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# Climate and landuse change impacts on water availability: a case study from Tasmania, Australia

**David Post**  
**HydroPredict 2010**  
**Prague, 20-23 Sep 2010**

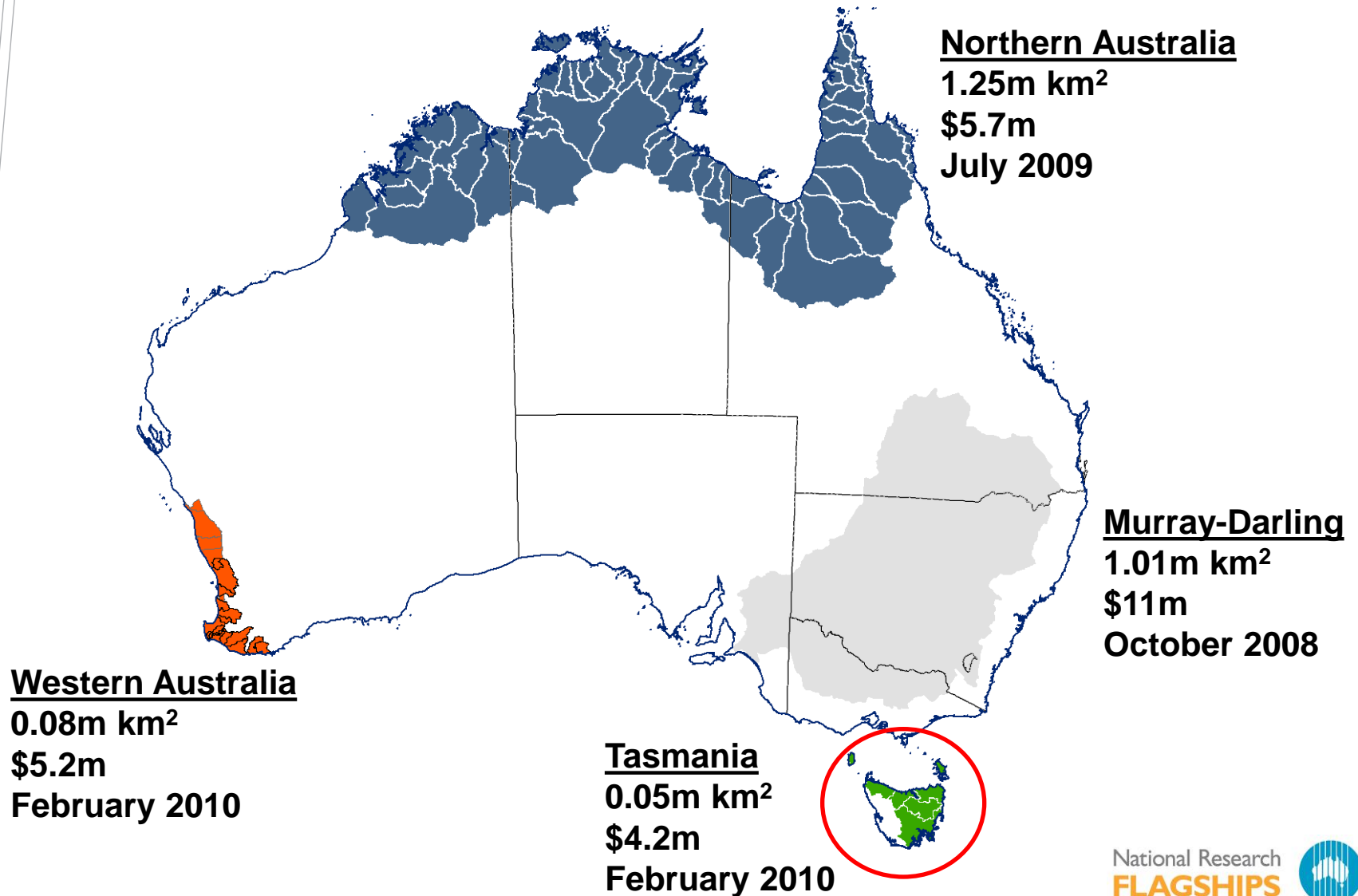
National Research  
**FLAGSHIPS**  
Water for a Healthy Country



# Background

- Australia is the driest inhabited continent. In order to effectively manage its water resources, detailed, accurate (and therefore reliable) assessments of water availability are required.
- The Australian Government has commissioned CSIRO to carry out water availability assessments for some of the major river systems across the country.
- This presentation gives the methods used and some results for one such 'sustainable yields' project – for Tasmania, an island state in south eastern Australia where there are State and Commonwealth plans to increase the area of land under irrigated agriculture.

