Ensemble Hydrological Forecasting in Australia

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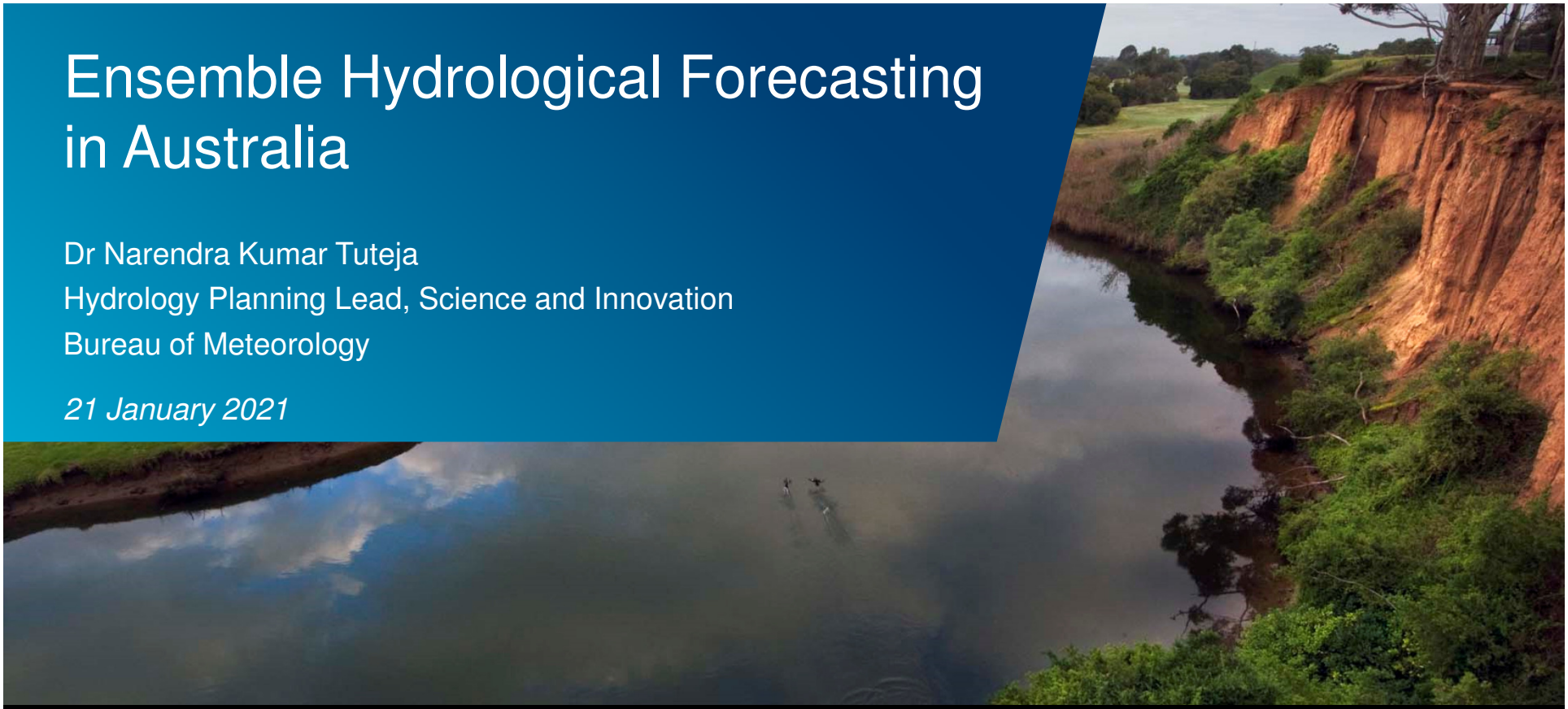

