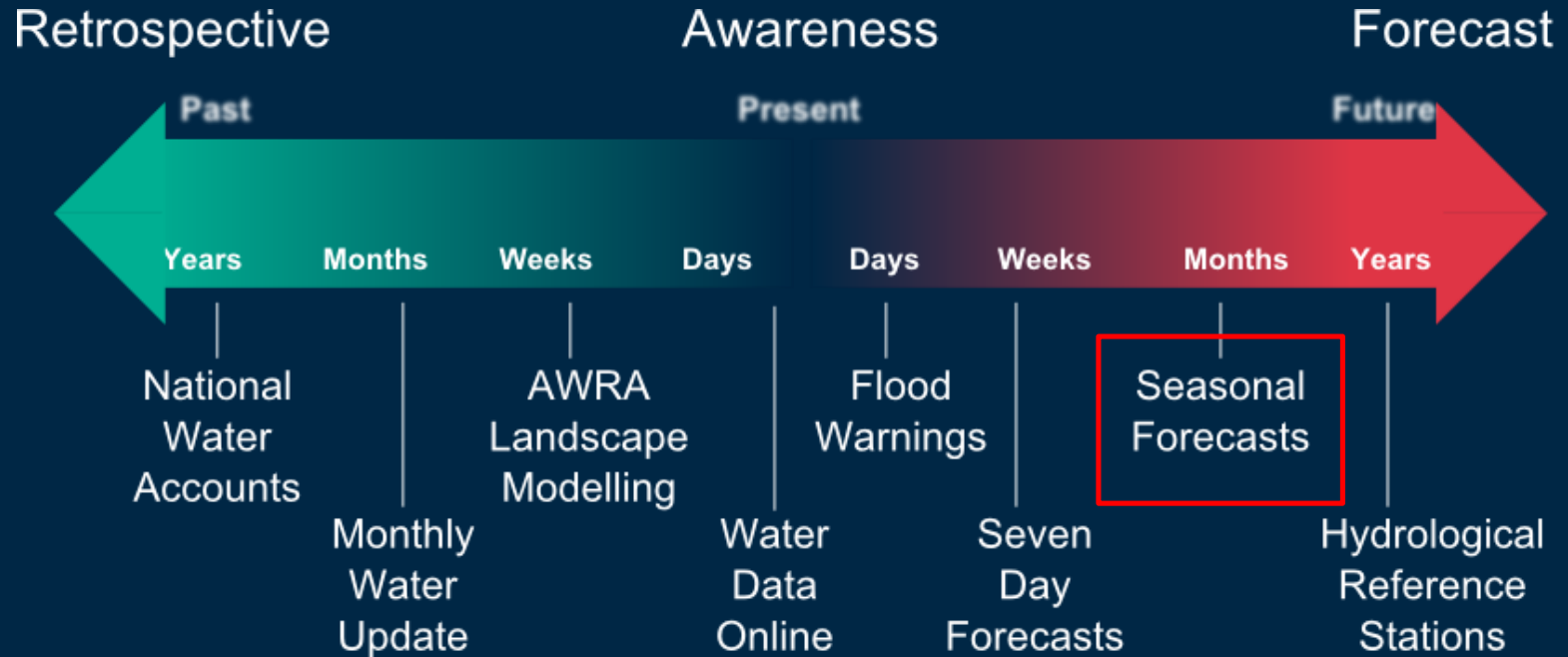


Upgrading the seasonal streamflow forecast service for Australia: transition from seasonal to multi-month forecasts

<u>Fatemeh Mekanik</u>	Julien Lerat
Patrick Sunter	Christopher Pickett-Heaps
Fitsum Woldemeskel	Paul Feikema
Senlin Zhou	Daehyok Shin
Robert Pipunic	Narendra Tuteja
Kevin Plastow	
Bat Le	

