

# Applying Climate Change Projections to Water Management Questions

The Harding Dam Case Study

Think climate change.  
Be waterwise.



# Who we are and where we're going



Our water services span 2.6 million square kilometres



Over the last year we supplied 388 billion litres of water



We manage \$38 billion (replacement value) of assets



We service a wide customer base, with 1,167,415 properties connected to water

**Our purpose** is to manage water service sustainably to make WA a great place to live and invest.

**Our vision** is for our people, our communities and our state to thrive.

## Six goals to drive us forward



Environmentally sustainable as climate changes



Safe for all



Efficient



Supporting state development



Satisfied customers



Great place to work

Think climate change.  
Be waterwise.



# Where we are now

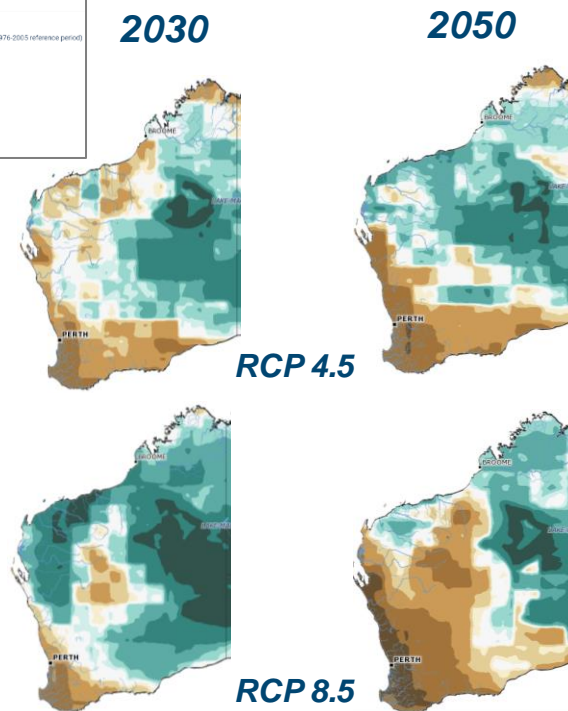
- We're particularly exposed to the physical and financial risks of climate change.
- We've proactively addressed climate change risks to our water resources for many years.

**but...**

- Climate change will continue to exacerbate existing, and create new, systemic risks.

**and...**

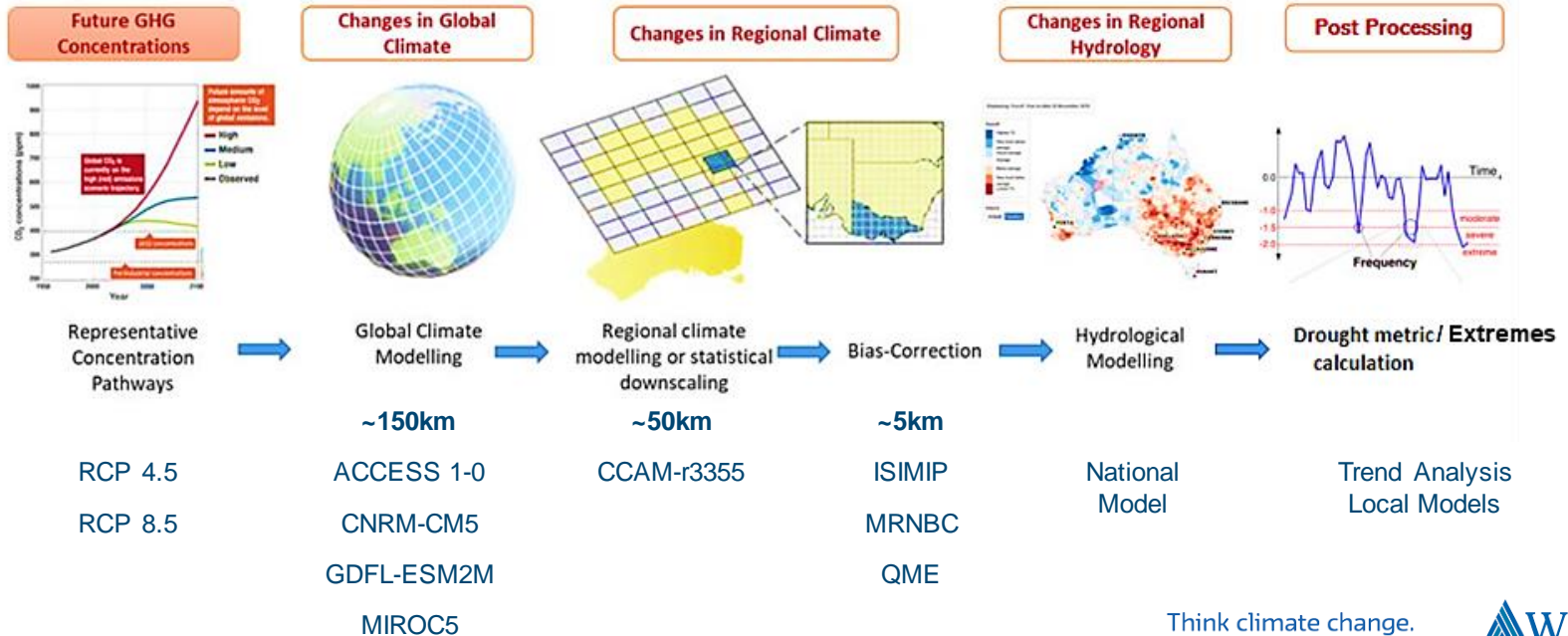
- Previous, increasingly outdated, regulatory guidance has led to methods for assessing risk being inconsistently applied across the state.