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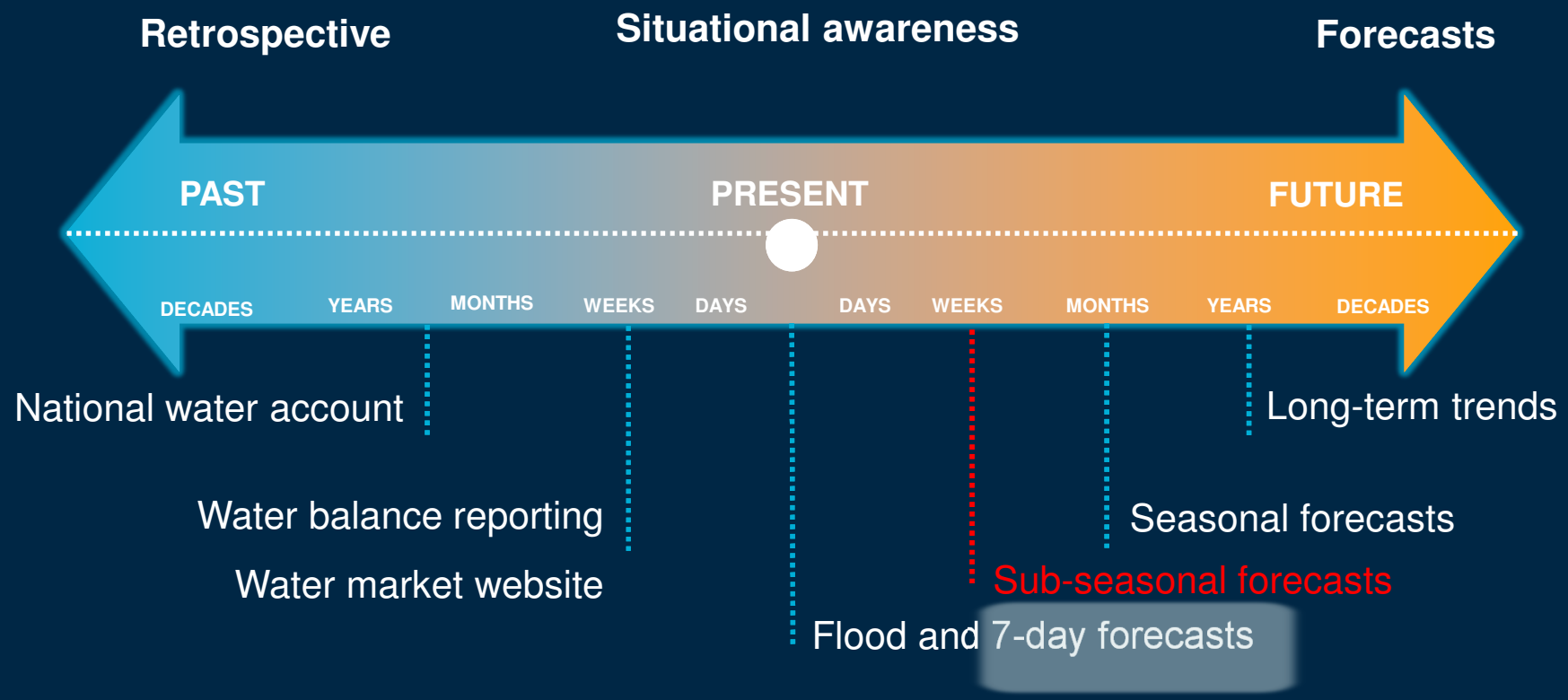
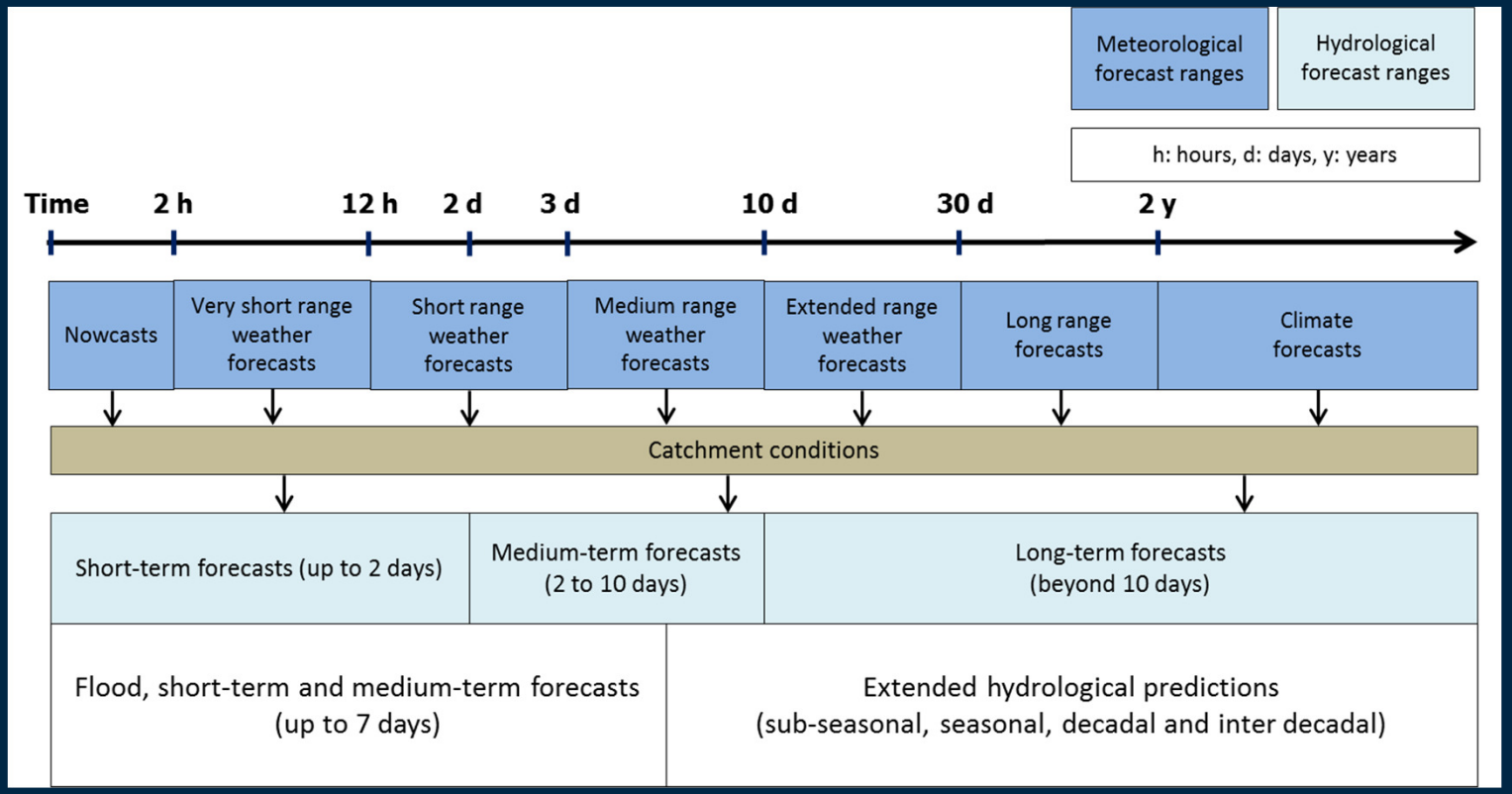
Water information products