# 'Sustainable yields' project areas



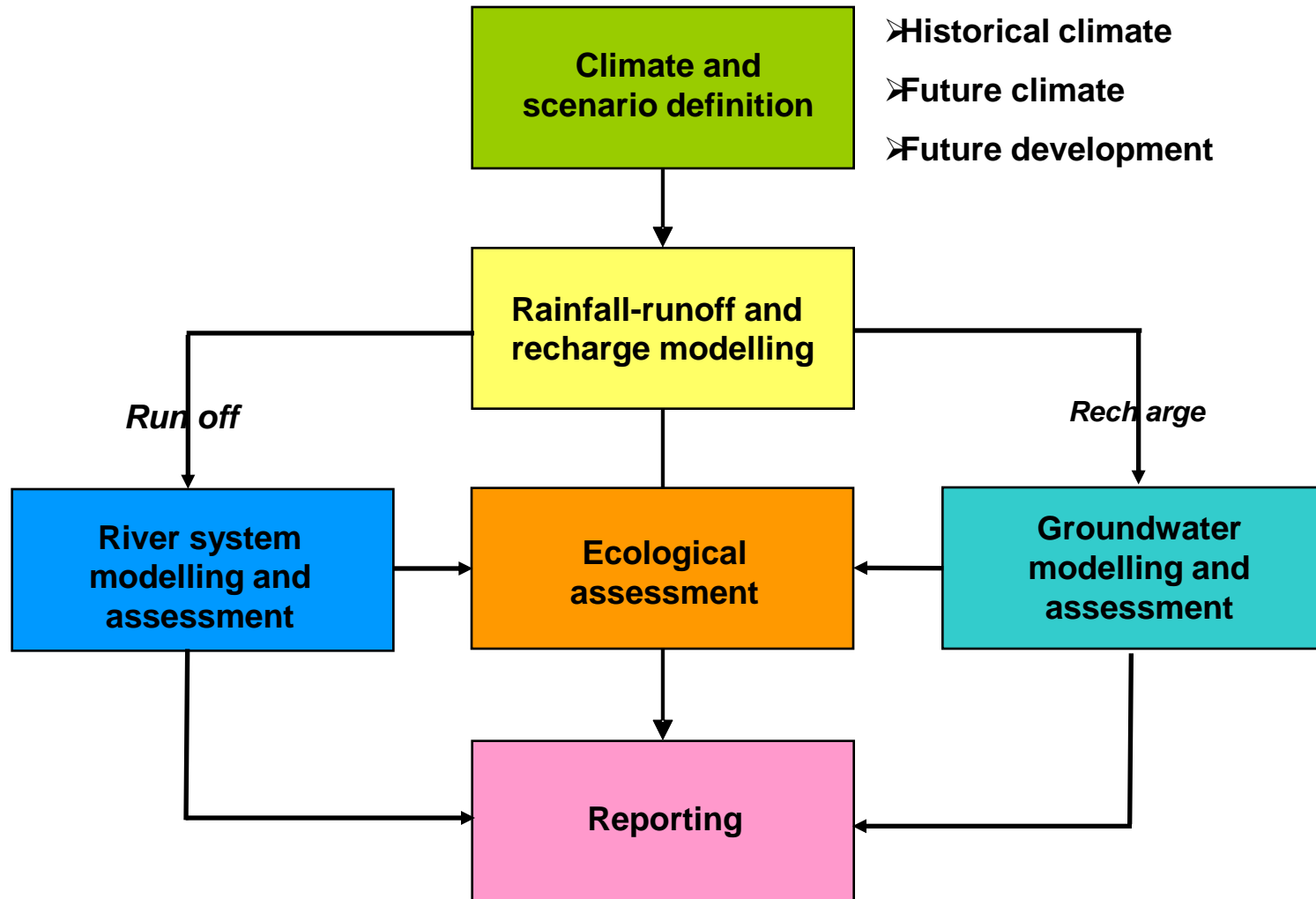
**Western Australia**  
0.08m km<sup>2</sup>  
\$5.2m  
February 2010

**Tasmania**  
0.05m km<sup>2</sup>  
\$4.2m  
February 2010

**Northern Australia**  
1.25m km<sup>2</sup>  
\$5.7m  
July 2009

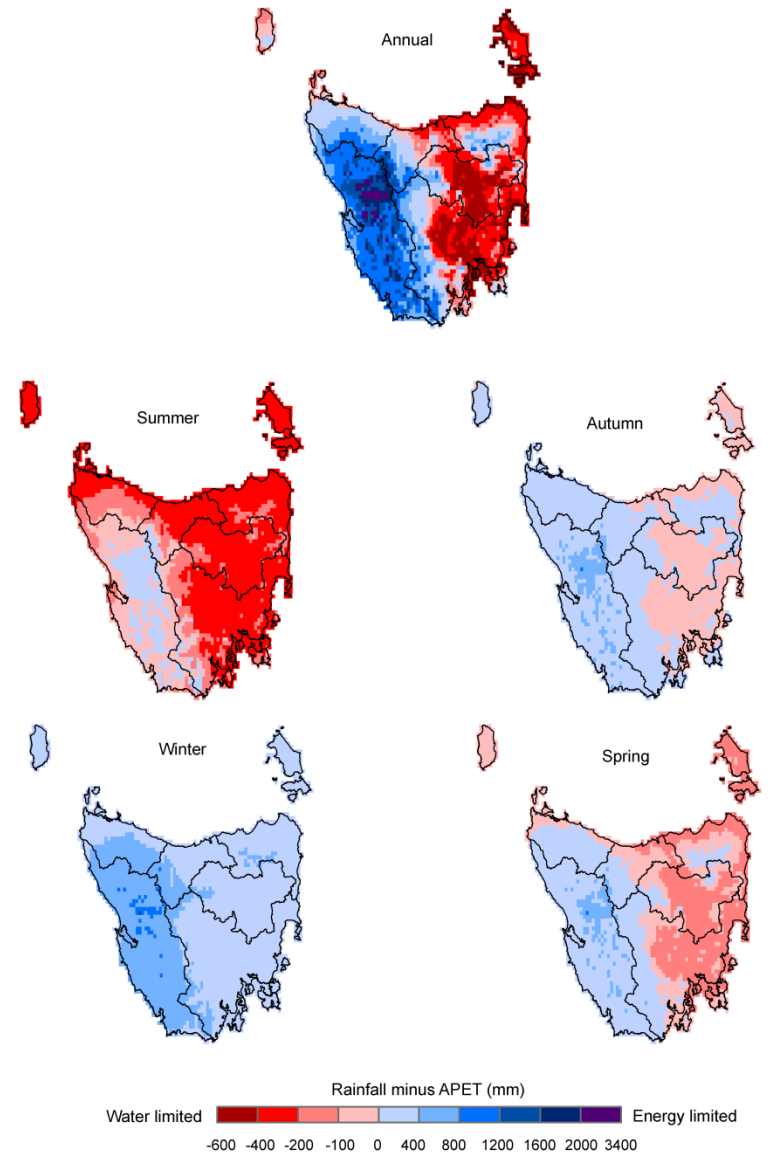
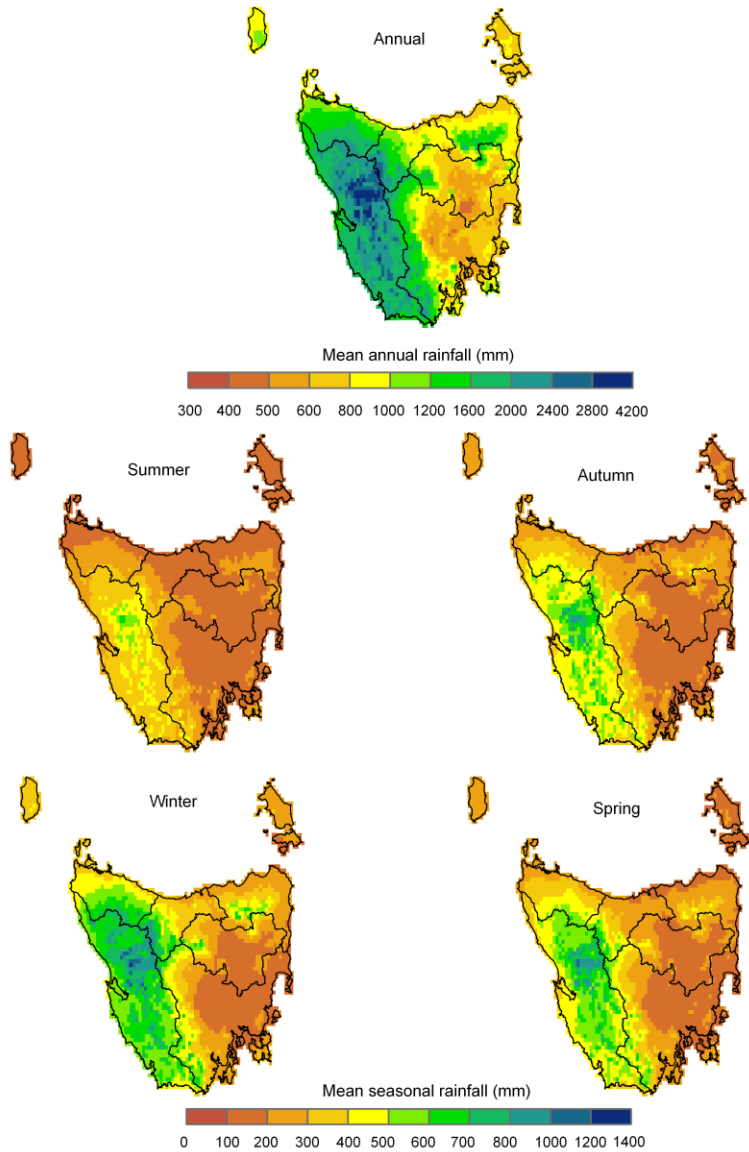
**Murray-Darling**  
1.01m km<sup>2</sup>  
\$11m  
October 2008