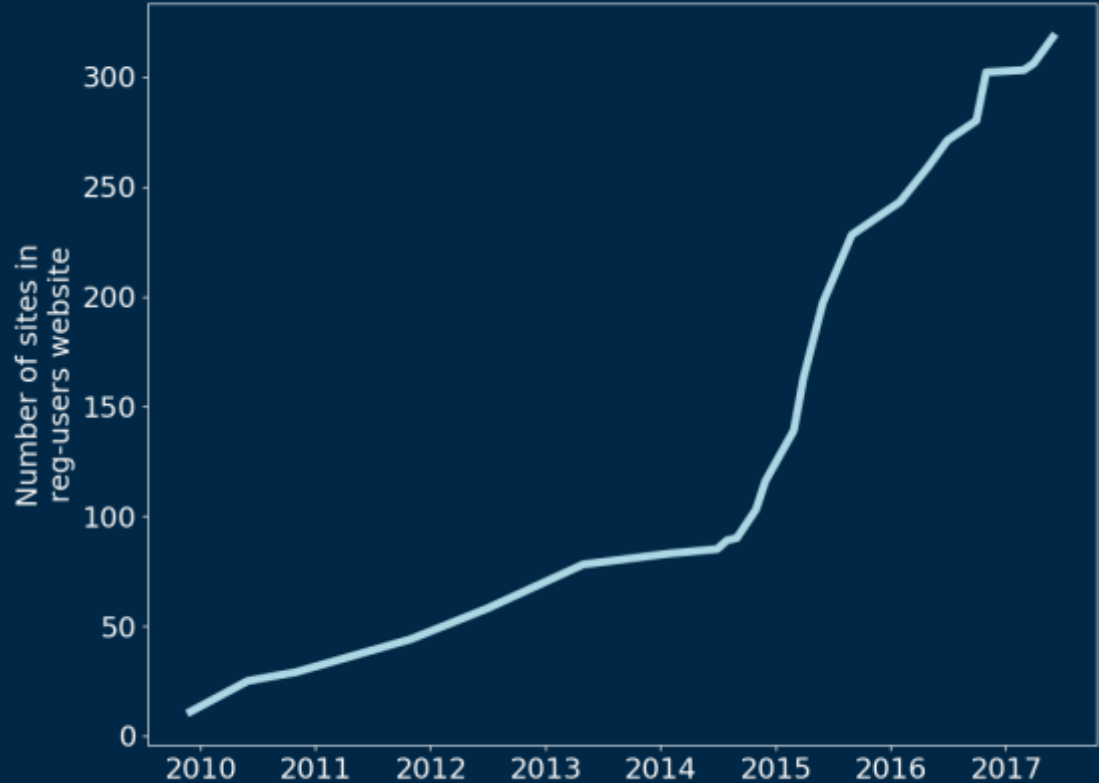
Bureau Water Products time frame



Seasonal forecasting service

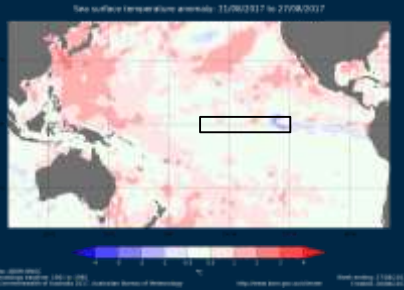
- 340 forecast sites
- Catchment scale
- 3 month total flow forecast
- 5000 ensemble members
- Issued on the 7th working day of the month
- Started in 2010

SSF service
Number of forecast locations



Statistical modelling

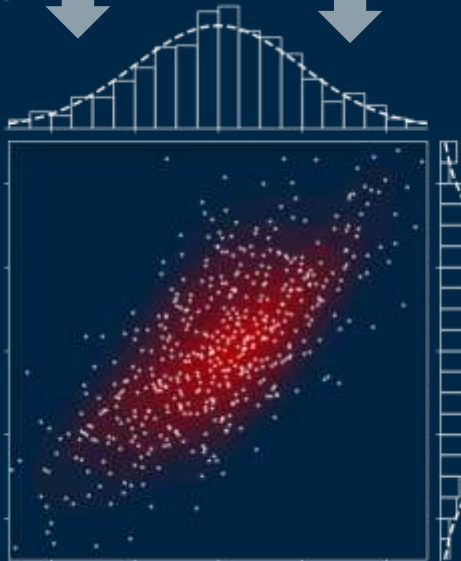
- Bayesian Joint Probability (BJP) modelling:



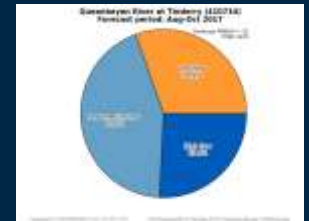
Climate indices



Antecedent streamflow conditions



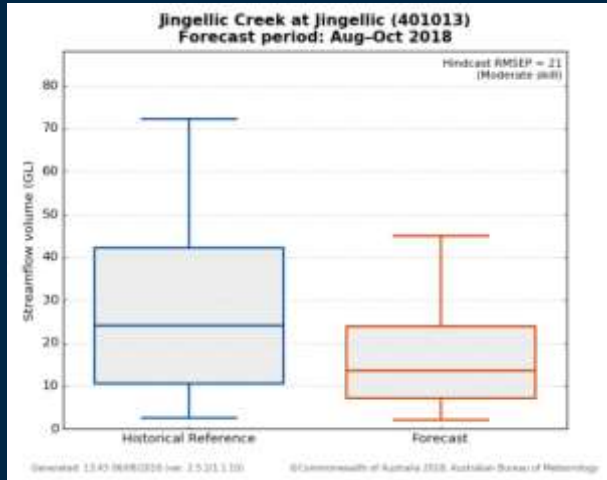
Multivariate normal distribution in transformed space



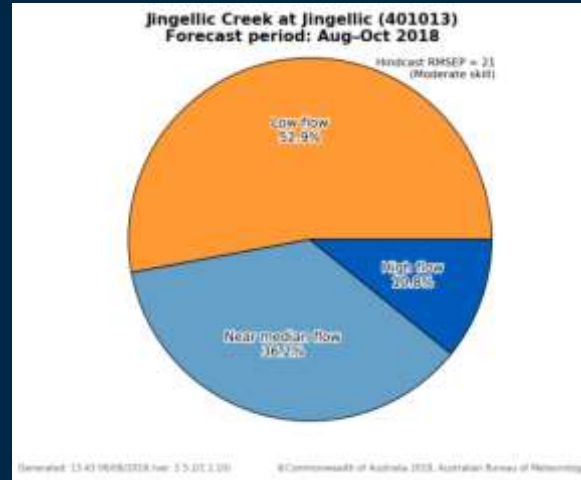
Probabilistic streamflow forecast for 3 months



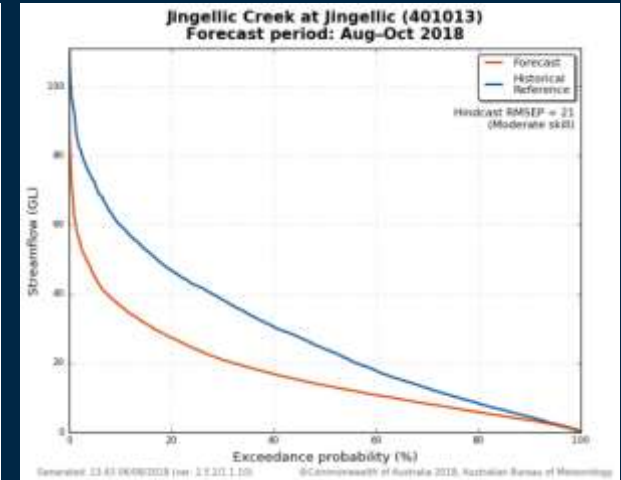
Seasonal forecasting service



Streamflow forecast and historical reference boxplot



Streamflow forecast categories



Streamflow forecast and historical reference exceedance curves

Demand for multi-month forecast

BJP version 2– Monthly split (released to register users on Aug 2018)

- Who uses the forecasts?
- Need for finer temporal resolution
- Bureau's response: streamflow forecasts for individual months



