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# The impact of climate change on Canberra



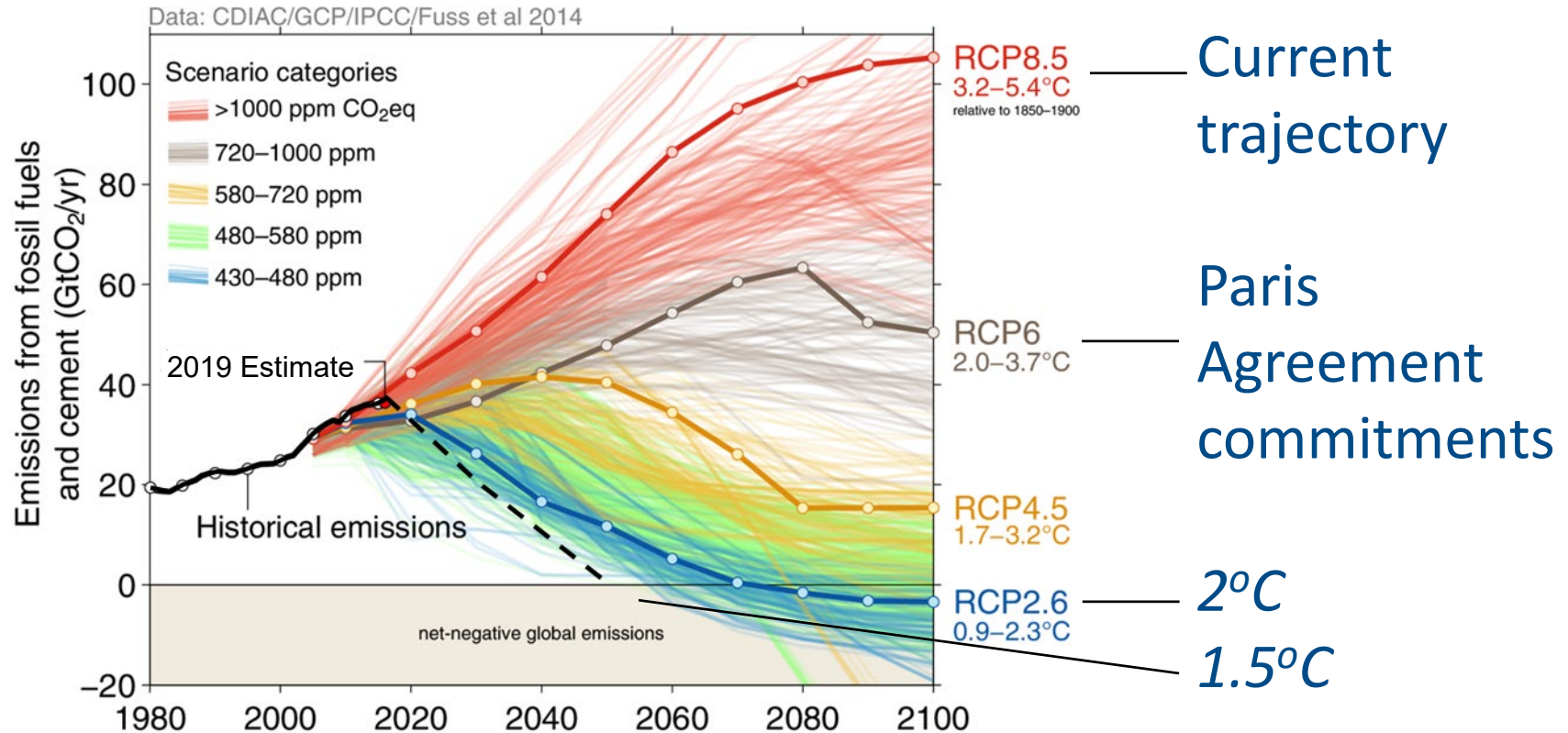
Professor Mark Howden

ANU Climate Change Institute

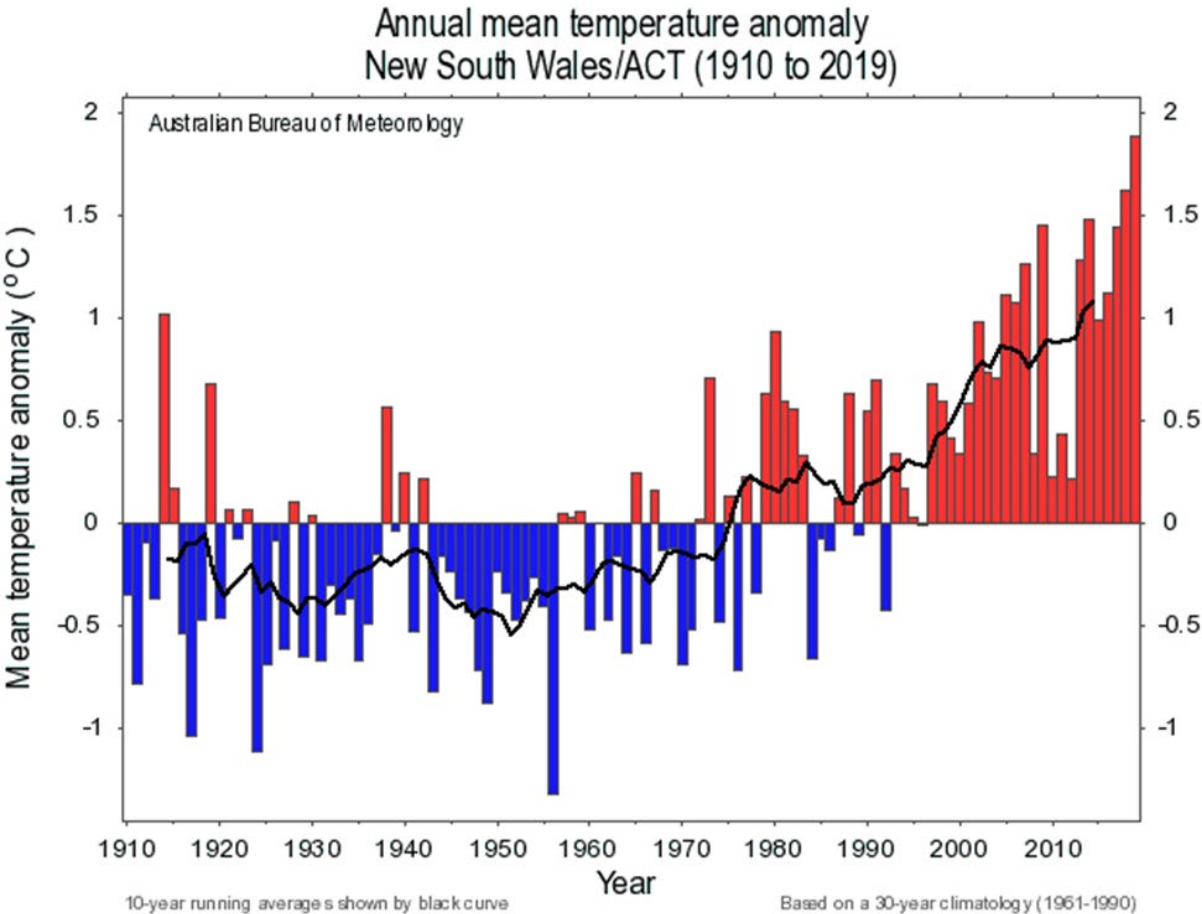
Vice Chair, IPCC Working Group II

[@ProfMarkHowden](https://twitter.com/ProfMarkHowden)