# Overview of project methods

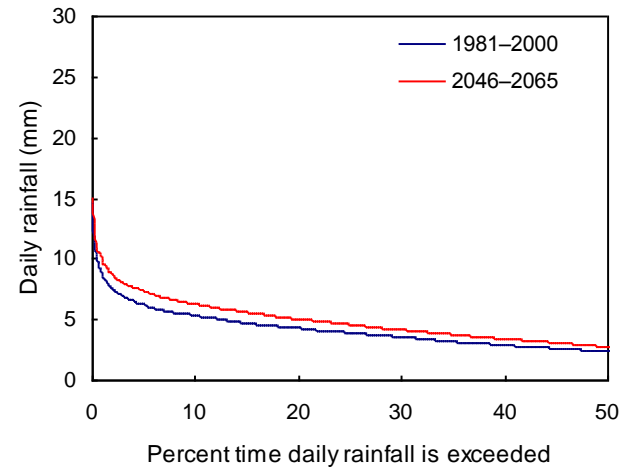
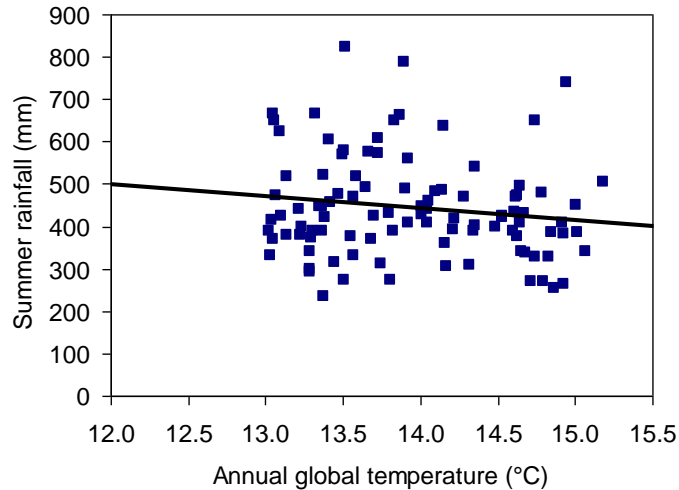