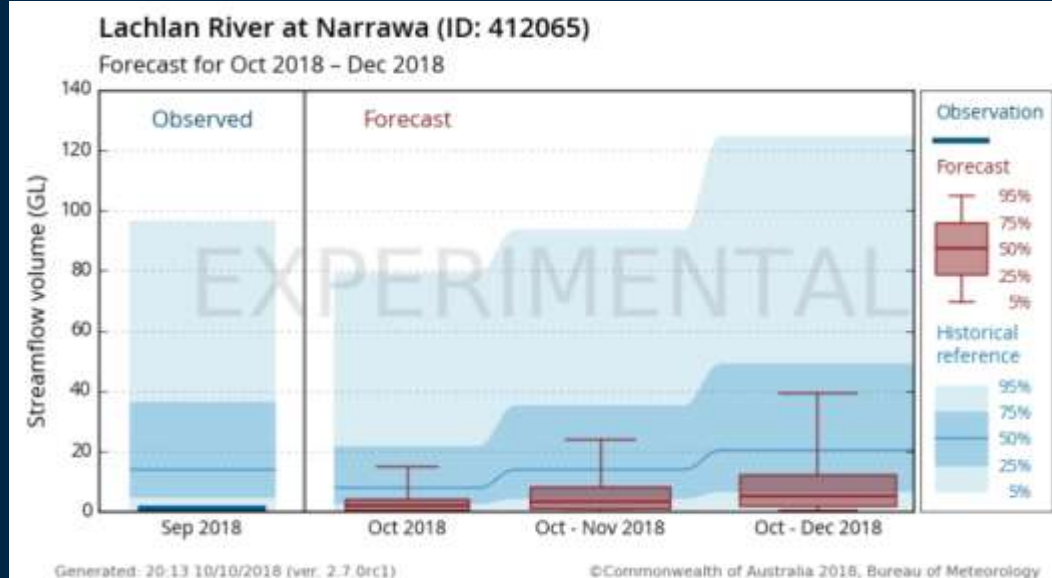
Dam operator



Irrigators

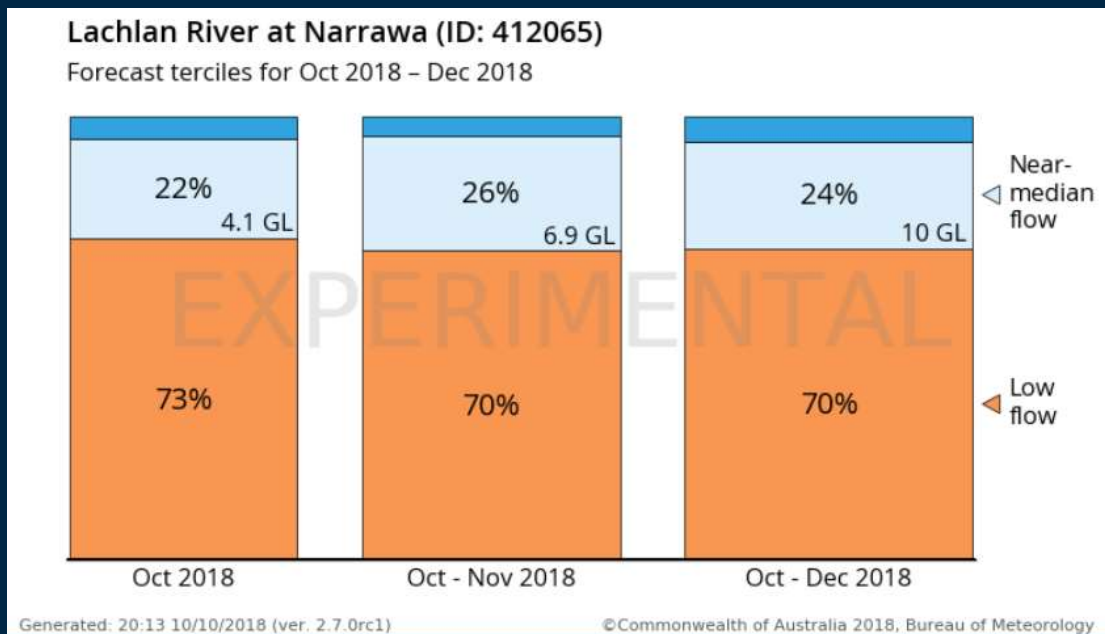


Environmental flows



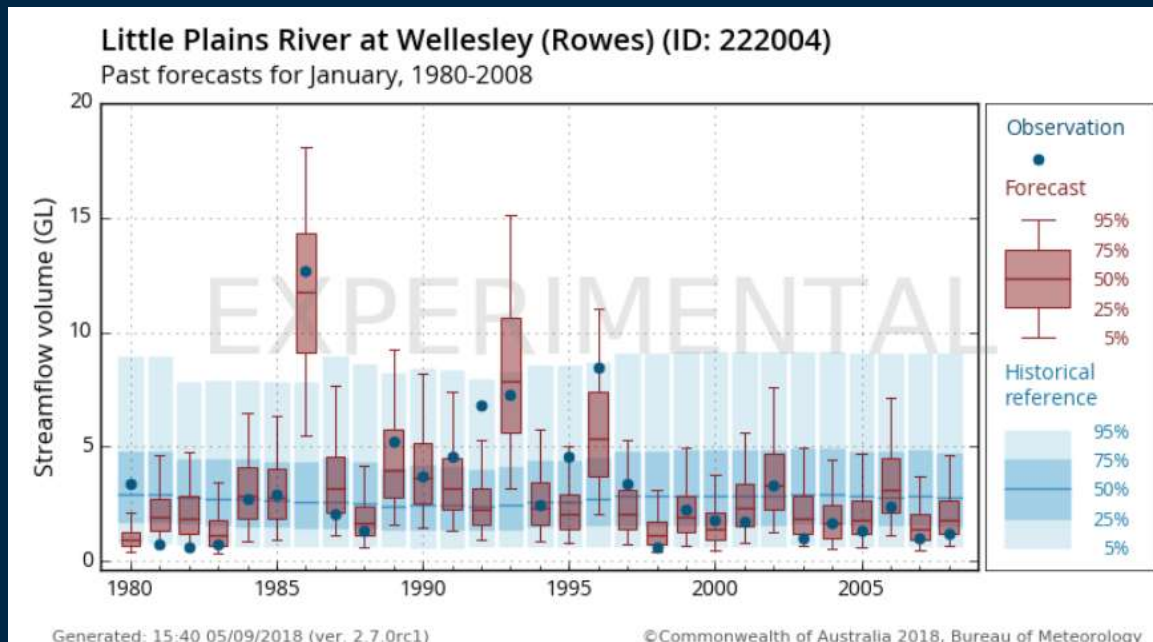
New graphic products: multi-month forecast