# GHG emissions and temperatures



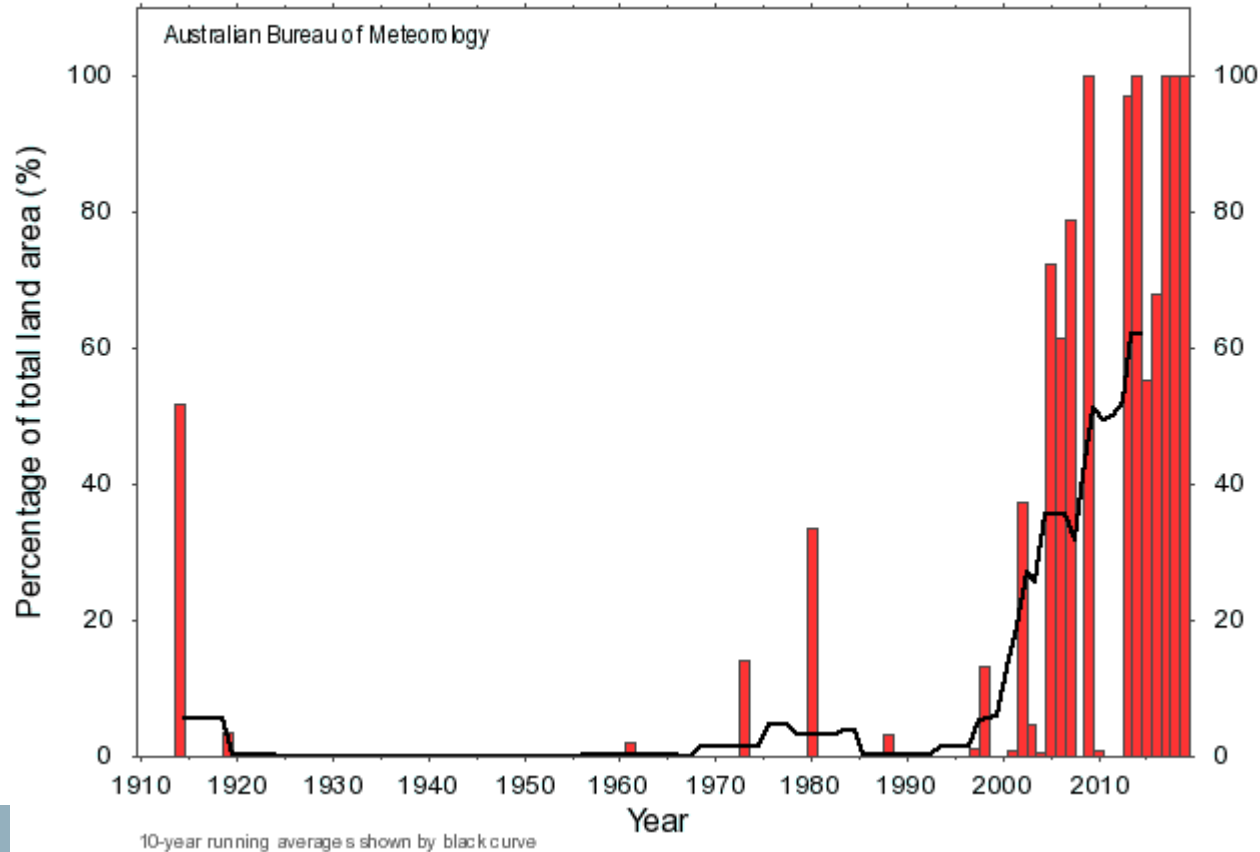
# Our region is warming quickly



- Hottest year ( $+1.89^{\circ}\text{C}$ ) especially daytime temperatures ( $2.43^{\circ}\text{C}$  above)
- Hottest summer
- Heatwaves in several months
- Hottest day record beaten on two successive days:  $40.9^{\circ}\text{C}$  and then  $41.9^{\circ}\text{C}$

# Extremes almost everywhere, all the time

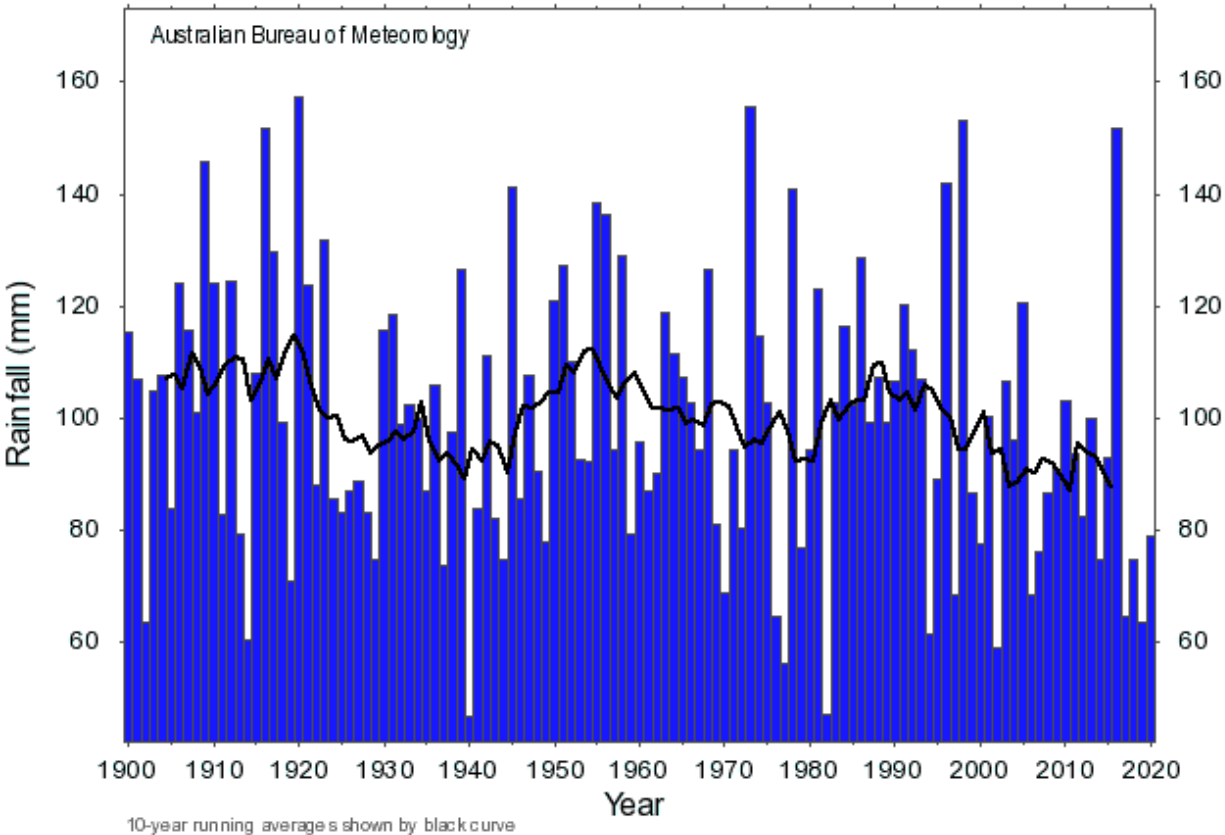
Annual mean temperature percentage area in decile 10  
New South Wales/ACT (1910 to 2019)