# Historical climate



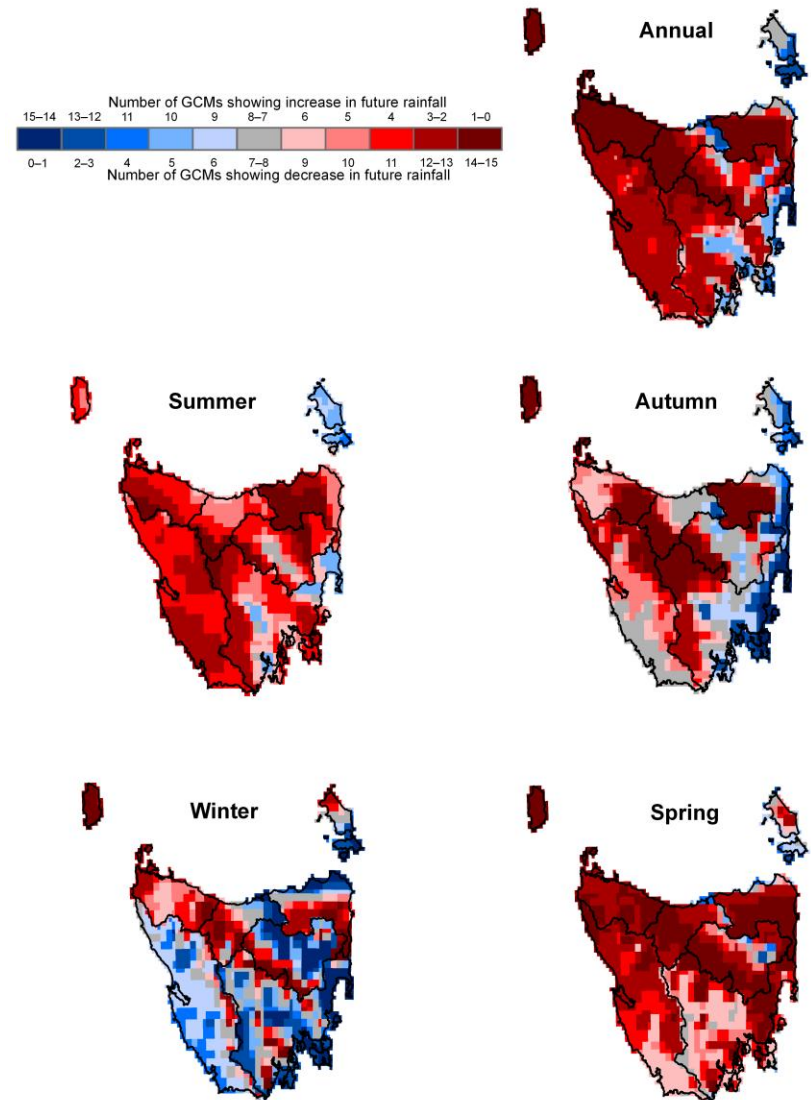
# Future climate



- Calculate change in seasonal rainfall per degree global warming for 15 of the 23 GCMs in IPCC AR4
- Scale daily rainfall amounts differently depending on their size

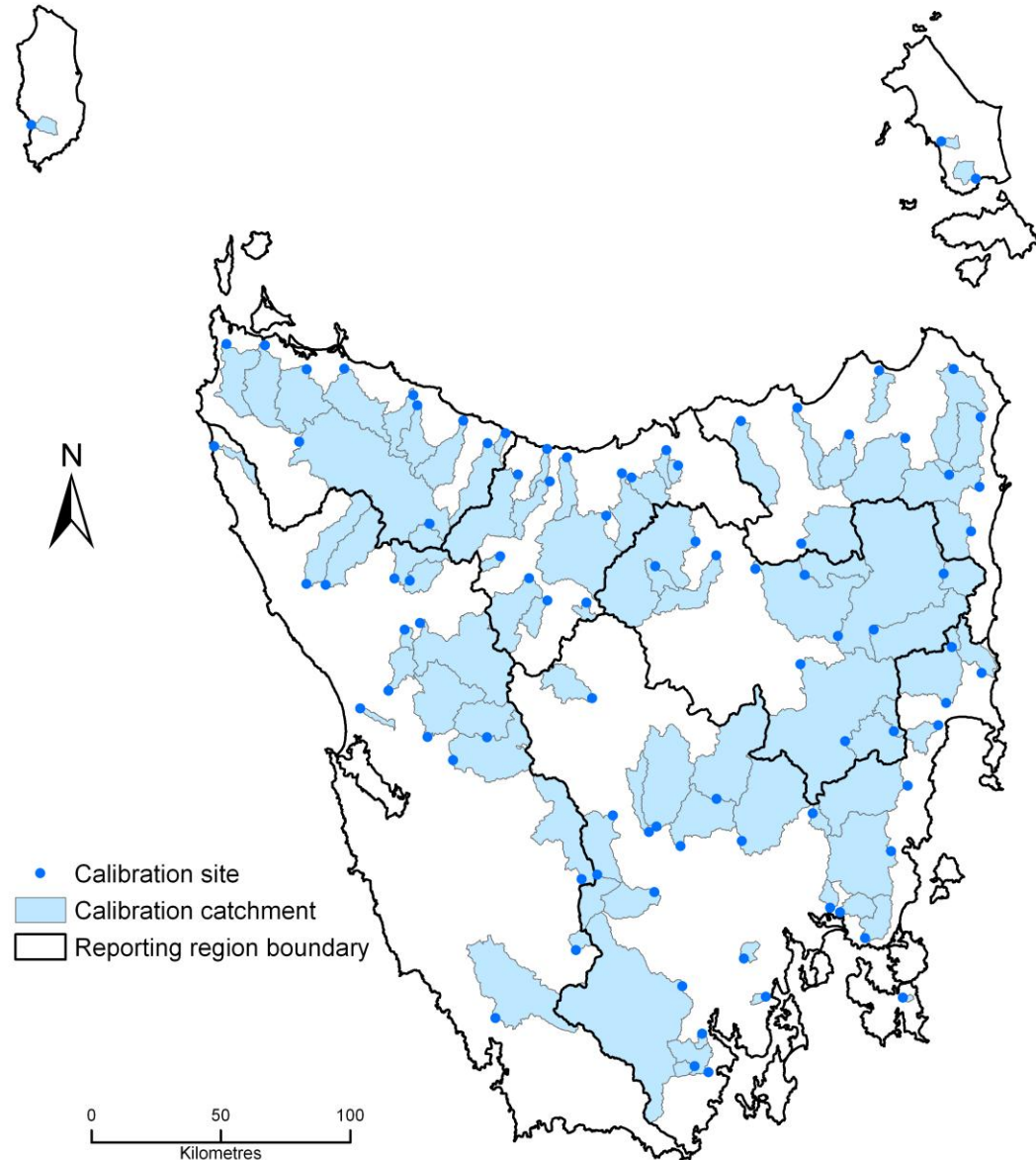
# Dynamic downscaling

- Use spatial patterns of projected changes from dynamically-downscaled CCAM model to scale GCM results.