www.bom.gov.au/water

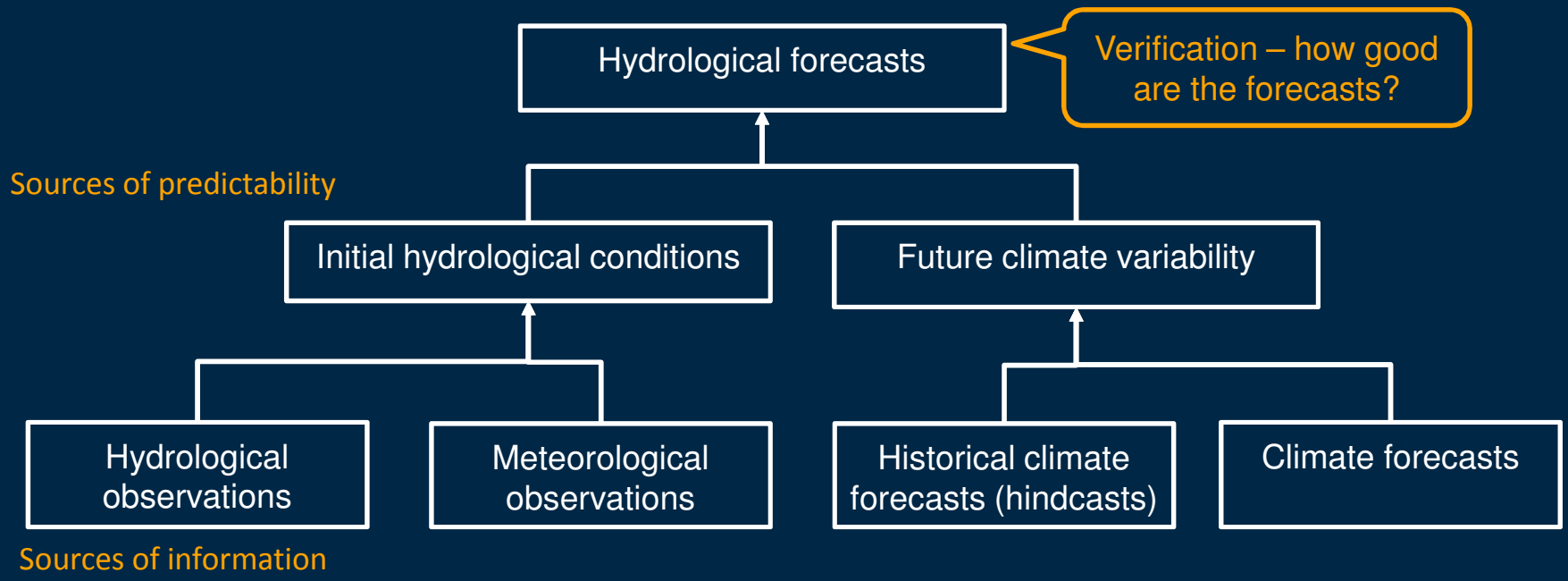


WMO specified meteorological & hydrological forecast ranges

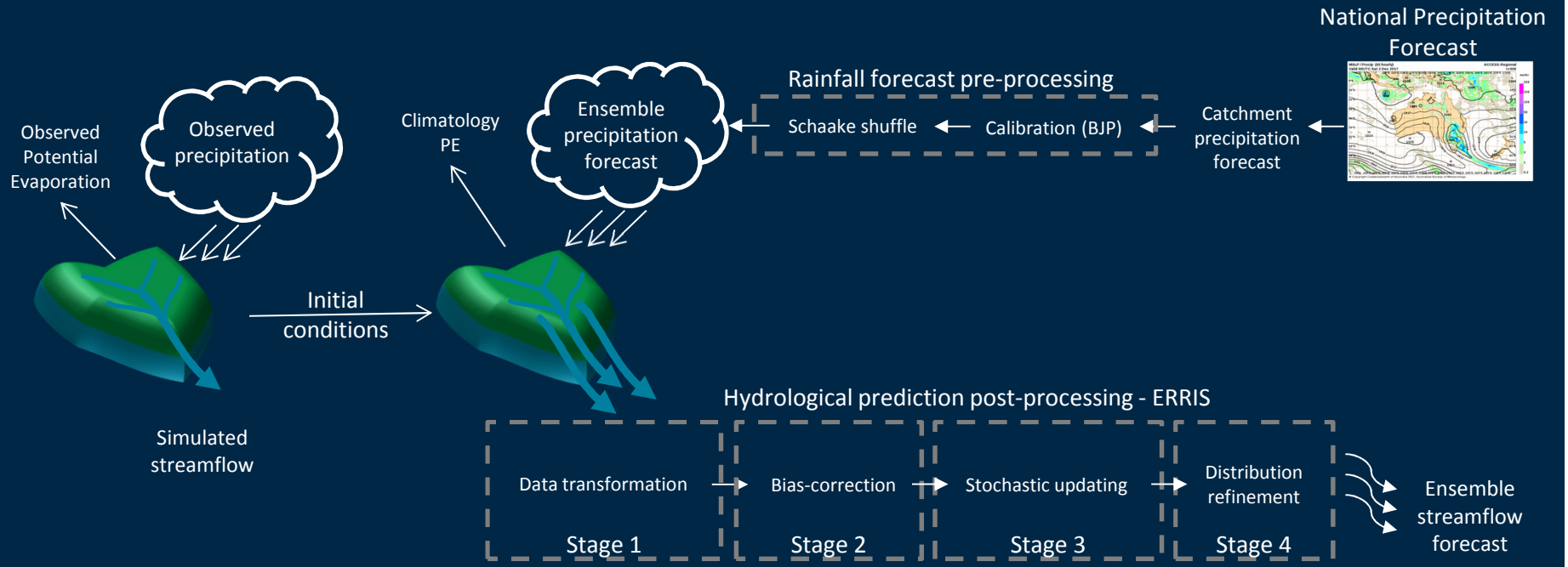


WMO Technical Regulations (WMO 2017, Appendix 1.1), Global Data-processing and Forecasting System, Annex IV , and WMO Technical Regulations Volume III – Hydrology

