Forecasting water availability and demand to inform water use and management

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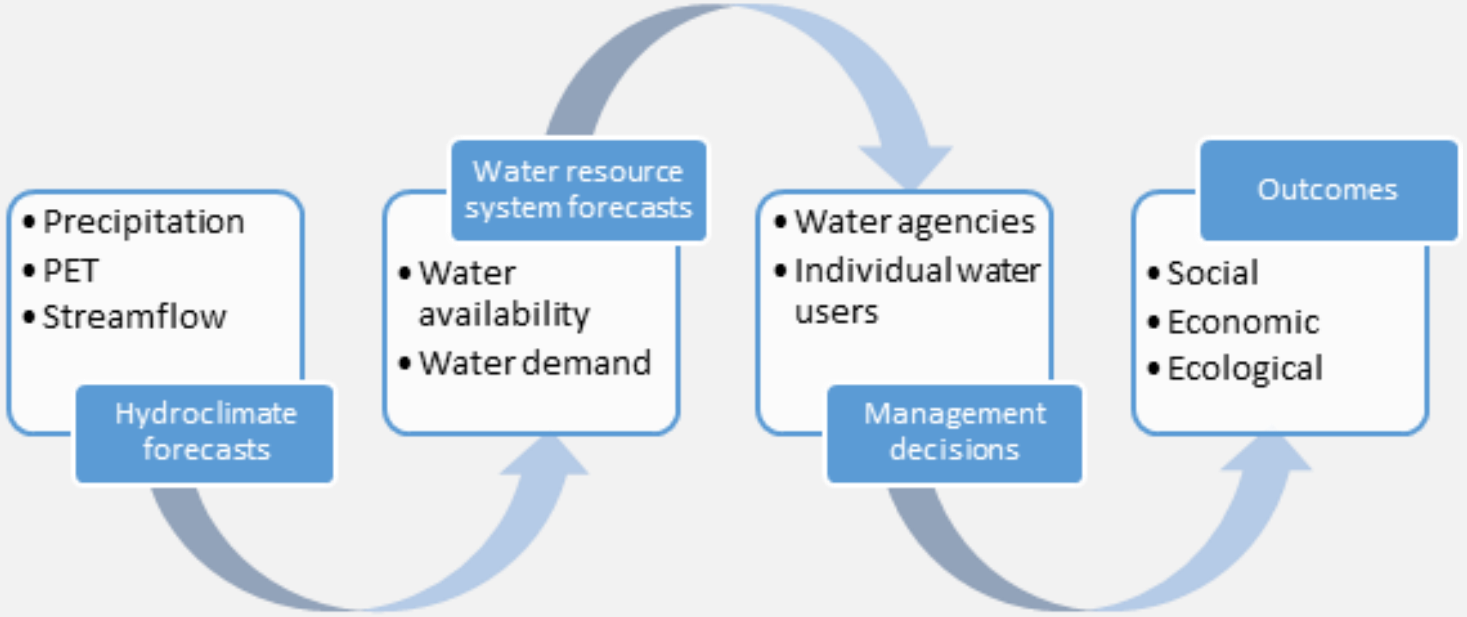
The University of Melbourne