# Rainfall-runoff modelling

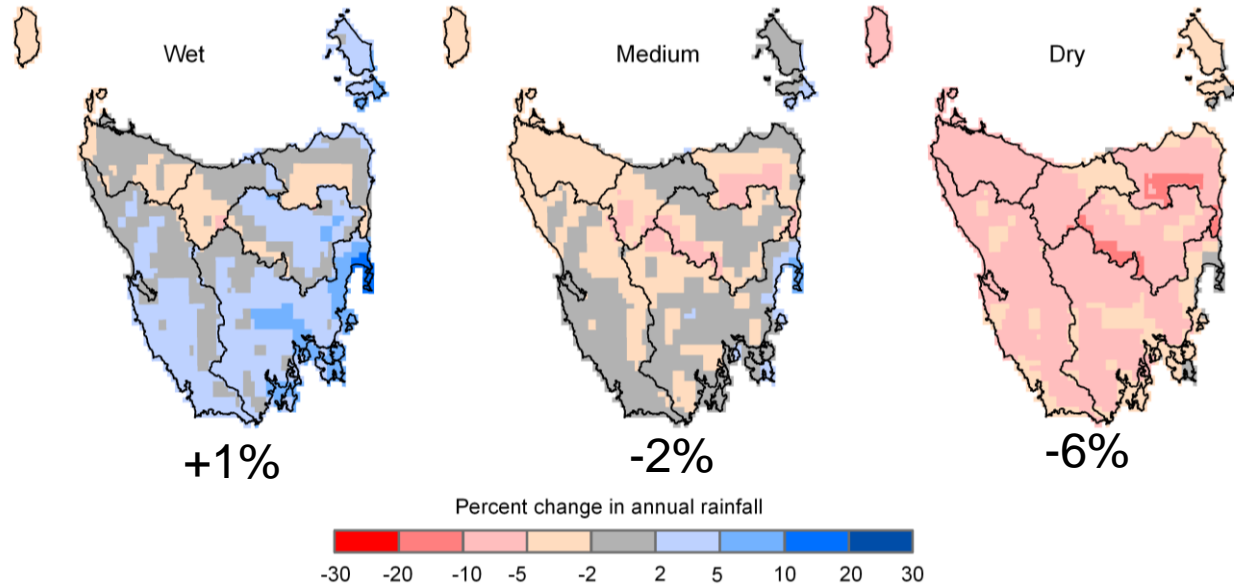
- Calibrate 5 models (SIMHYD, Sacramento, IHACRES, SMARG, AWBM) to 90 unregulated catchments
- Evaluate model performance through cross-validation using parameters from the nearest neighbour
- Choose optimal model and regionalise to ungauged areas.



