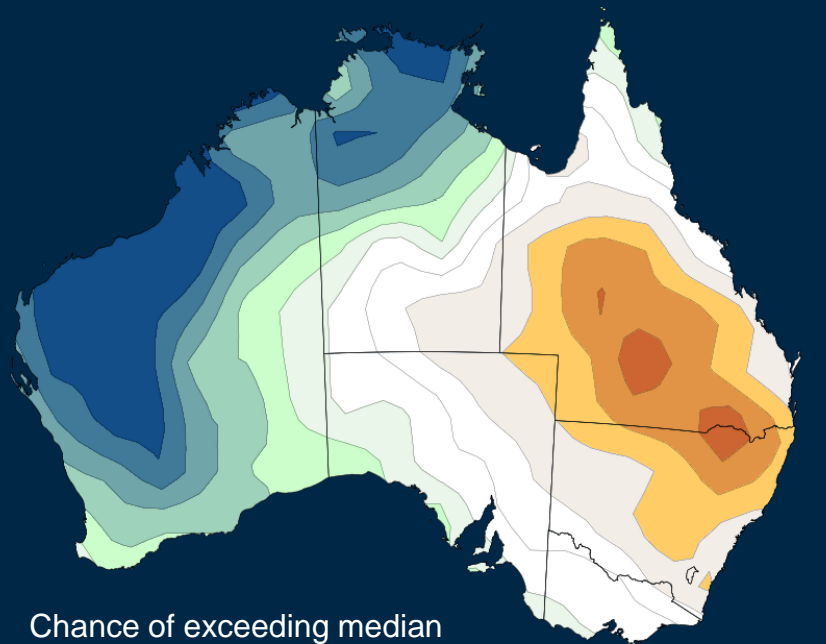


# Rainfall outlook

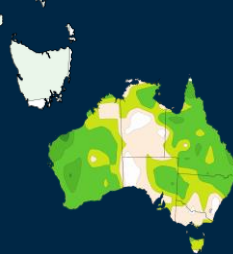
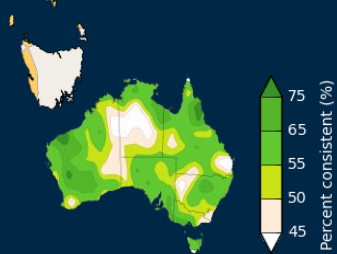
February–April 2017



Chance of exceeding median rainfall, February–April 2017

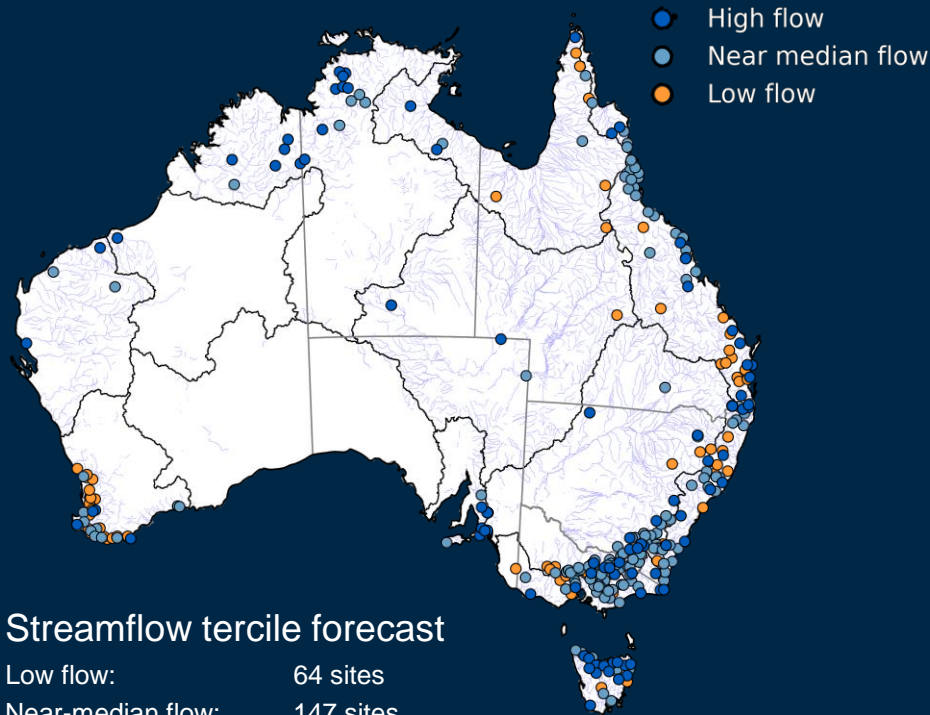


Chance of exceeding median rainfall, February 2017



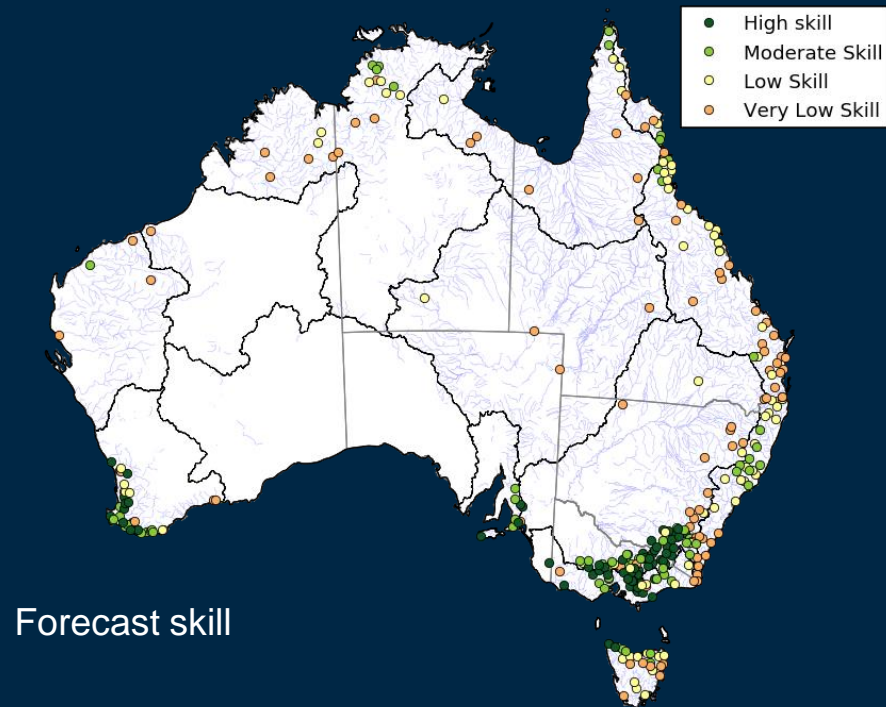
# Seasonal streamflow outlook

January–March 2017



## Streamflow tercile forecast

Low flow: 64 sites  
Near-median flow: 147 sites  
High flow: 89 sites



## Forecast skill

<http://www.bom.gov.au/water/ssf/>

# Thank you

## Questions?

[www.bom.gov.au/water](http://www.bom.gov.au/water)