# Drying trends, droughts and fires

Winter rainfall  
Southern Australia (1900 to 2020)

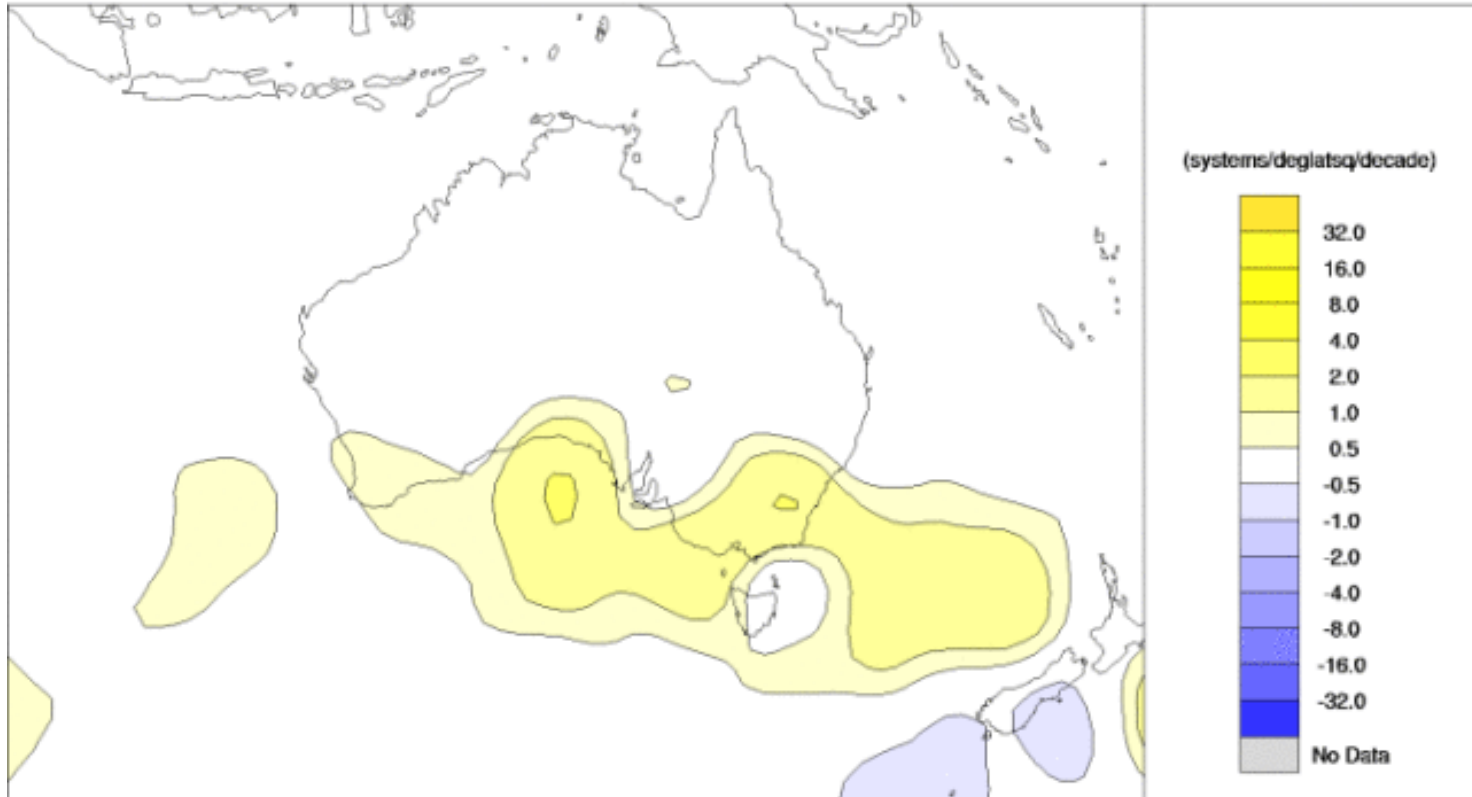


- Increased propensity for droughts and decreases in river flows
- Fire season has extended, and intensity, frequency and burnt area have increased
- Control burning opportunities reduced



# Change in pressure systems: Australia

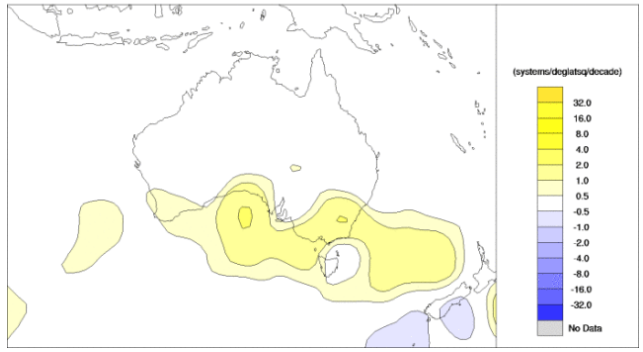
Trend in Annual Anti-Cyclone Density 1970-2019