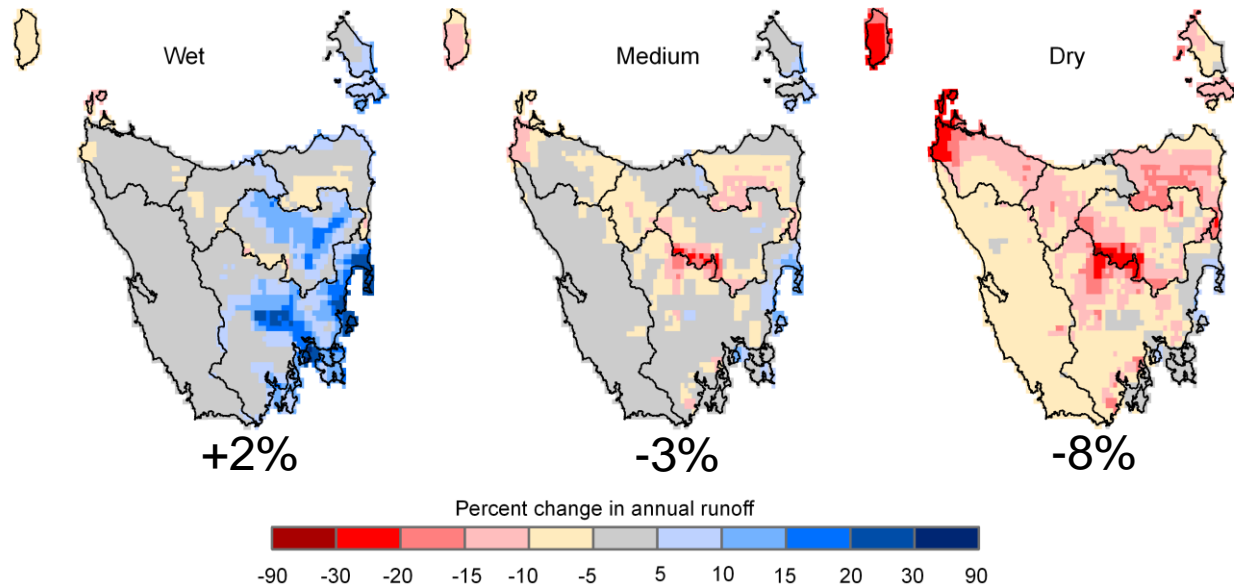


# Changes in rainfall and runoff by ~2030

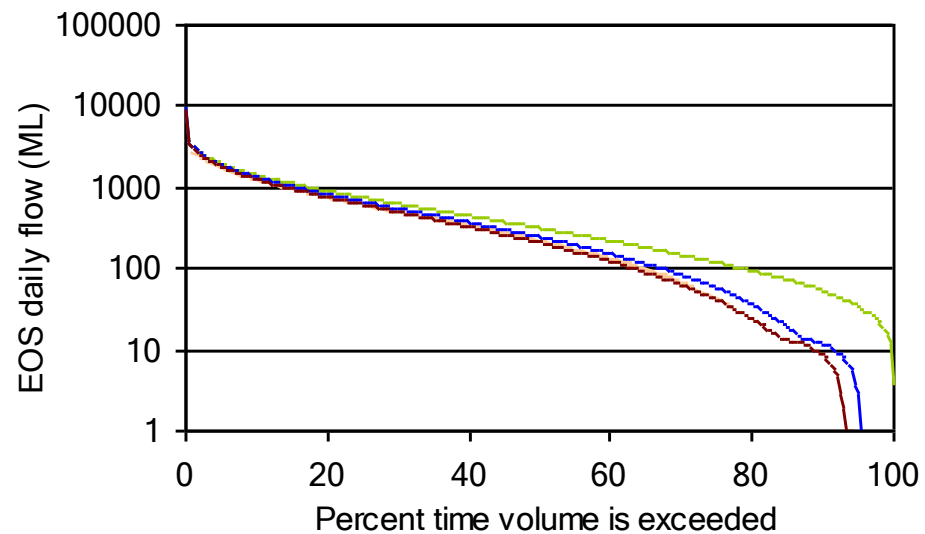
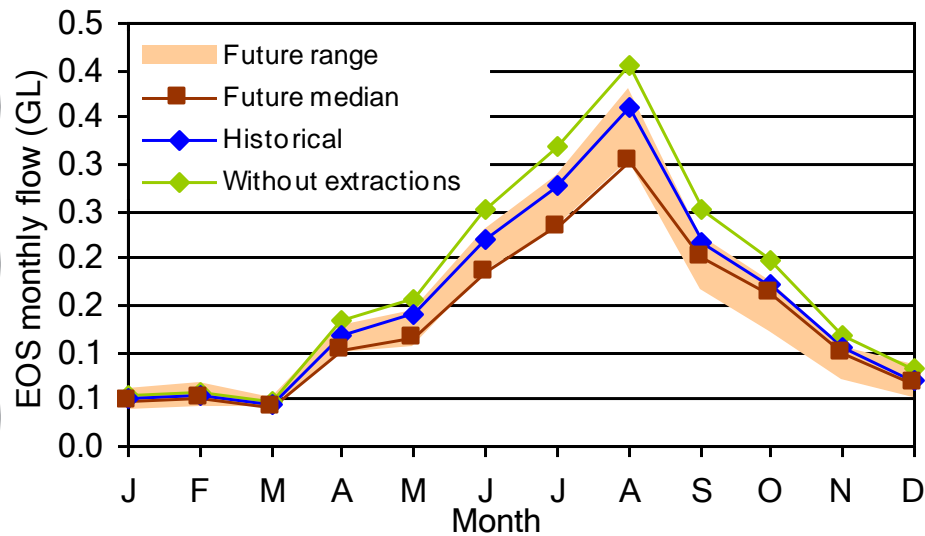
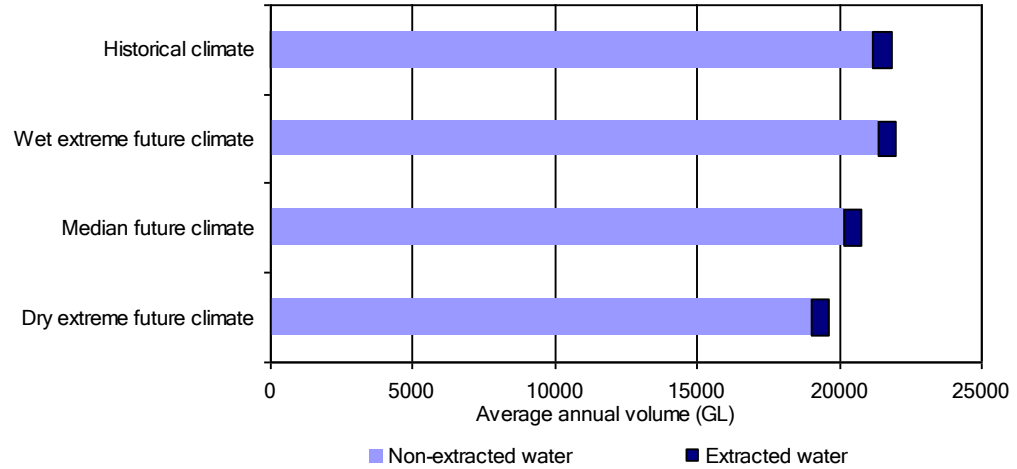
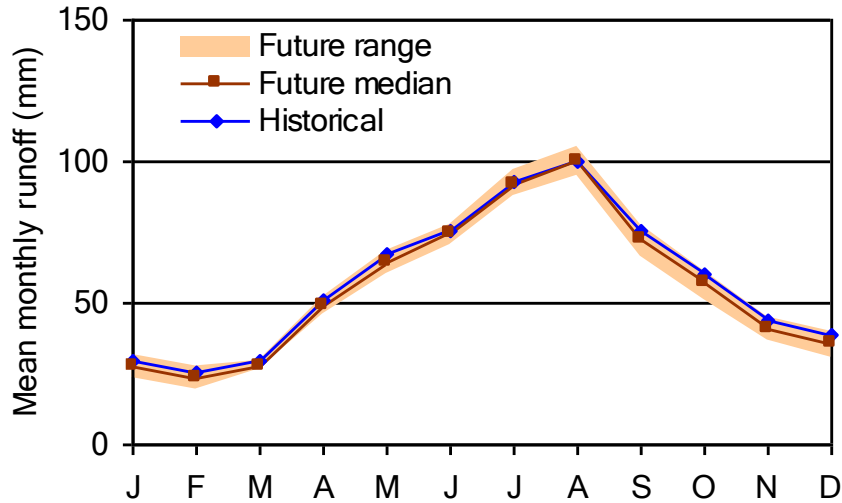
Rainfall