Forecast categories



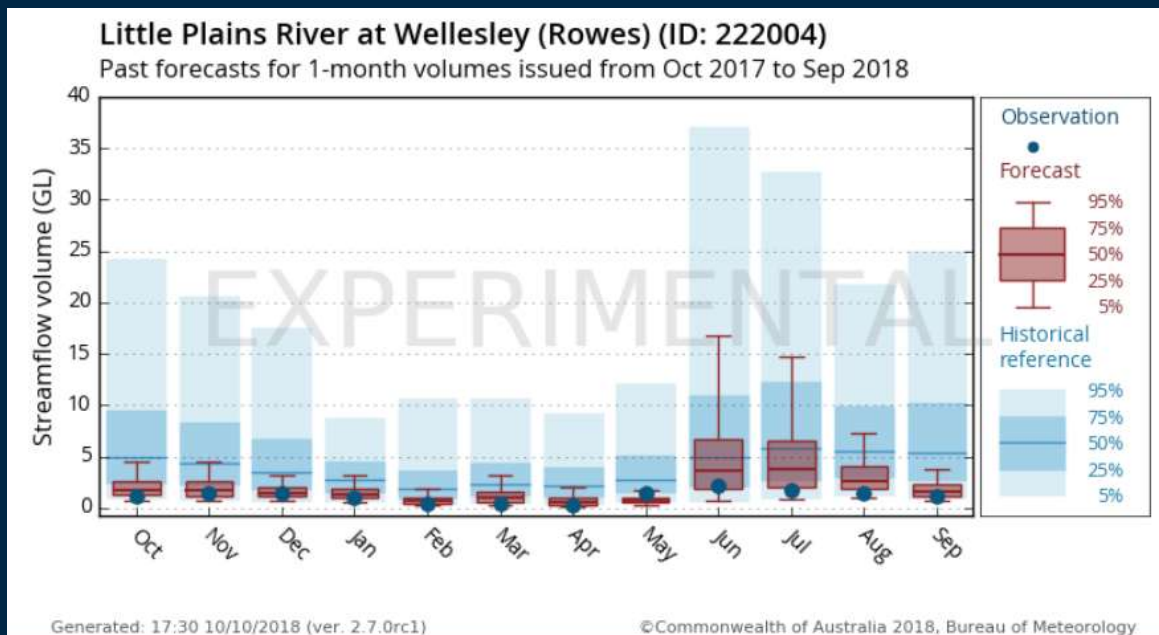
New graphic products: multi-month forecast

Verification hindcasts



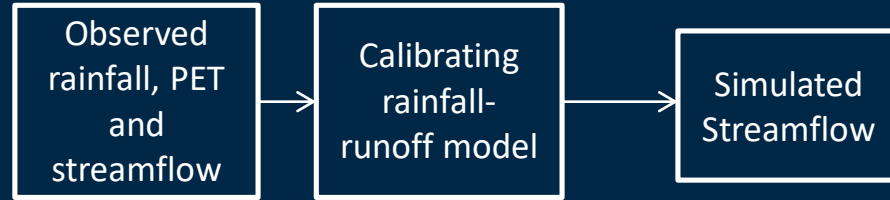
New graphic products: multi-month forecast