Sources of predictability



Ensemble forecast system



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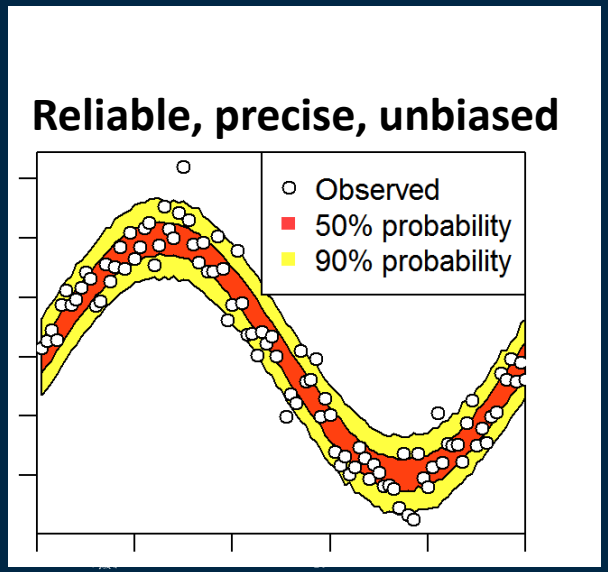
ERRIS: Error Reduction In Stages

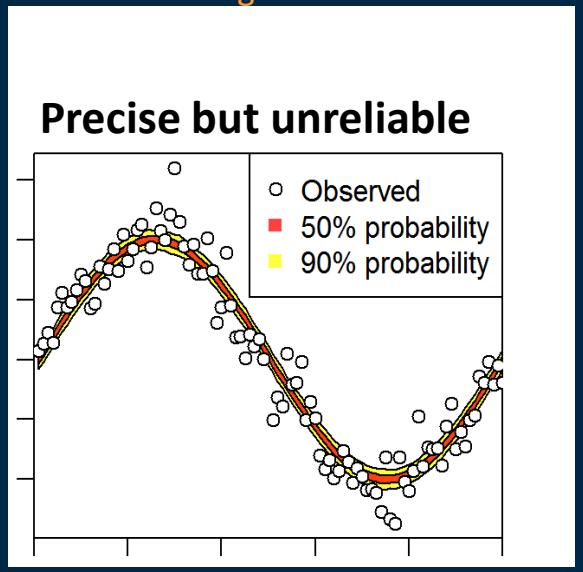
What makes a good probabilistic forecast?

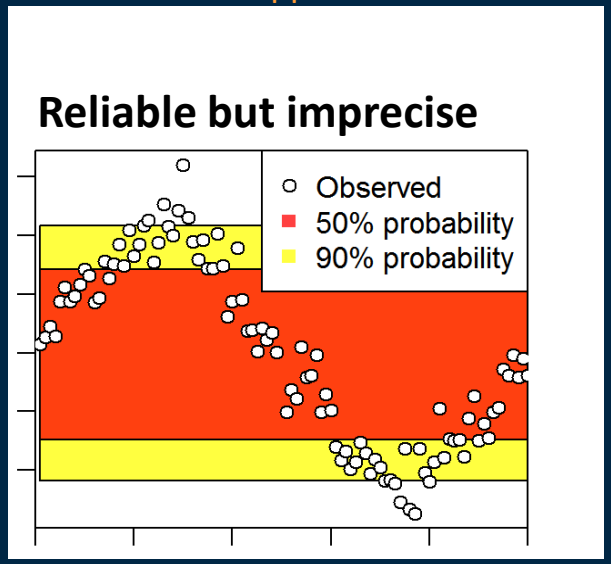
- Water management is about “balancing risks” of extreme events (floods/droughts)
- For accurate risk estimates of extreme events, a good forecast needs to be:
  1. **Reliable**
  2. **Precise**