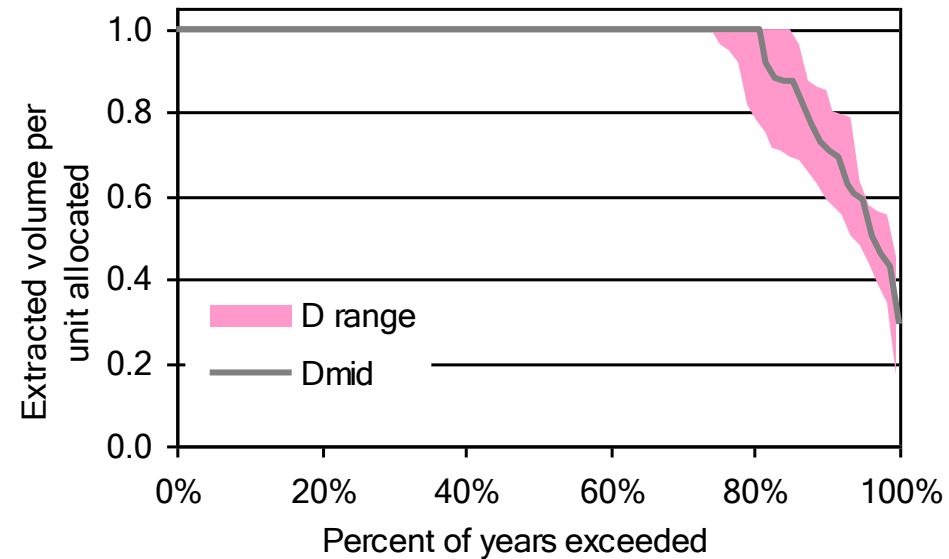
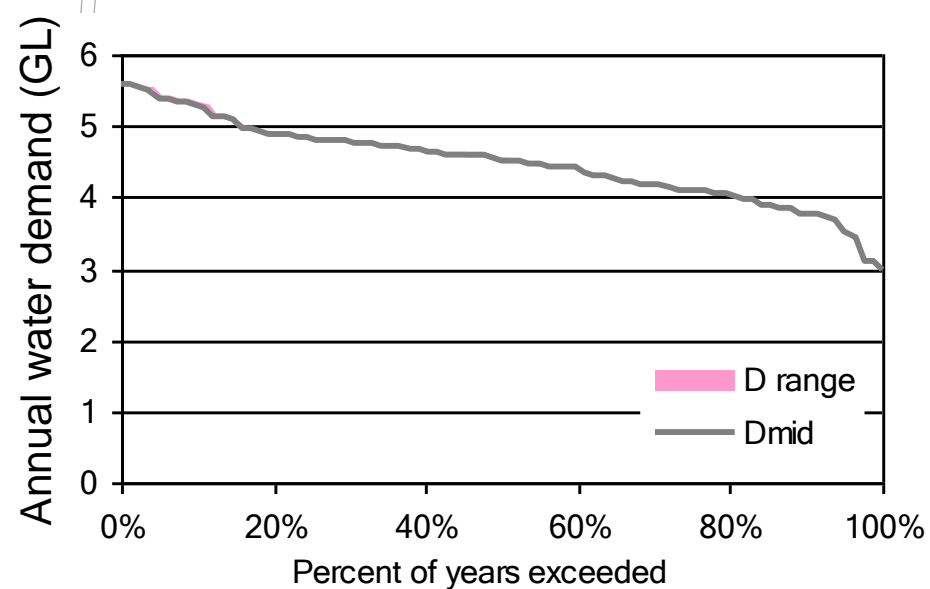
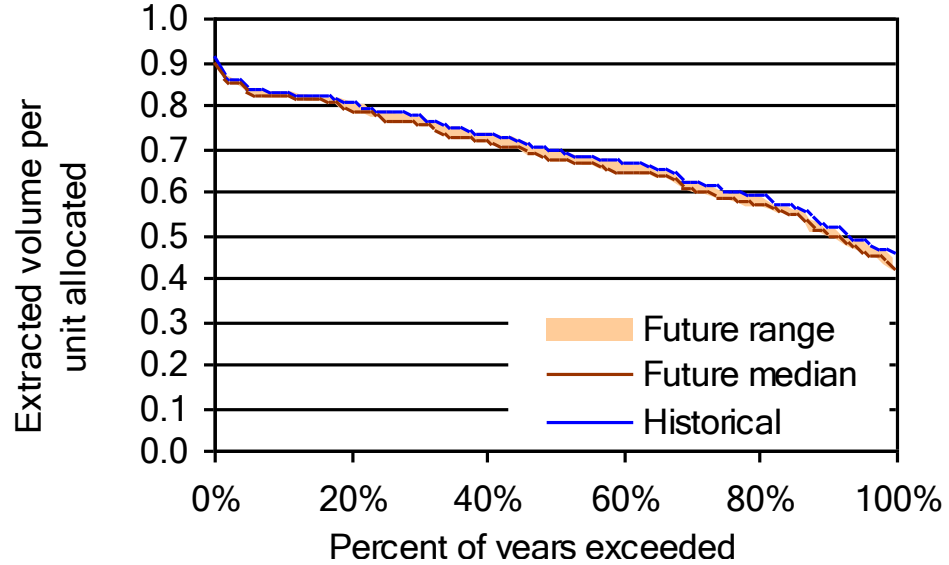
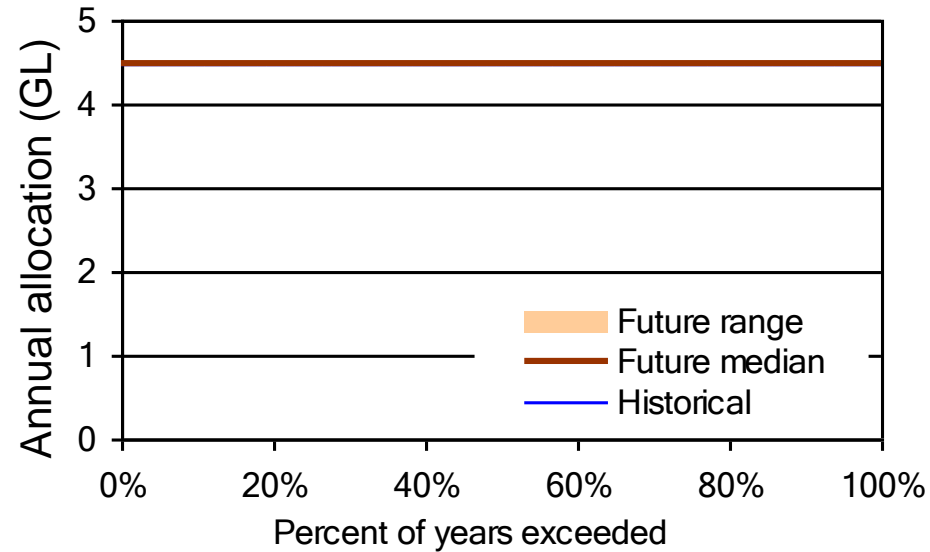
Runoff