# National Hydrological Projections (NHP)



## From Global to Local Scales

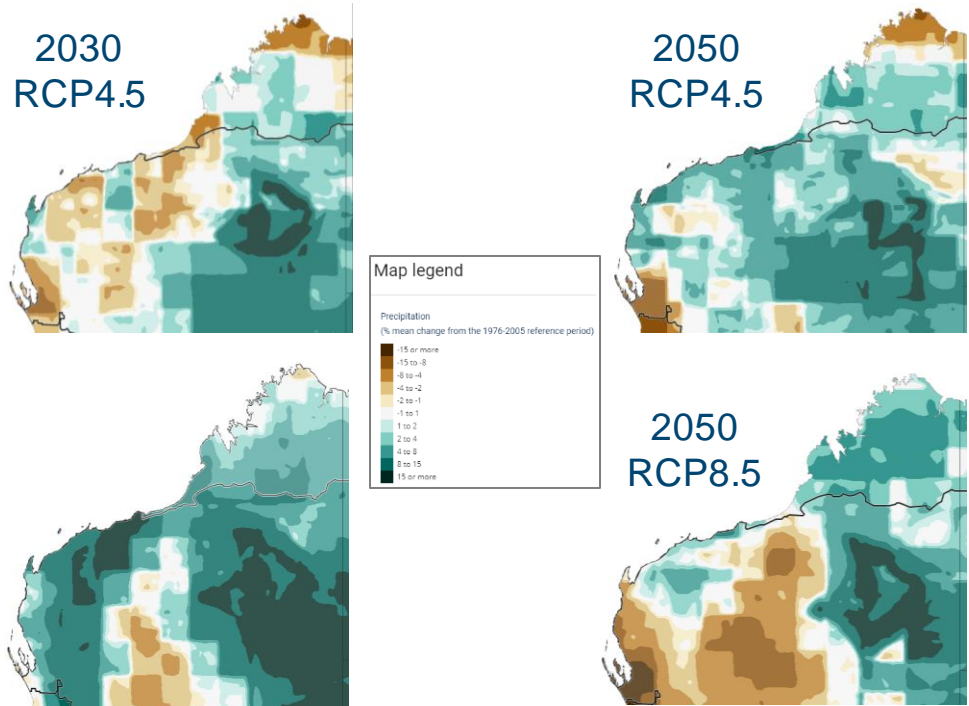


# Guidance on the Projections

AWO Website (released May 2022)

Reports:

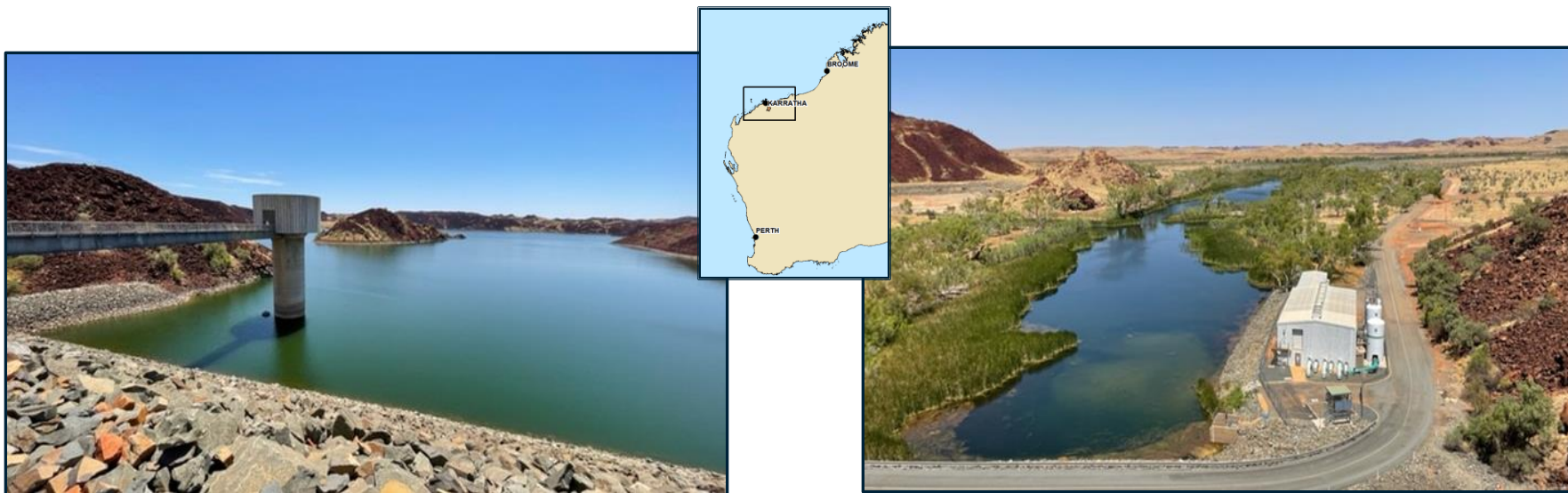
- Technical report (the Bureau).
- NRM Region Cluster reports (the Bureau).
- Consistency assessment (the Bureau)
- Guidance document (DWER).
- Case studies
  - South West of WA (DWER)
  - **North West of WA (WC)**





# Harding Dam

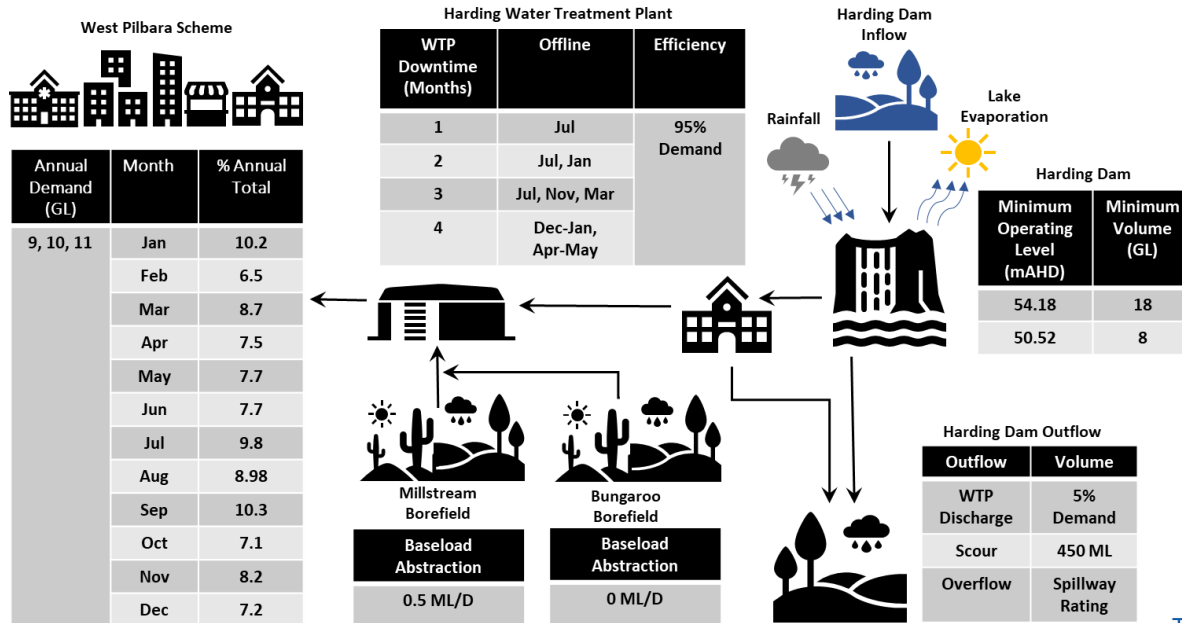
- One of three sources West Pilbara Water Supply Scheme
- Commissioned in 1985 » Primary Source » Reliable for ~ 2 years



# Harding Dam yield reliability



eWater Source, Rainfall Runoff model feeding into Scheme Water Balance Model.