BoM R&D Workshop 2020

ARC LINKAGE PROJECT PARTNERS

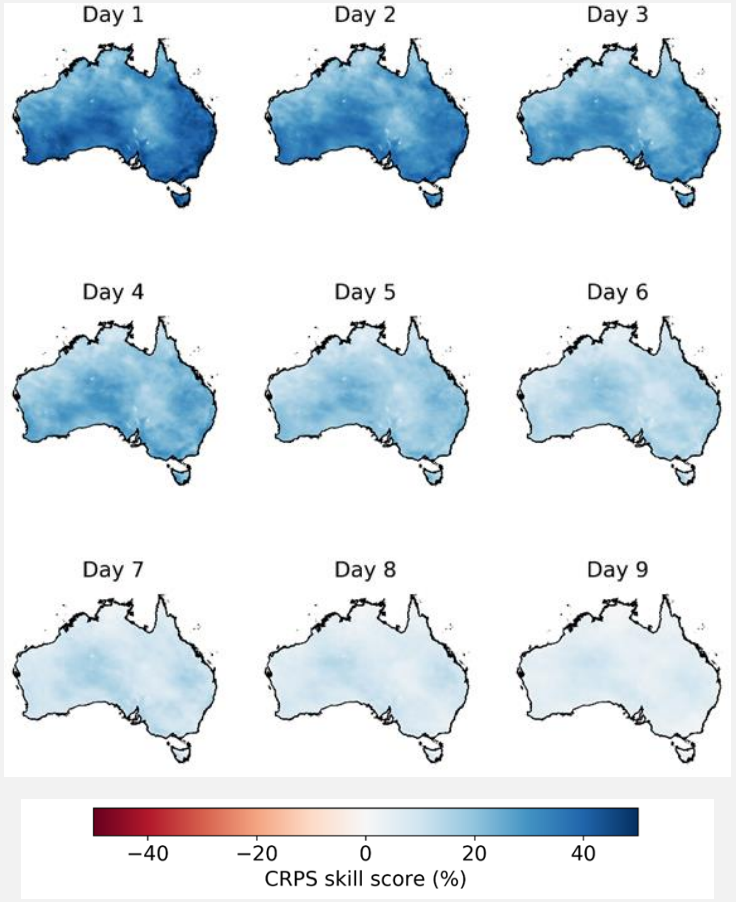
- The University of Melbourne
- Bureau of Meteorology (Narendra Tuteja, Paul Feikema, Senlin Zhou, Fatemeh Mekanik)
- Murray-Darling Basin Authority
- Commonwealth Scientific and Industrial Research Organisation
- New South Wales Department of Planning, Industry and Environment
- Goulburn-Murray Water
- Lower Murray Water
- European Centre for Medium-Range Weather Forecasts

PROJECT AIM

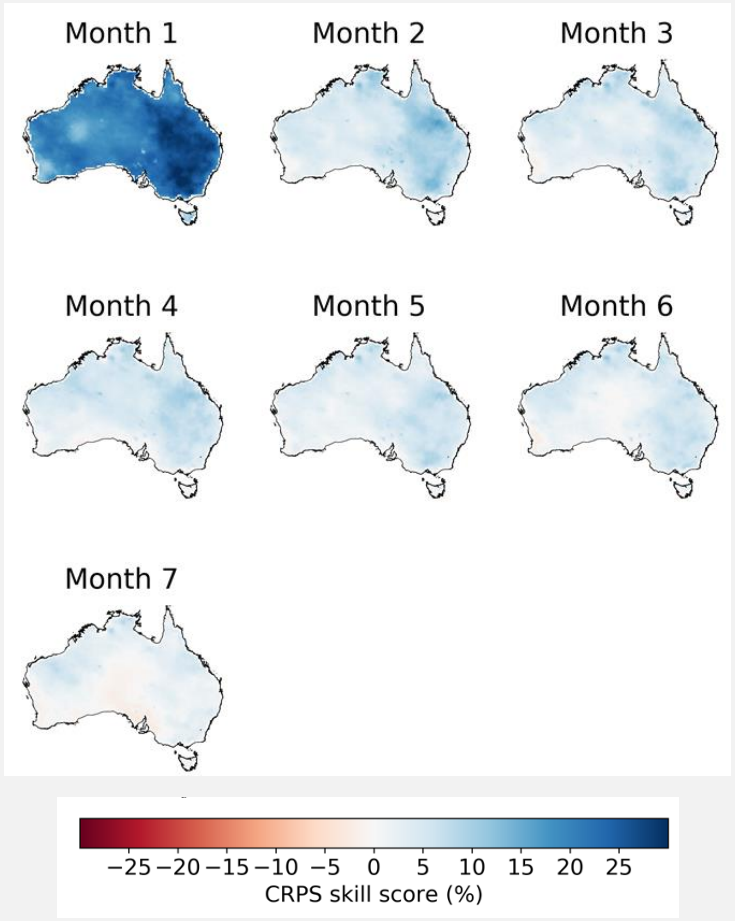

• Precipitation
• PET
• Streamflow
Hydroclimate forecasts
Water resource system forecasts
• Water availability
• Water demand
• Water agencies
• Individual water users
Management decisions
Outcomes
• Social
• Economic
• Ecological