# Reporting metrics



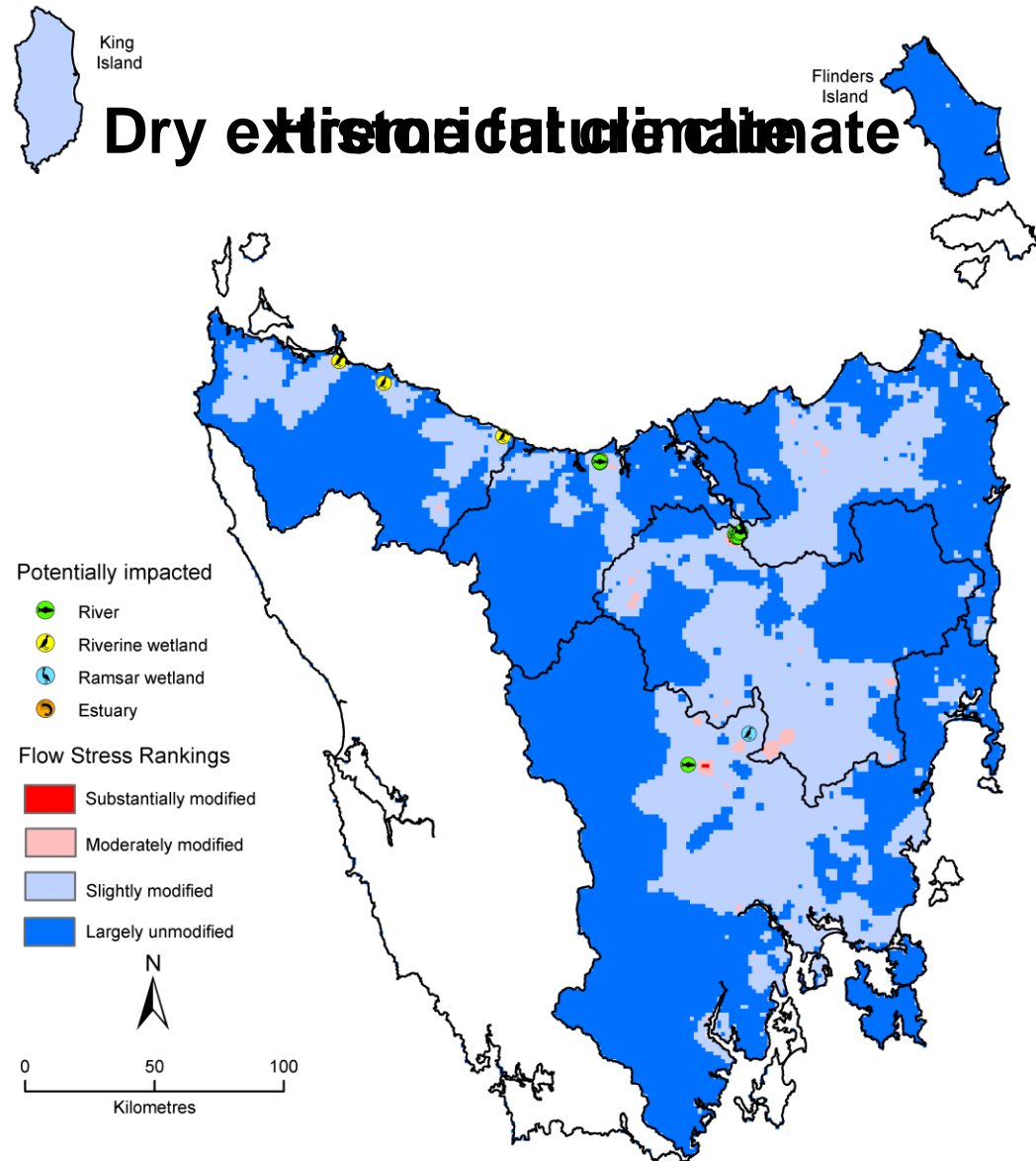
# Reporting metrics



# Ecological impacts

- 2% of subcatchments and 13 key ecological sites are potentially impacted:

- 80 river sections
- 4 riverine wetlands
- 2 Ramsar wetlands
- 0 estuaries



# Conclusions

- A method has been developed which allows estimates of current and future water availability to be made across very large regions.
- The method includes assessments of changes in water availability due to changes in climate, as well as impacts due to catchment development such as forestry, irrigation and groundwater extractions.
- The method produces a wide range of reporting metrics, including:
  - Spatial patterns of changes in rainfall and runoff
  - Current and future water availability and use at catchment scale
  - Reliability of proposed future irrigation development schemes
  - Impacts of climate change and catchment development on streamflows
  - Ecological impacts of projected changes in streamflows.