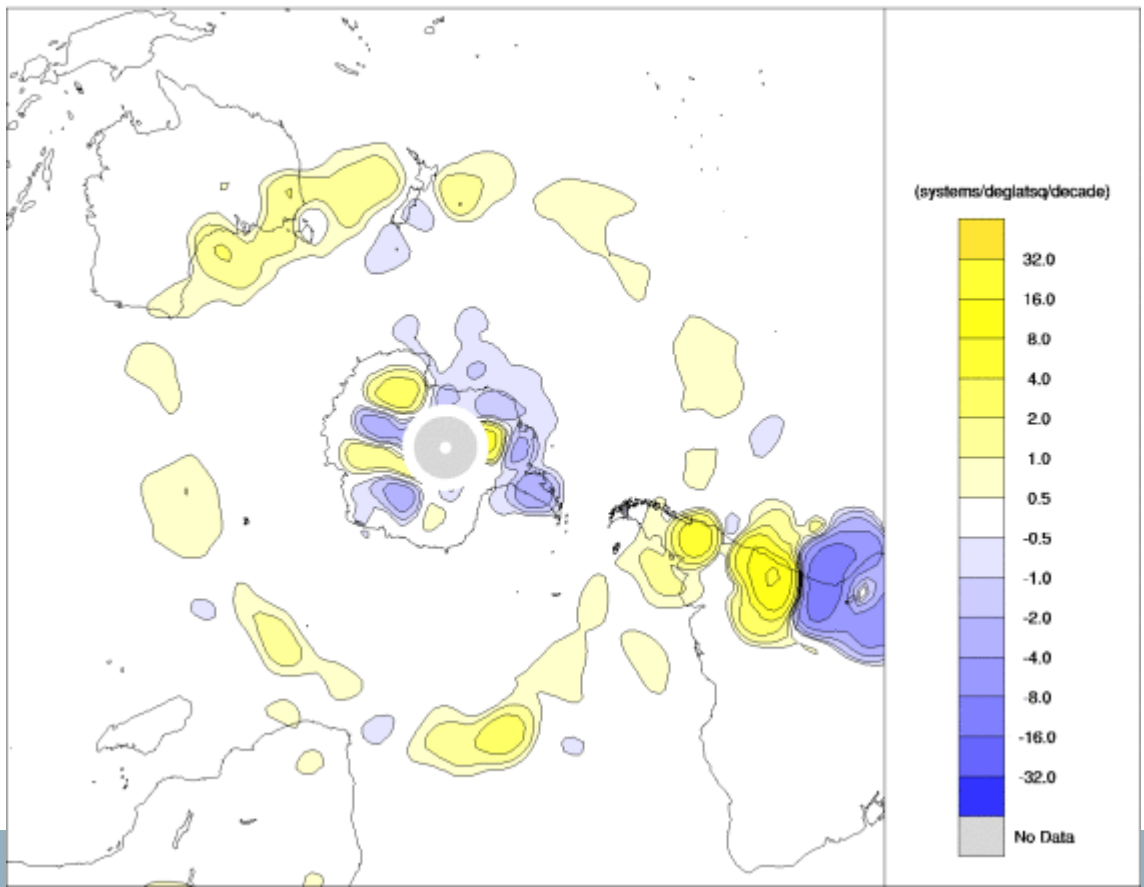


# Change in pressure systems: Sthn Hemisphere

Trend in Annual Anti-Cyclone Density 1970-2019

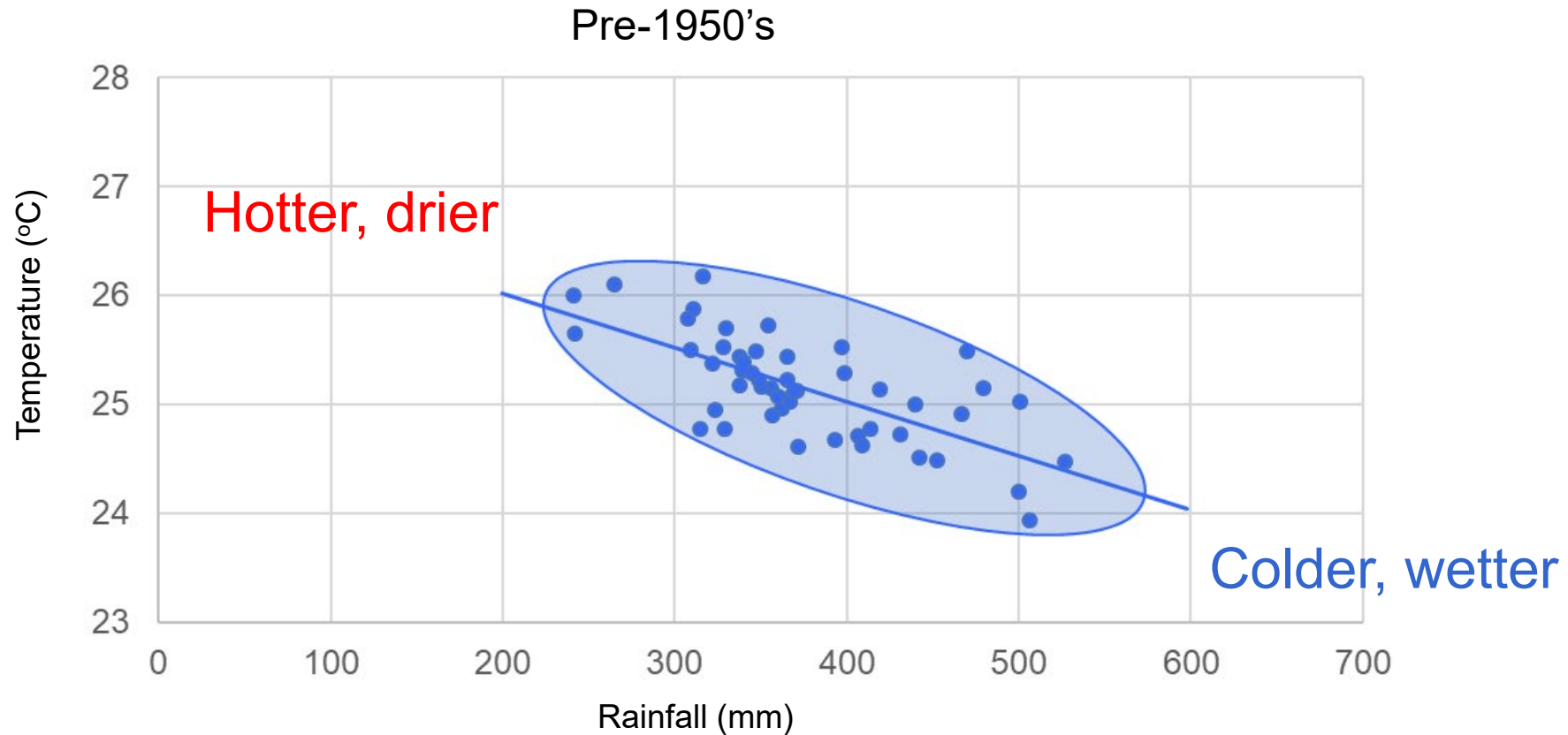


Trend in Annual Anti-Cyclone Density 1970-2019





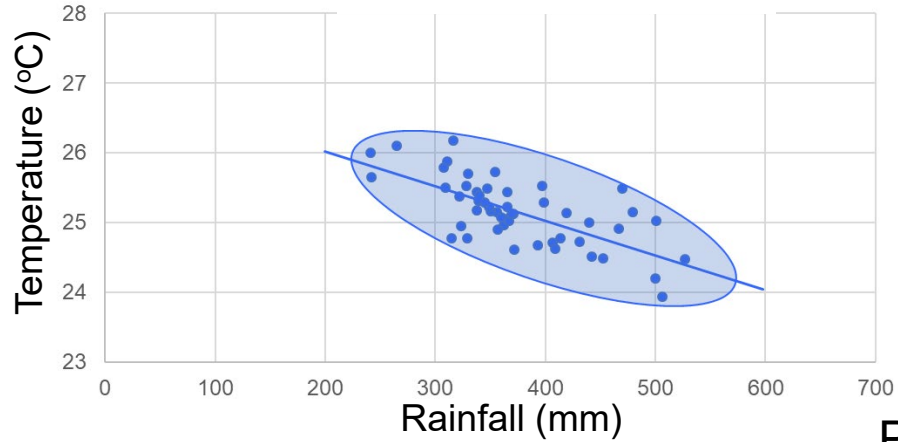
# The rainfall-temperature operating envelope