FORECASTING REFERENCE CROP EVAPOTRANSPIRATION (FAO56 ETo)

Days ahead

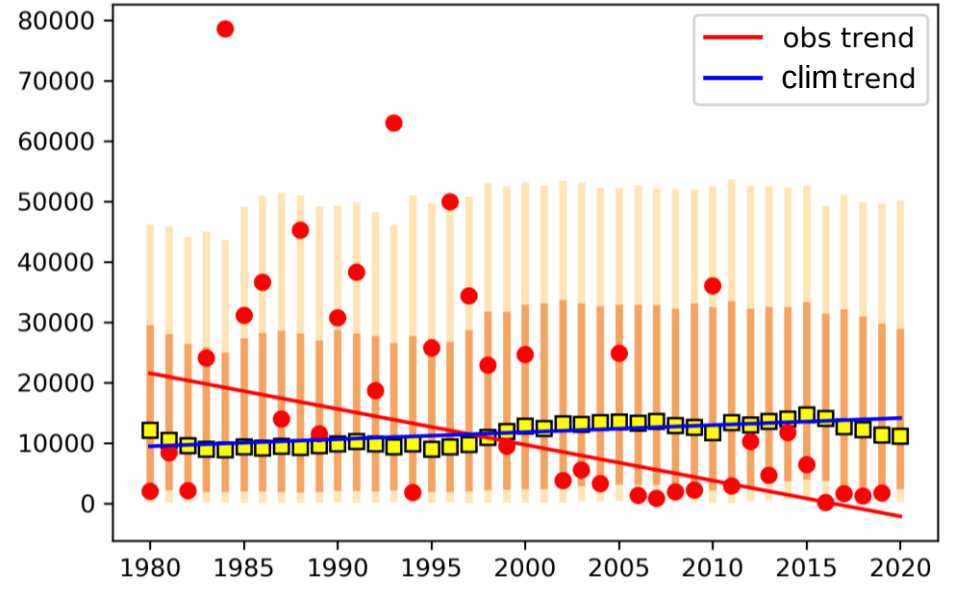


Months ahead

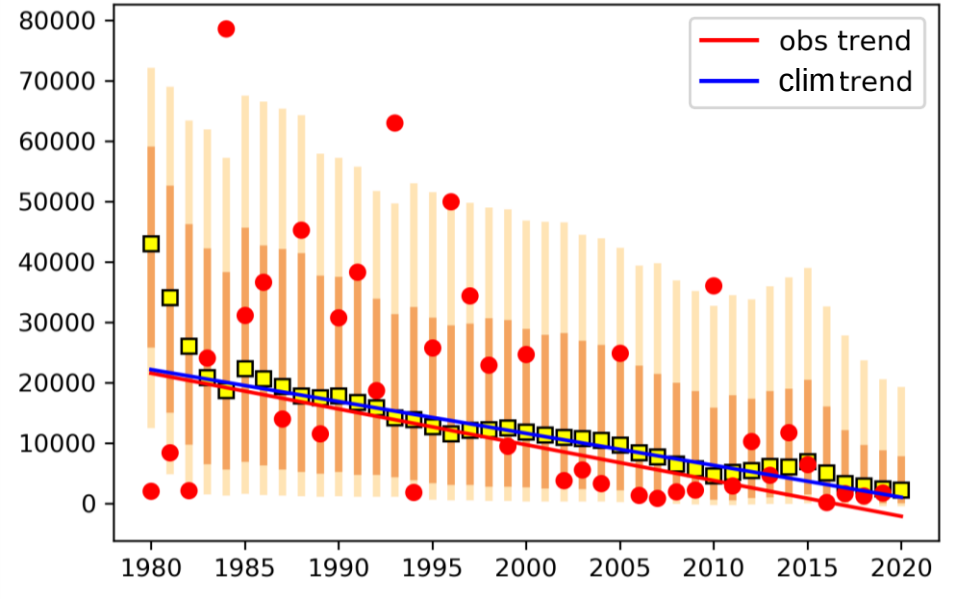


EMBEDDING TREND INTO SEASONAL FORECASTS

- Climatology forecasts for September at Lachlan, NSW



BJP



BJP-t

IMPROVING WATER ALLOCATION OUTLOOKS

- Seasonal allocation

Water System	High-Reliability Water Share
Murray	2%
Broken	0%
Goulburn	2%