Past 12 months forecast



Dynamic modelling using ACCESS-S

Model calibration
using historical data

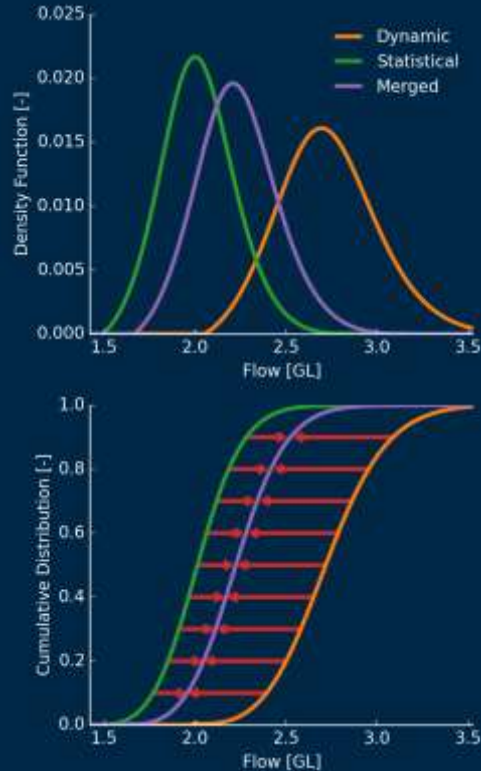


Applying calibrated
model

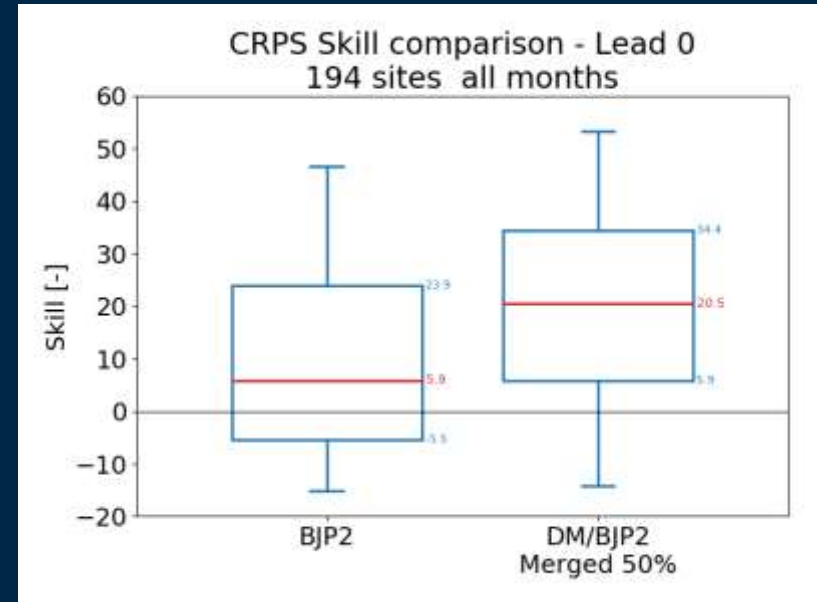


Merging between statistical and dynamic forecasts

- Ensemble merging with the Quantile Model Averaging (QMA) developed by CSIRO

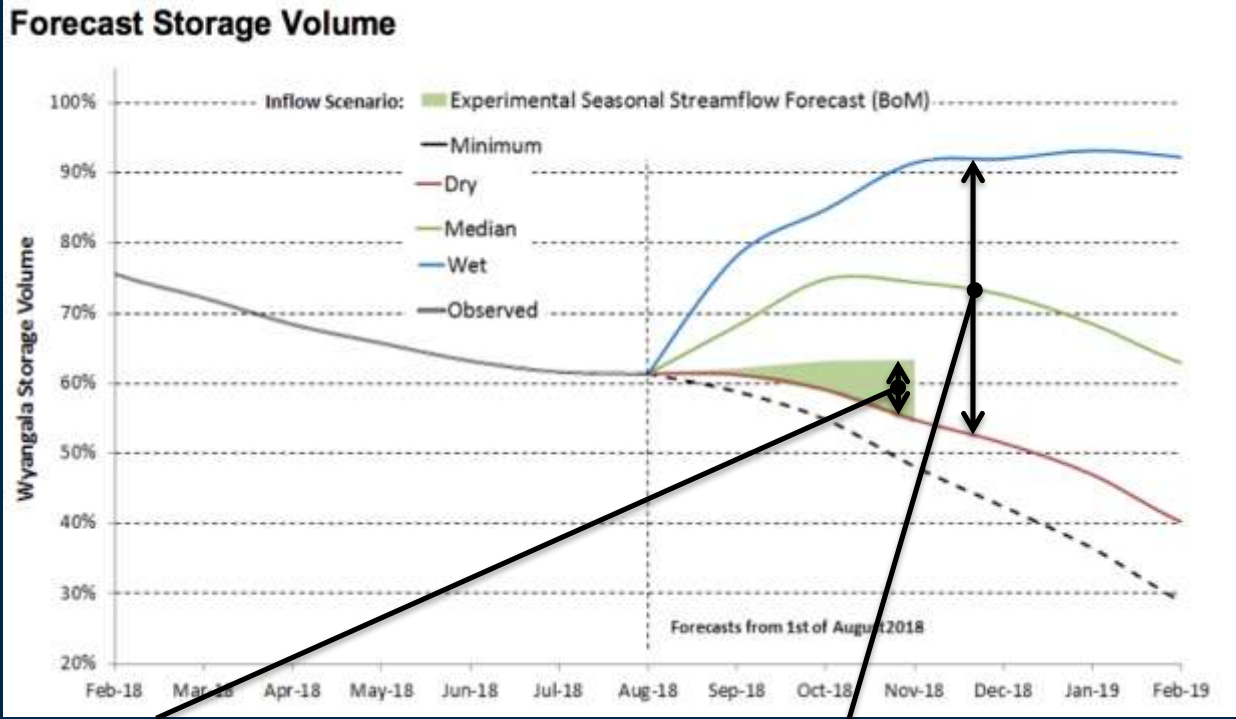


Preliminary result



Seasonal streamflow forecast application Example: Wyangalla Dam

Storage forecast
August - October 2018



20%-80% percentile
BoM inflows
- Constrained by dam level & likely inflows

20%-80% percentile
Inflow Climatology
- Constrained by dam level only

Summary

- Multi-month streamflow forecasts are generated for 340 locations now.
- New graphic products and website has been generated.
- A robust forecast evaluation process has been incorporated.
- Merging of forecasts from the current statistical approach with those from a new dynamic approach (driven by ACCESS-S) is the next step.



New website Overview (video):

Australian Government
Bureau of Meteorology

HOME | ABOUT | CLD | WA | SA | TAS | ACT | NT | AUSTRALIA | GLOBAL | ANTARCTICA

Experimental Seasonal Streamflow Forecasts