“Over-confident”: under-estimate risks, can’t manage extremes

“Too-conservative”: over-estimates risks => missed opportunities

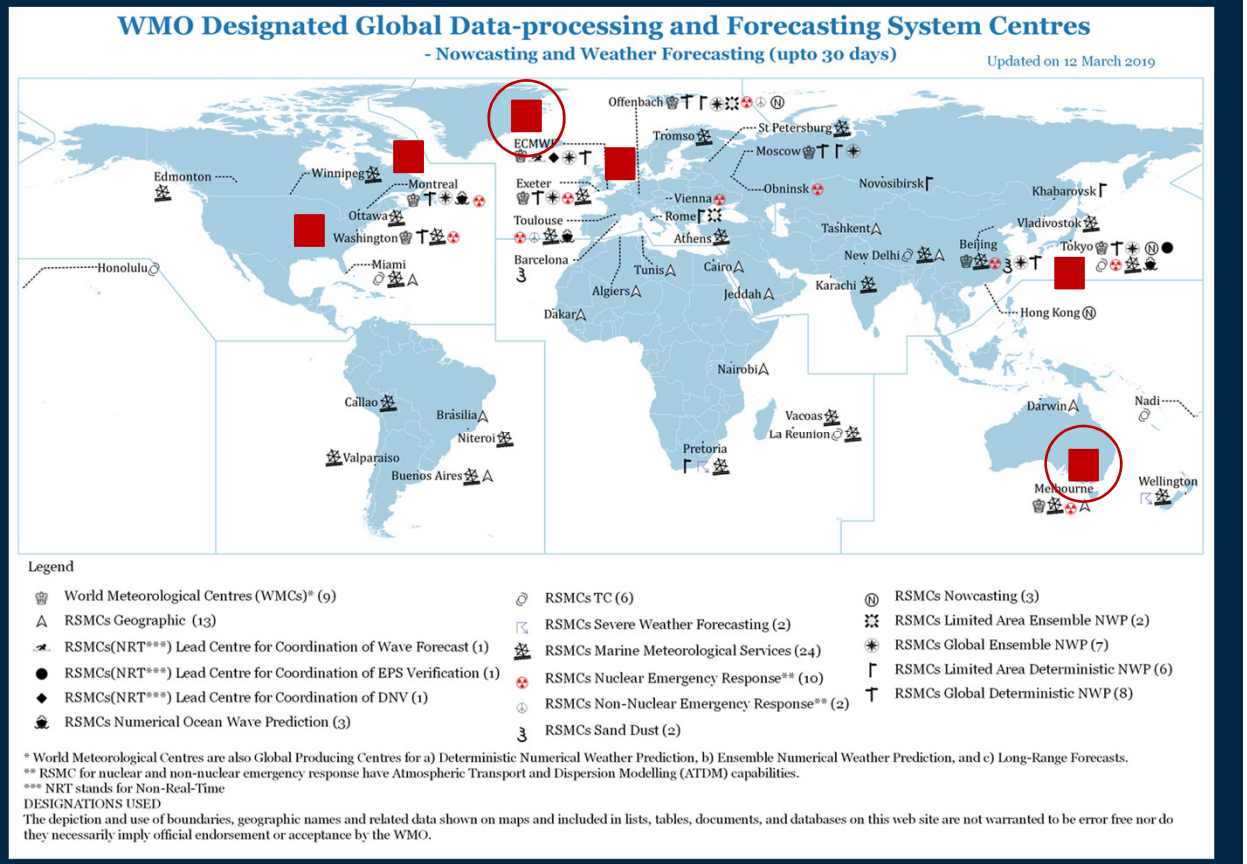






Ensemble rainfall forecast data

- Ensemble mean of NWP models from: Australia, UK, USA, Canada, Europe, and Japan
- ECMWF (18 km, 51 ensembles)
- ACCESS-GE (~33km, 36 time lagged ensembles)



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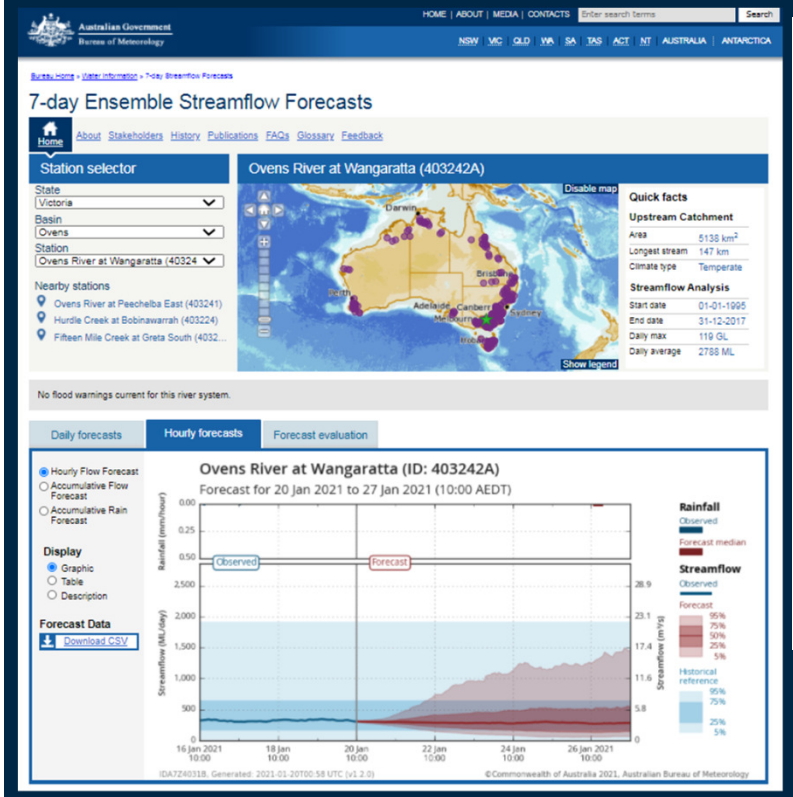
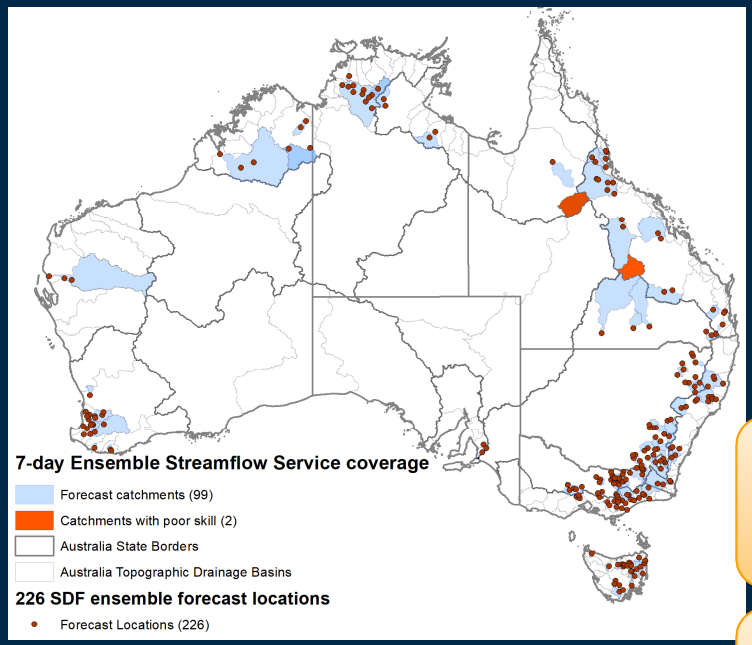
7-day ensemble streamflow forecast service