Campaspe	26%
Loddon	2%
Bullarook	19%

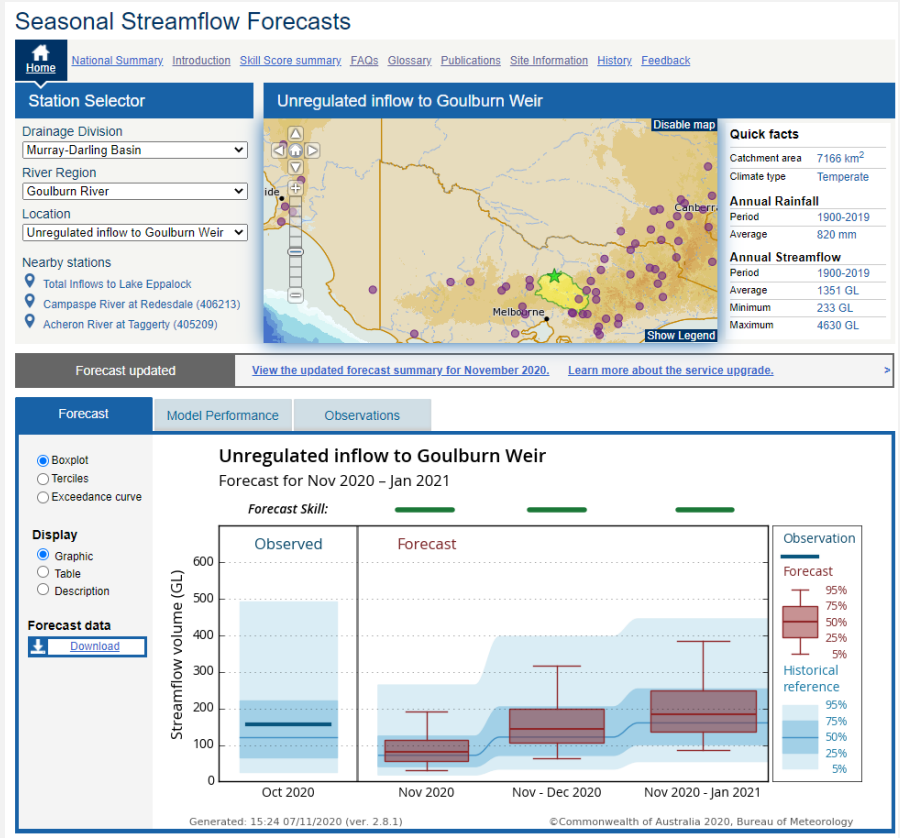
- Allocation outlooks

Goulburn System Outlook for Seasonal Determination of High-Reliability Water Shares

Inflow Conditions	Similar inflow season	15 August 2019	15 October 2019	16 December 2019	17 February 2020
Wet	2010/11	52%	100%	100%	100%
Average	2003/04	35%	67%	97%	100%
Dry	2008/09	16%	35%	41%	44%
Extreme Dry	2006/07	5%	11%	15%	18%