Home | National Summary | Introduction | Data Source Summary | FAQs | Contact Us | Publications | Registration | History | Feedback

Station Selector

Drainage Division
Murray-Darling Basin

River Region
Upper Murray River

Location
Unregulated inflow to Hume Dam

Nearby stations
 • Total flow of Kiewa River to Murray River
 • Yakanandah Creek at Odomes Flat (4922)
 • Stralongs Creek at Watbumbine (410091)

Unregulated inflow to Hume Dam

Map showing the catchment area and streamflow forecast locations. Includes a legend and a "Show Legend" button.

Quick facts

Catchment area	11704 km ²
Climatic type	Temperate
Annual Rainfall	
Period	1905-2017
Average	1050 mm
Annual Streamflow	
Period	1905-2017
Average	2524 GL
Minimum	205 GL
Maximum	3745 GL

Forecast updated: View the updated forecast summary for September 2018

Forecast | Model Performance | Observations

Boxplot
 Tables
 Exceedance curve

Display

Graphic
 Table
 Description

Forecast data

Unregulated inflow to Hume Dam
Forecast for Sep 2018 - Nov 2018

Streamflow volume (GL)

Observed | Forecast

Aug 2018 | Sep 2018 | Sep - Oct 2018 | Sep - Nov 2018

Observation
Forecast
95%
75%
50%
25%
5%

Historical reference
95%
75%
50%
25%
5%

Generated: 21:34 05/09/2018 (ver: 2.7.0c1) | ©Commonwealth of Australia 2018, Bureau of Meteorology

Questions?