3 Town demand profiles.

x 2 Minimum Volume Scenarios

x 4 WTP reliability scenarios

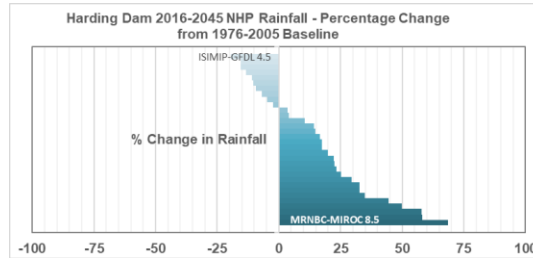
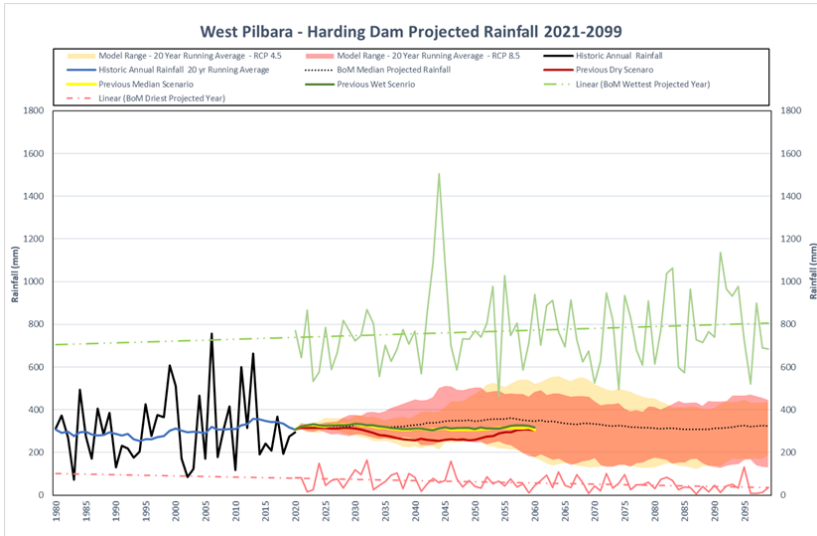
x 32 climate projections (daily out to 2099)

**768 model runs (59,904 years)**

# Rainfall Trends

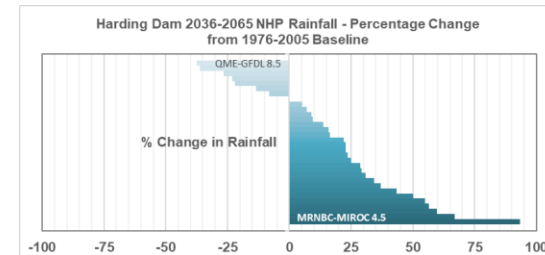


For Harding Dam the NHP projections represent a broader range of potential Climate risk including significant rainfall extremes and minimums not previously observed.