- Released to public in June 2020
  http://www.bom.gov.au/water/7daystreamflow/





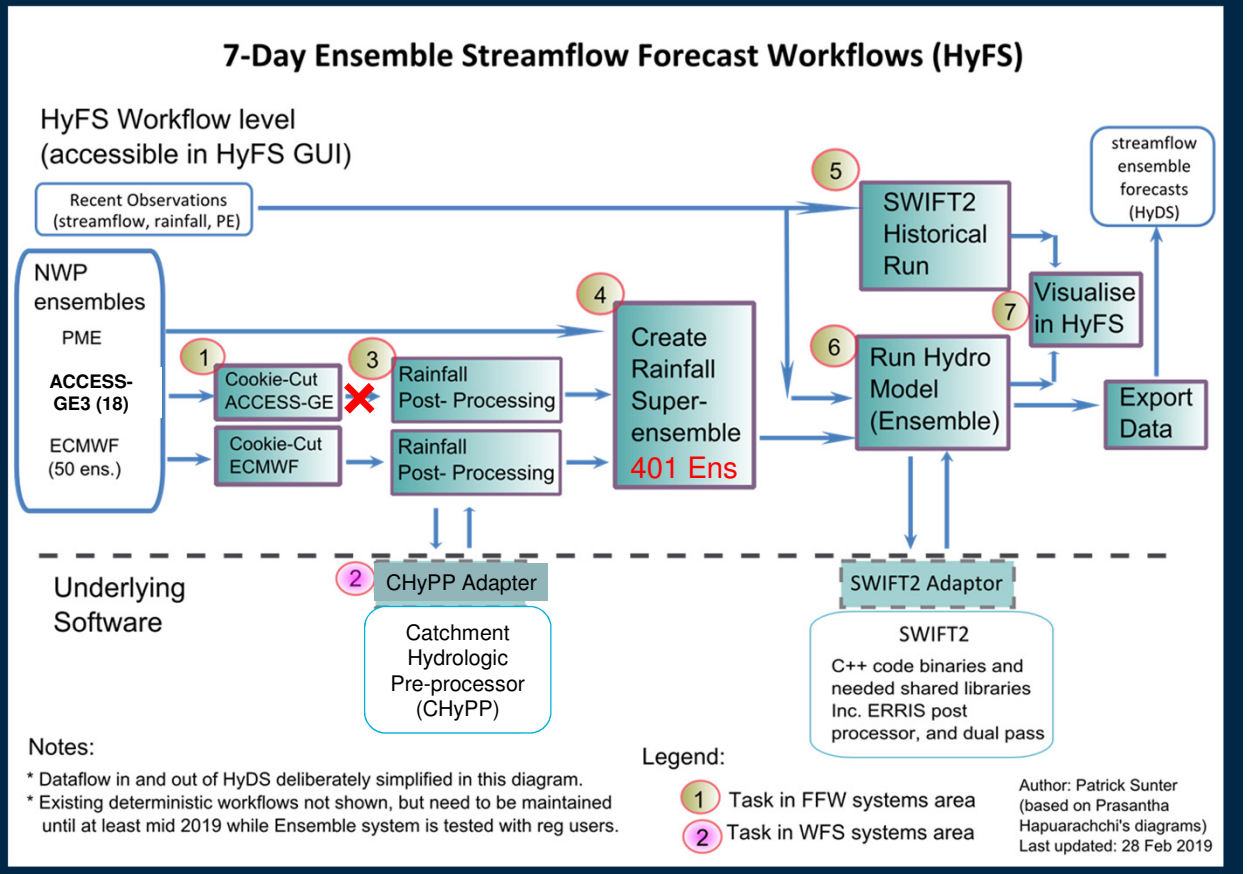
Region	Forecast locations
NSW & ACT	58
NT	16
QLD	29
SA	4
TAS	28
VIC	60
WA	31
Total	**226**

Forecasts are updated daily around 10:30-11:30 AEST

Data provision via the website and FTP to key stakeholders

Upgraded 7-day ensemble forecasting system

- HyFS: Enterprise approach to operational flood and short range water forecasts
- All modelling tools are fully consistent with Bureau of Meteorology technology stack
- Based on FEWS system, adopted by most water utilities in Australia
- Rainfall forecasts
  - PME (1)
  - ECMWF IFS (50)
  - ACCESS-GE3 (18) – To be used



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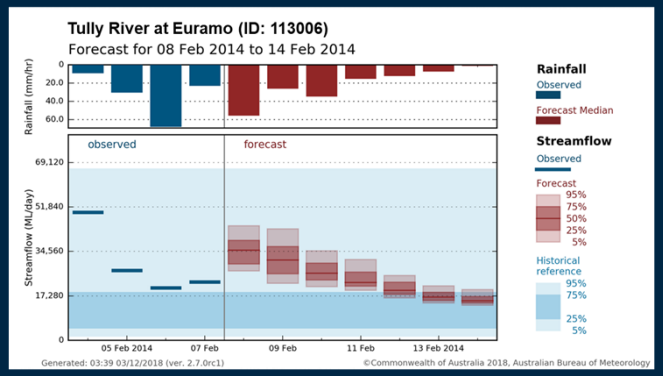
7-day streamflow forecast products

1



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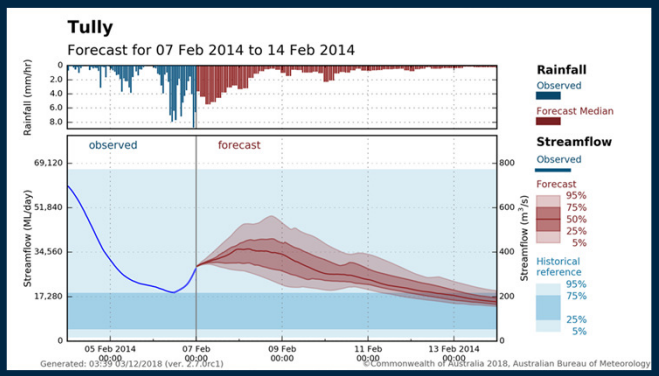
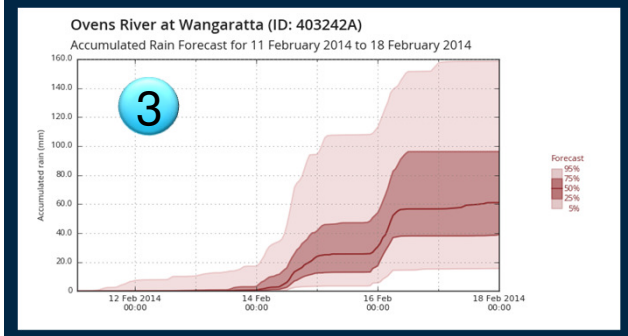
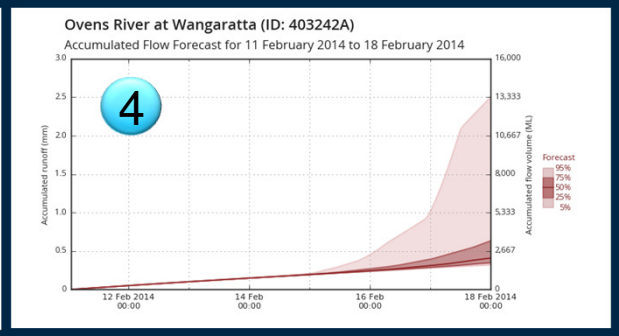