https://nvrm.net.au/

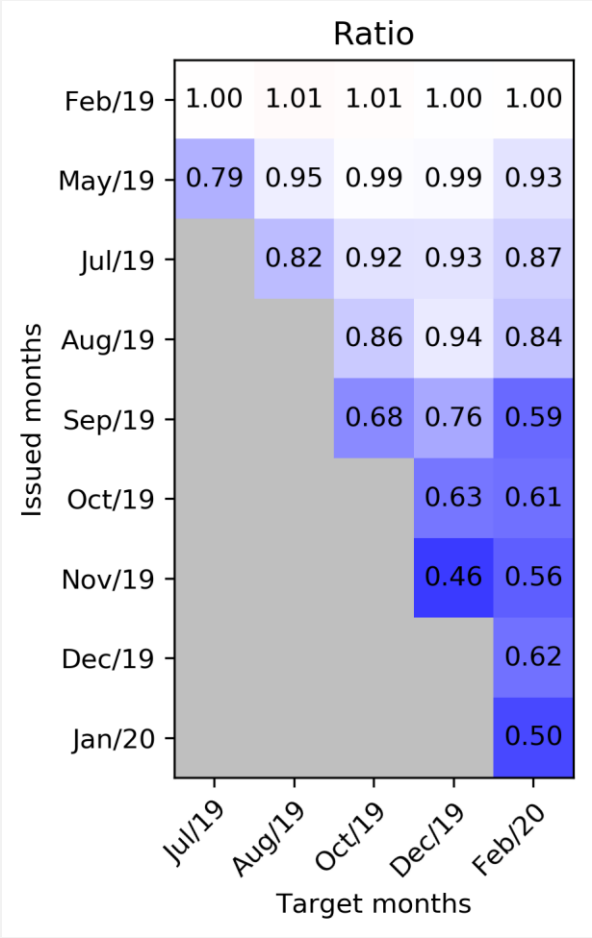
- Seasonal streamflow forecasts



IMPROVING WATER ALLOCATION OUTLOOKS

More certainty

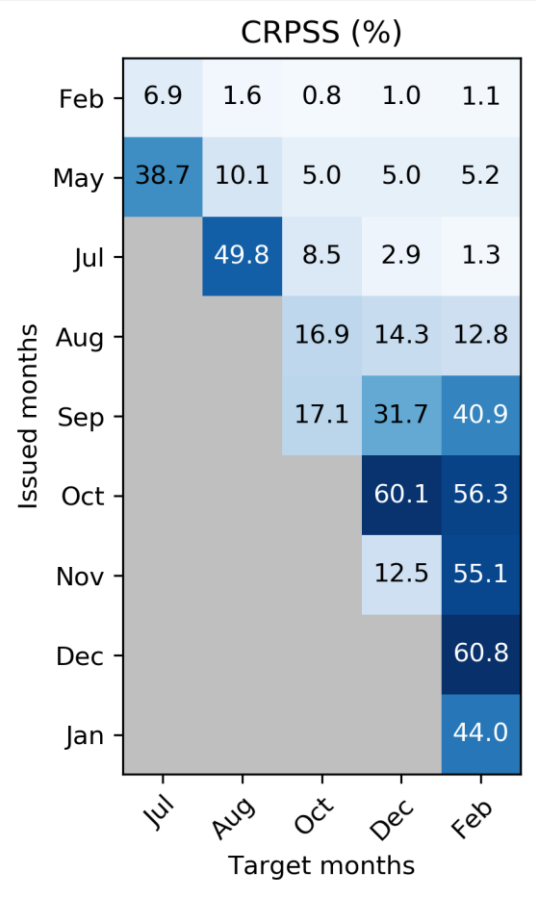
- Goulburn system
- The ratio of the uncertainty width of allocation outlooks using streamflow forecasts and climatology
- Ratio = 1 means the same
- Ratio < 1 means narrower uncertainty