*Majority (21/32) indicate a potential increase in average annual rainfall*

*But a plausible extreme drying may not be captured in current dataset*

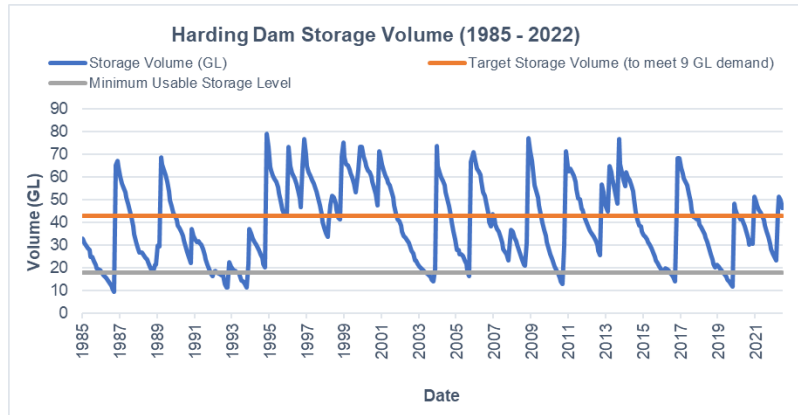




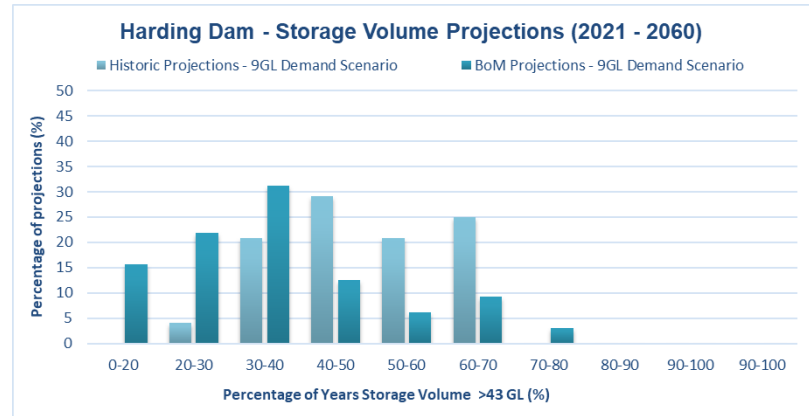
# Reliability Trends



Climate projections indicated possible decline in dam's capacity to supply water (increasing range of possible behaviours)



Historically – 60% reliability.



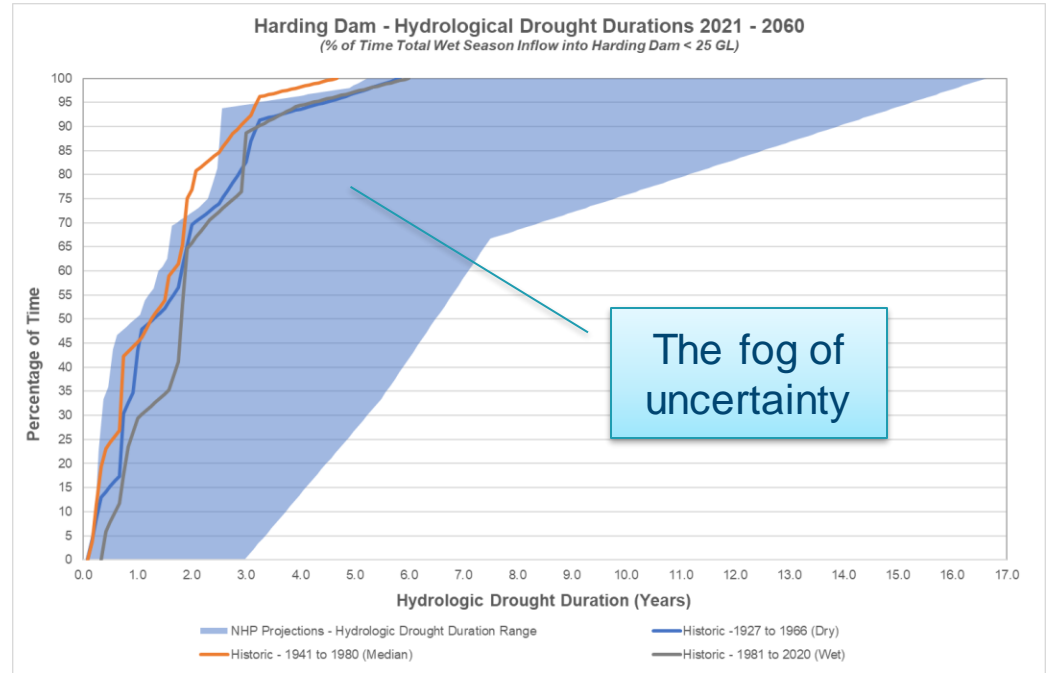
Previous Studies - 30 to 70% reliability  
 NHP Projections - 0 to 80% reliability

# Why?

Majority of projections indicate potential for increases in hydrological droughts.

Historic drought durations have been between 1 - 5 years (80% < 3 years),

By 2060, conservative projections flagged the potential for everything from a continuation of current trends to durations between 3 -17 years (80% < 12 years).



# Key Learnings



**Modelling 32 plausible futures x 24 potential operation regimes is challenging.**

» *Significant commitment (time and cost)*

**Communicating the (768 sets/59,904 years of) results and associated confidence is extremely challenging.**

» *Information overload* »» *Increased uncertainty (the fog)*

»»» *Reduced confidence in outcomes*

**Before you start ensure you understand**

» *System and its history (vulnerability, and sensitivity)*

»» *Risk being assessed*

»»» *The critical climate metrics*

# And...



## Early application of the storylines approach could have been beneficial in refining the context and extent of the study

Descriptive ‘storylines’ of plausible future climates to explore the possibility and likely outcome for a particular risk<sup>1</sup>

Includes consideration of past events (e.g., **droughts**) as an indicator of what might occur and the potential consequence.

Helps to create understanding about the possible impacts by relating them to episodic memory.

Not “What will happen?” but rather “**What is the potential impact of particular influences or actions?**”<sup>1</sup>