Accumulated rainfall and flow





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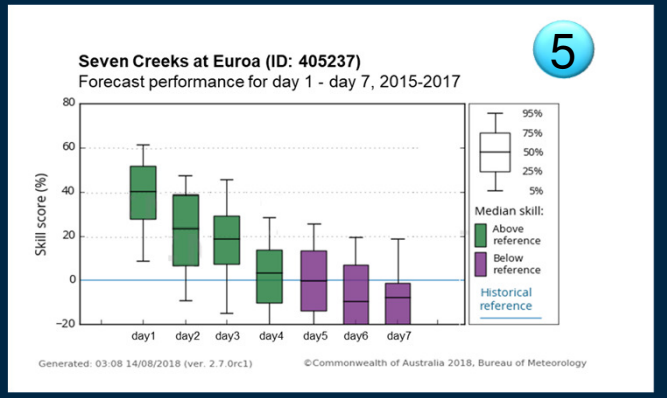
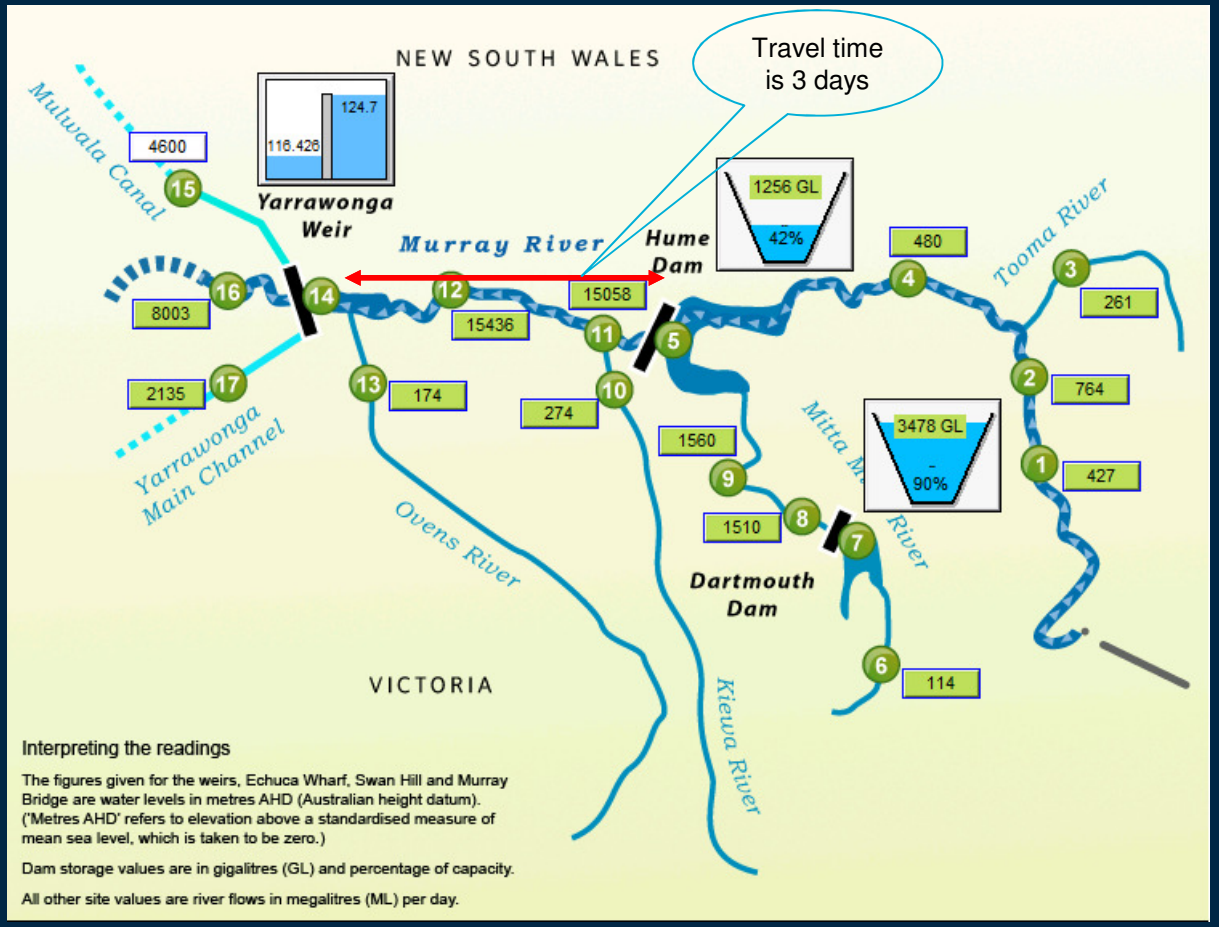