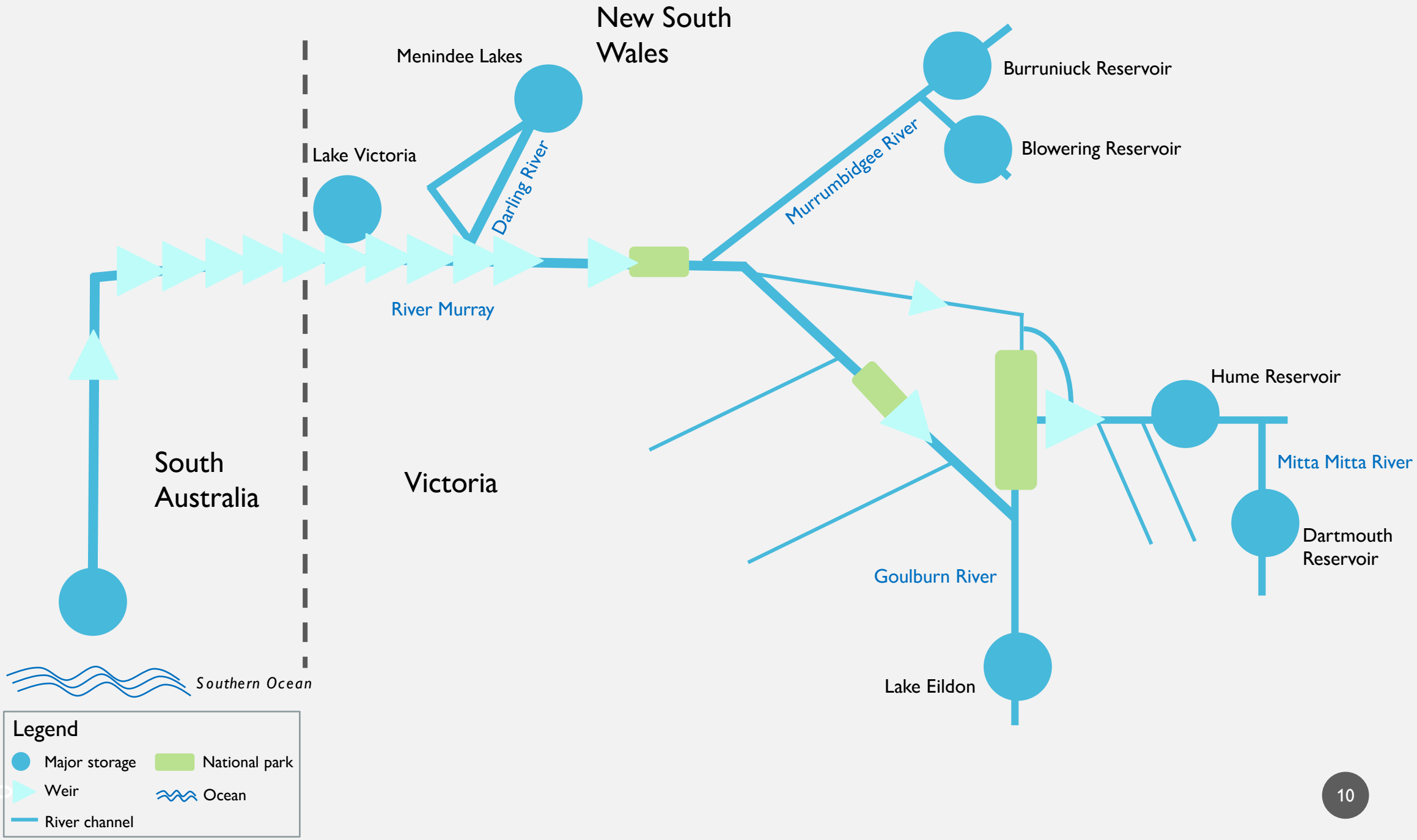
IMPROVING WATER ALLOCATION OUTLOOKS

Greater accuracy

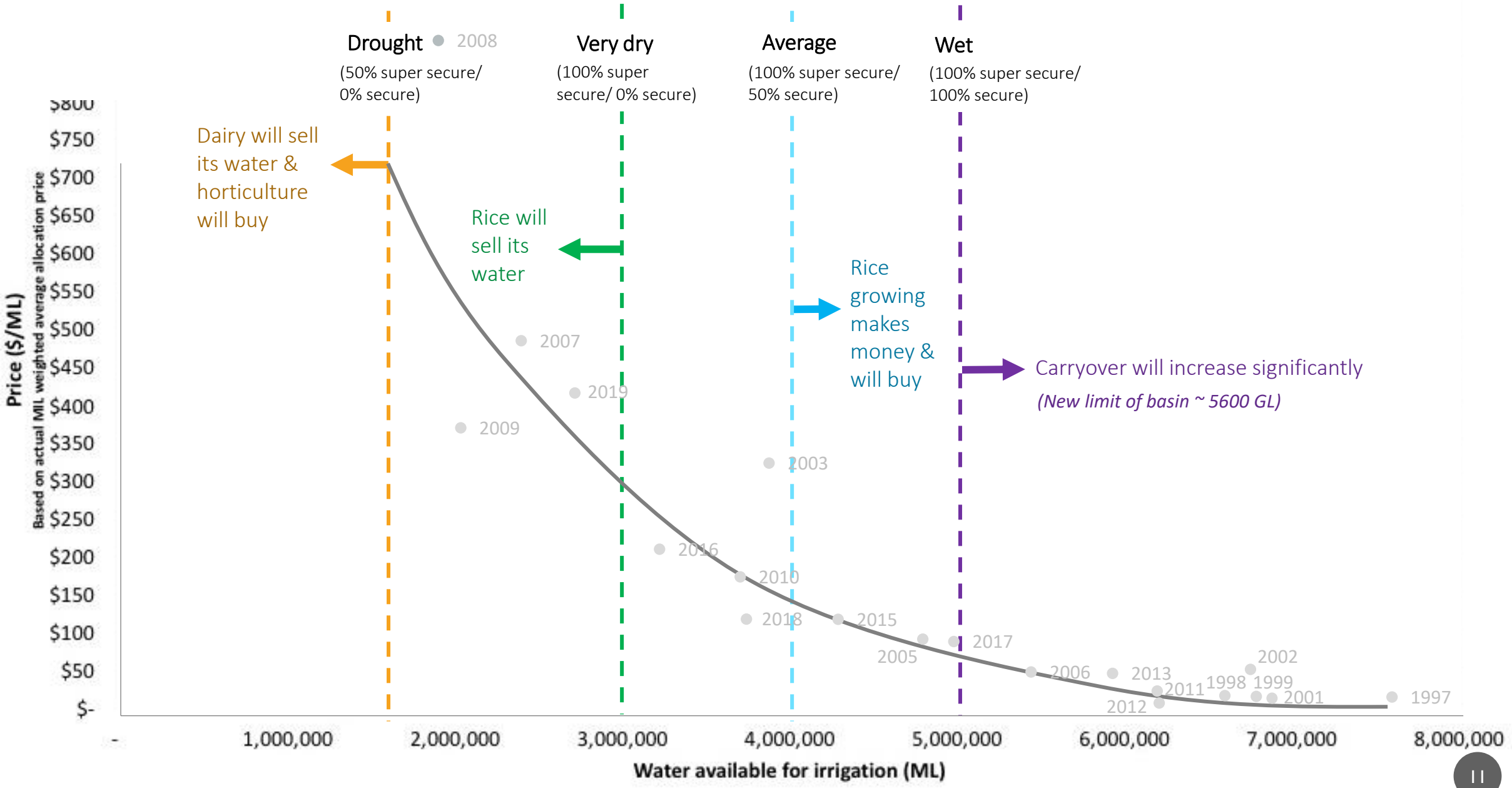
- Goulburn system
- Evaluate the outlook accuracy over the three irrigation seasons
- Positive values show better outlooks compare to climatology



FORECASTING WATER DEMAND


New South Wales
Menindee Lakes
Lake Victoria
Darling River
Murrumbidgee River
Burruniuck Reservoir
Blowering Reservoir
River Murray
Hume Reservoir
Mitta Mitta River
Dartmouth Reservoir
South Australia
Victoria
Goulburn River
Lake Eildon
Southern Ocean
Legend
Major storage
National park
Weir
Ocean
River channel

Movement of water in the Southern Connected System



Sources: RMCG 2019 Report – "It's Not All About the Almonds"

SUMMARY

- Improving and extending hydroclimate forecasts
- Bridging hydroclimate forecasts and water management