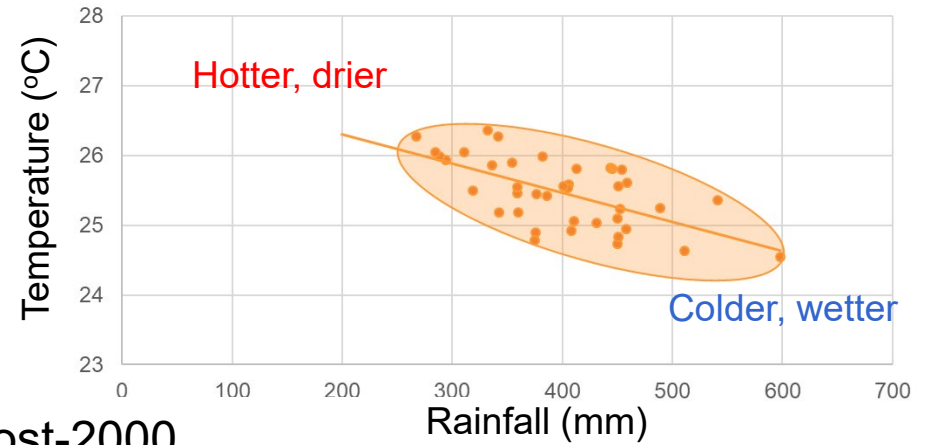


# Rainfall-temperature operating envelopes

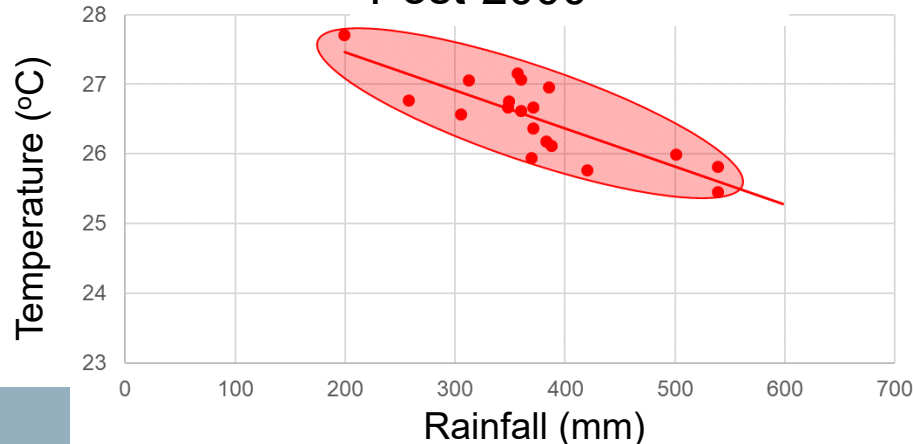
Pre-1950's



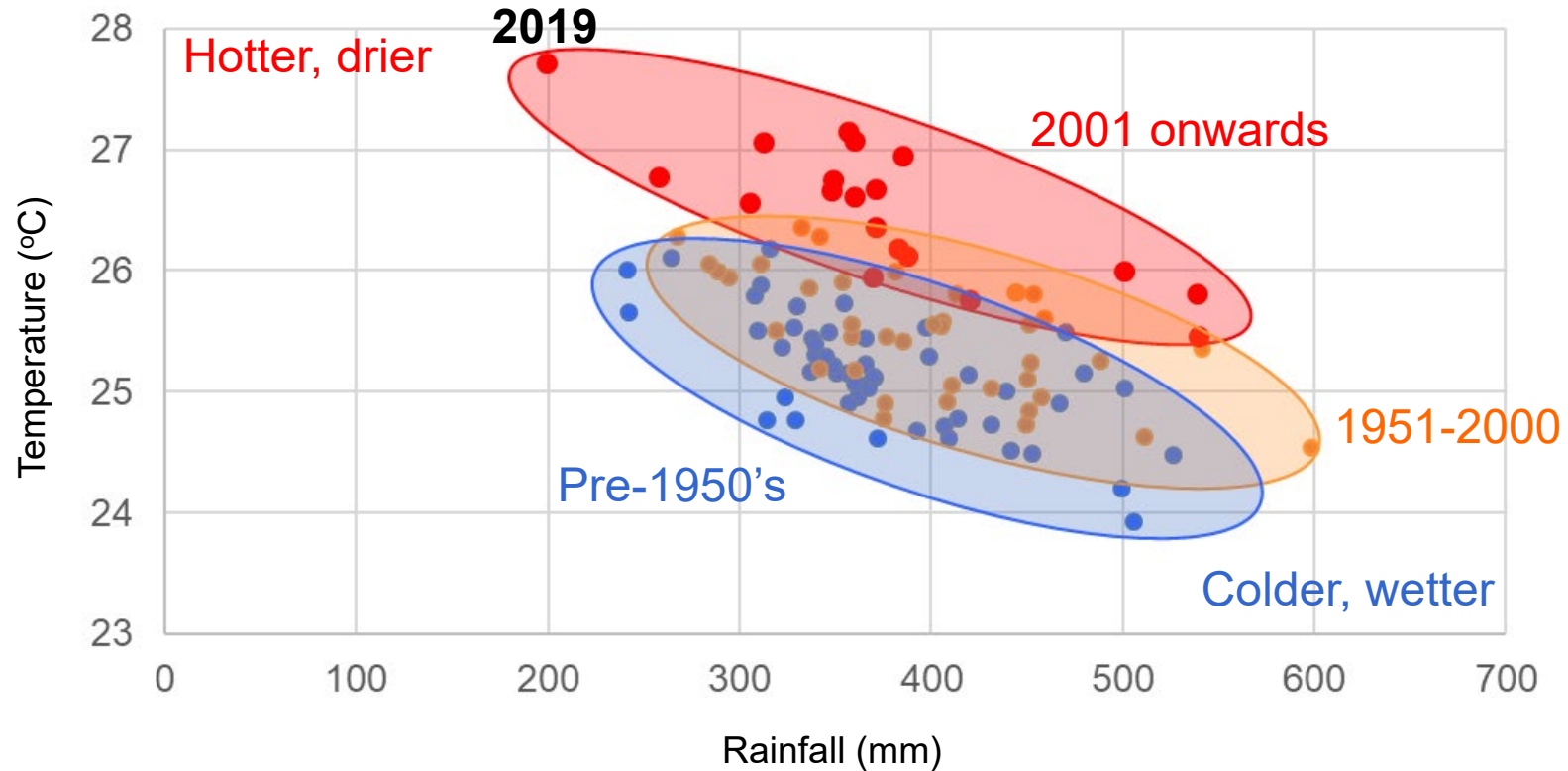
1951-2000



Post-2000



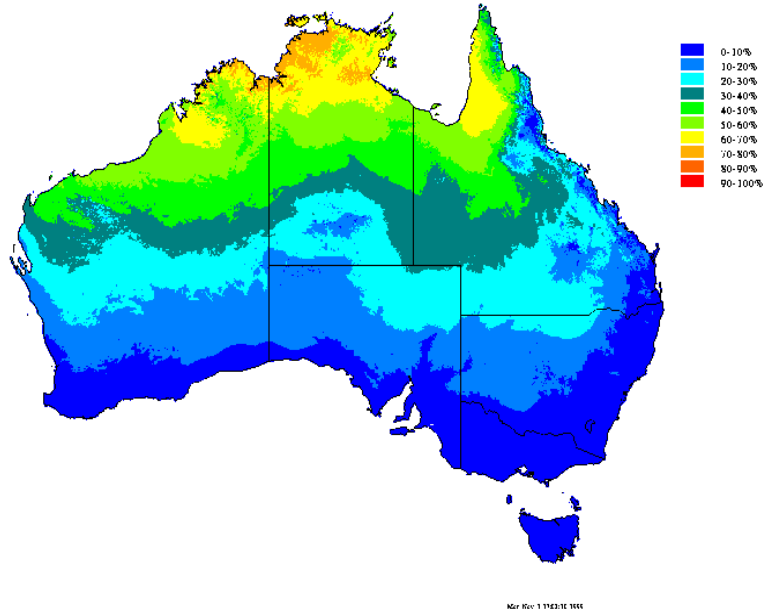
# A changed operating environment



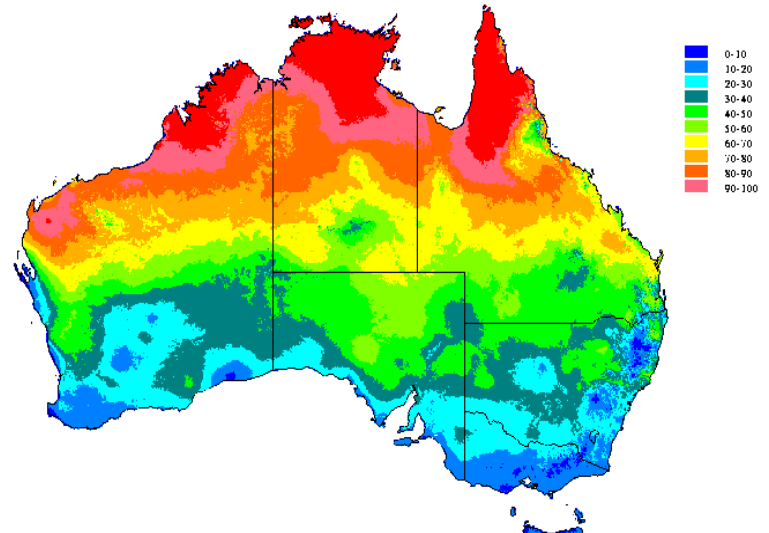


# Changes in heat stress frequency

## Historical heat stress



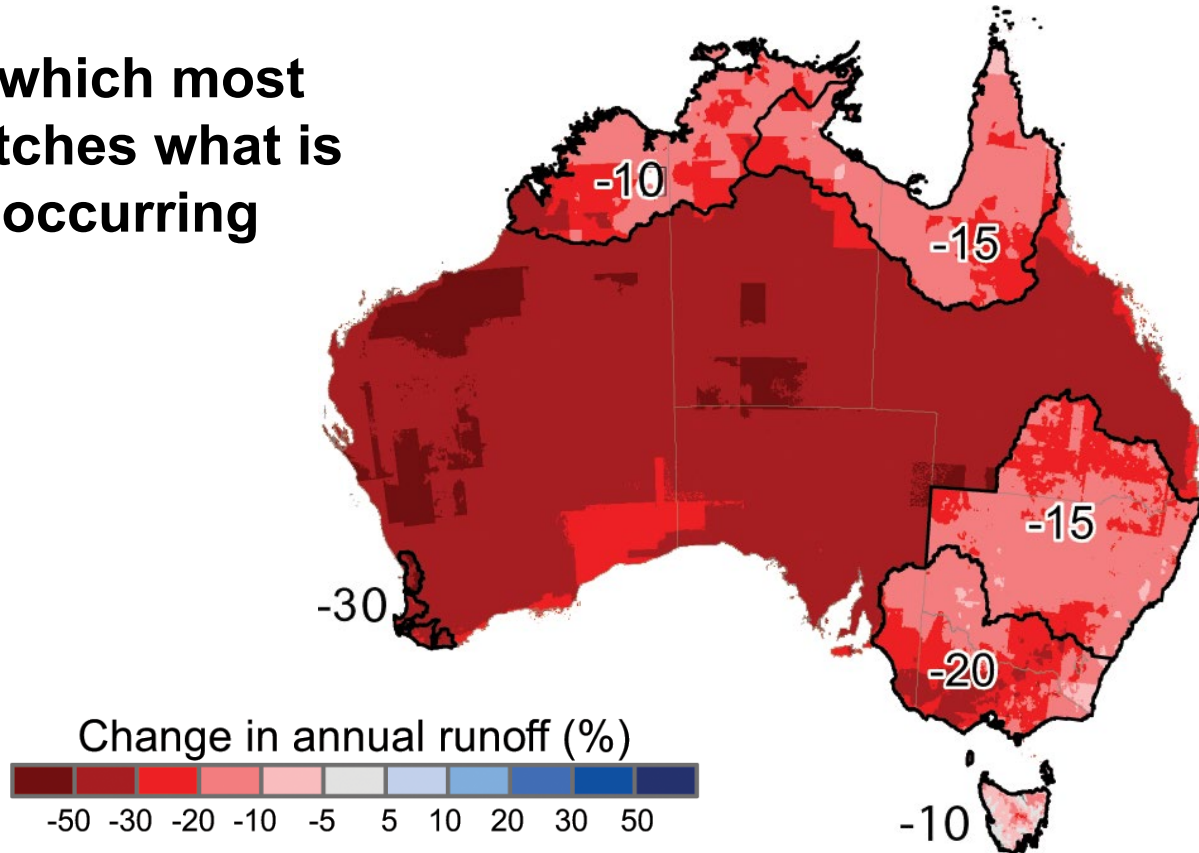
## Heat stress 2.7°C warmer





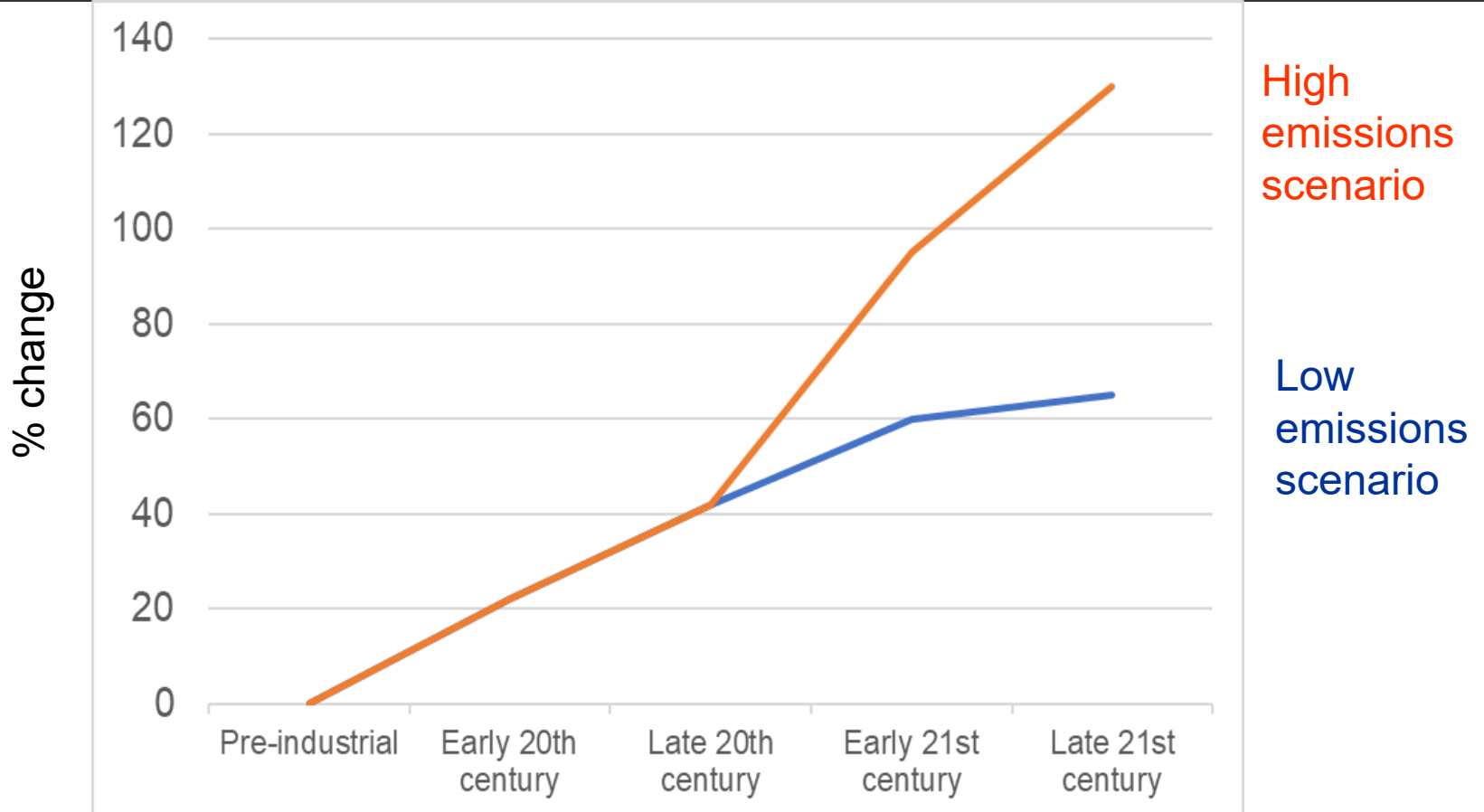