Managing releases from the Hume Dam



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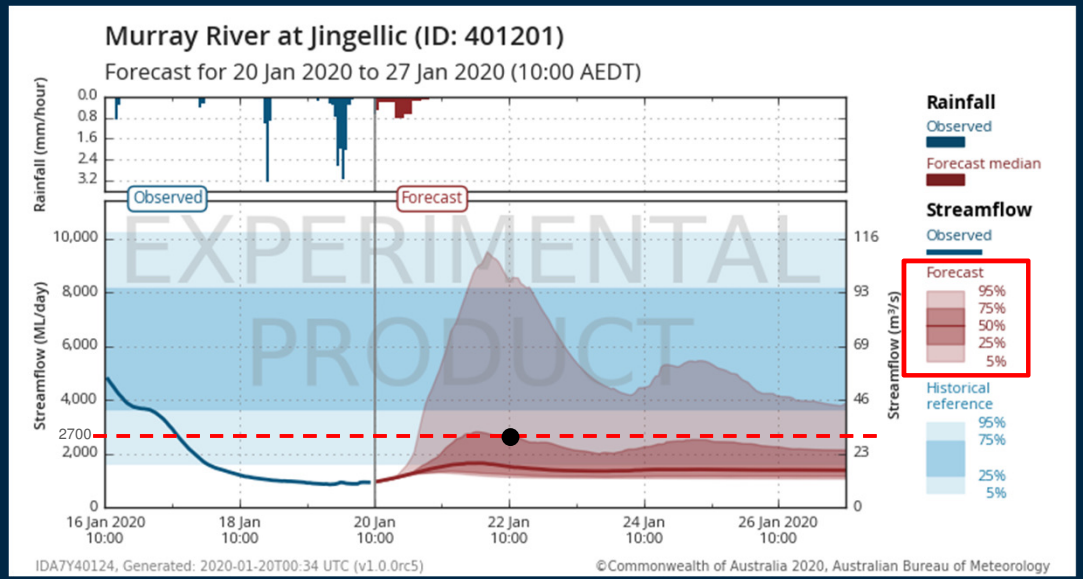
#1 Example of educational activities with dam operators

- Which of the following statements best represent the flow at Jingellic in 2-days lead-time (22/01/2020 10:00) to be as shown by the black dot in the plot below?

1. There is 75% chance of flow exceeding 2700 ML/day
2. There is 75% chance of flow not exceeding 2700 ML/day
3. There is 25% chance of flow not exceeding 2700 ML/day
4. Information provided is insufficient



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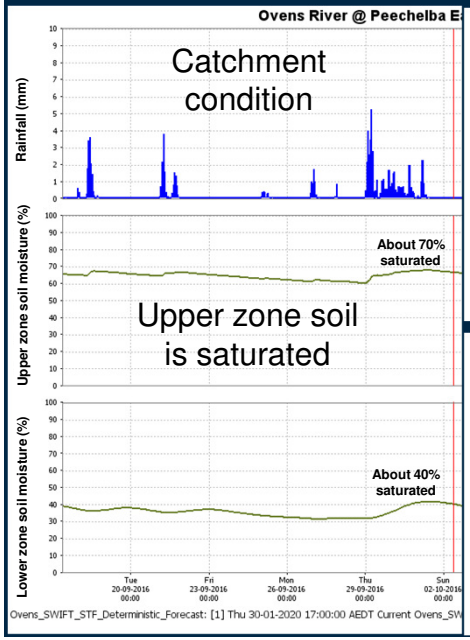
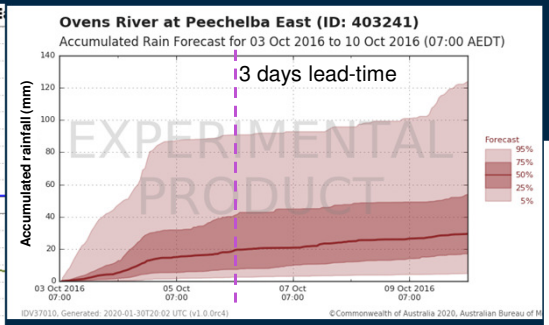
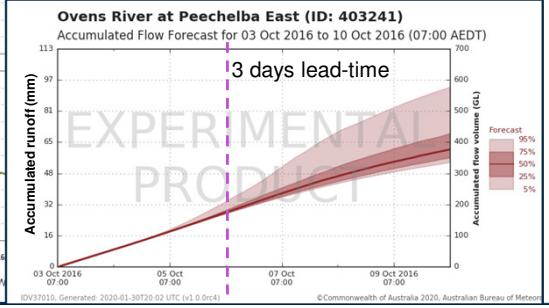
#2 Example of educational activities with dam operators

- Based on the catchment conditions and forecast data given below, what forecast flow percentile range at Peechelba (Ovens River) would you choose for making releases (under flood scenario) from the Hume Dam on 03/10/2016?

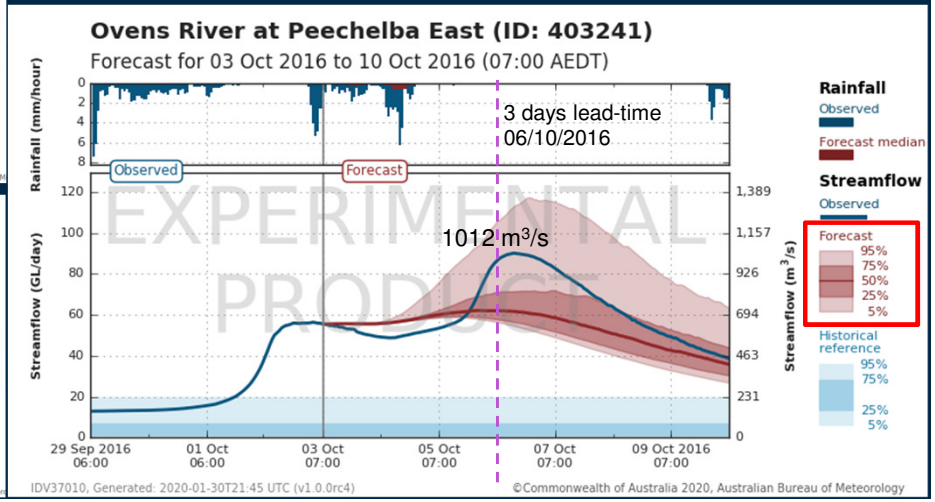
1. 5th – 25th percentile
2. 25th – 75th percentile
3. 75th – 95th percentile
4. Information provided is insufficient







Forecast issue time:
03/10/2016 7:00



Thank you

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