# Run-off change per °C warming

**Scenario which most closely matches what is already occurring**





# ENSO-related disruptions increasing

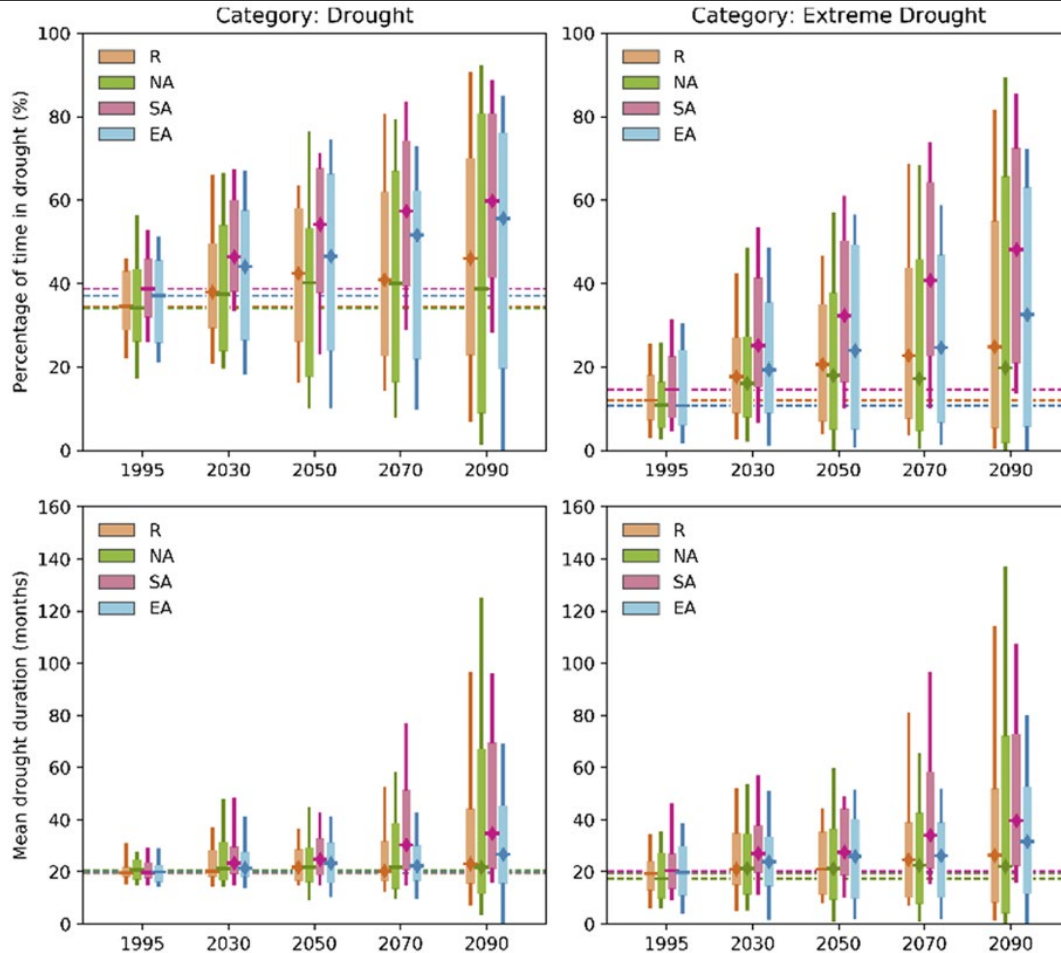


High emissions scenario

Low emissions scenario



# Drought projections: Australia



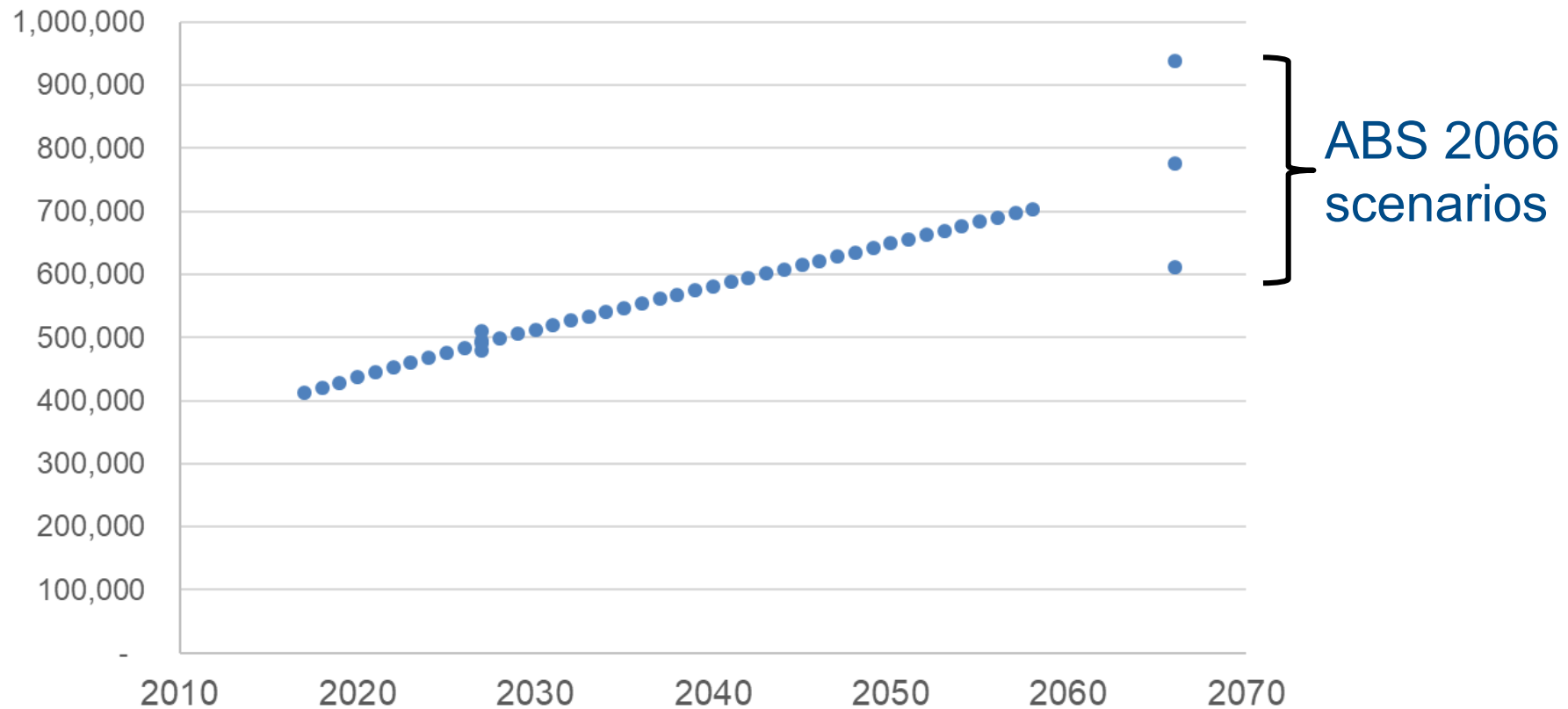
More frequent,  
longer and more  
extreme droughts

- ACT Climate Change Strategy is a great start
- Leadership through both what we are doing here and helping other jurisdictions to follow their own, unique path to climate change sustainability
- Pathway to reduced GHG emissions - urgency
- Adaptation strategies (built environment, health, biodiversity, transport, food, water, fire etc)
- Synergies from both adaptation and mitigation including developing the ACT as an R&D leader

- Living Infrastructure Plan
- Green and liveable city
  - provides shade and space for outdoor recreation
  - encourages active transport
  - retains water in the landscape
  - supports wildlife and biodiversity
- BUT green infrastructure requires water
- More water will be needed under climate change for the same level of ‘service’



# Population projections: ACT



- More water we use, the less for downstream users in the MDB

- Canberra's climate is already changing
- More change is likely and the impacts substantial
- Leadership in reducing emissions is important
- Climate adaptation will be needed across almost every aspect of our lives and of the city
- We know how to implement some of these adaptations but not all – systems view
- Learning together and working together will be critical



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## *Thankyou*

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