



F!REWARNED

IS

F✓REARMED

Forecasting tools for informed decision making

Making better tactical
decisions using the
climate forecast tools



Australian Government
Department of Agriculture,
Fisheries and Forestry



nd



SOUTHERN NSW
Innovation Hub
SUSTAINABLE AGRICULTURE,
LANDSCAPES AND COMMUNITIES

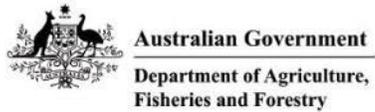
Welcome

- Purpose:
 - To assist Australian farmers to better understand forecasting of extreme weather and climate events
 - How to use the FWFA tools to make better tactical decisions
- Introductions:
 - Name, location, greatest weather challenge encountered / which weather app do you use most / ... / choose your own introduction approach!
- Housekeeping

Agenda

- Welcome
- Overview of forecasting
- The five FWFA tools
- Using the five FWFA tools
- Further resources, feedback
- Close

Project partners



This project is supported by funding from the Australian Government Department of Agriculture, Fisheries and Forestry as part of its Rural R&D for Profit program and developed in conjunction with the Southern NSW Drought Resilience Adoption and Innovation Hub as part of the Drought Resilience Adoption and Innovation Hubs Program, which received funding from the Australian Government's Future Drought Fund – an Australian Government initiative.



Benefits of the new forecasting tools

- **Fit-for purpose** thanks to farmer and industry input throughout the FWFA program.
- **Free tactical tools** to test decisions that build resilience through drought, floods, heatwaves or extreme cold.
- **Localised information** ahead of weather events which help protect your business, animals, crops and people, and capitalise on upsides.



Overview of forecasting

The climate decision gamble



Chess

Poker



Pokies

Photos by [Michał Parzuchowski](#) on [Unsplash](#)



Forecast language

- Weather forecast

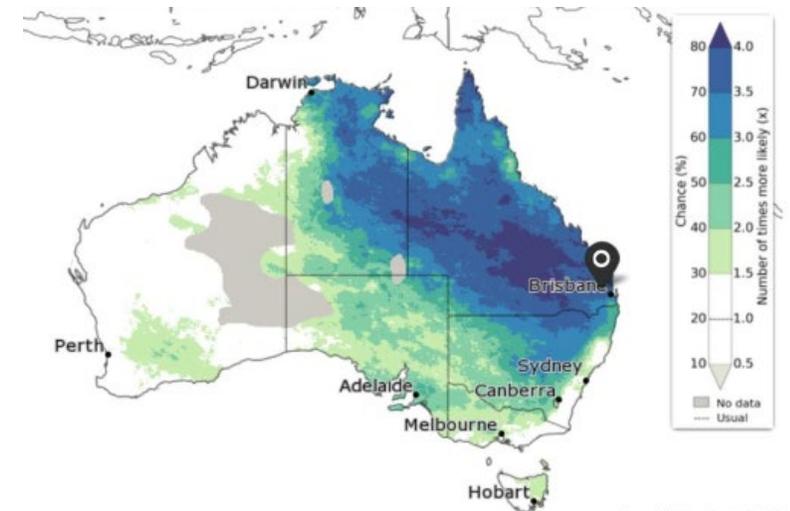
- Prediction of weather conditions, for a specific time and place, in the near future
- Next few hours to several days with resolution of 1-2 km
- More accurate as the timeframe for the forecast becomes shorter
- Planning operational activities

- Seasonal climate forecast

- Long-term predictions of the average weather conditions for a particular region
- Several months with resolution of 25 km
- Less certain (range of possible outcomes)
- Tactical planning

- Multi-week climate forecasts

- Short term seasonal rather than long term weather



Issued: 5 September 2022



Weather forecast interpretation

Possible rainfall

- First number: 75% chance of at least
- Second number: 25% chance of at least

Forecast icon

- General condition for day or hour

Thursday 8 June



Min 12 Max 17

Showers easing then sunny.

Possible rainfall: 1 to 15 mm

Chance of any rain: 80%



Mallee area

Partly cloudy. High chance of showers in the east, medium chance elsewhere. The chance of a thunderstorm in the morning. Winds north to northwesterly 20 to 25 km/h tending west to northwesterly 20 to 30 km/h during the morning. Overnight temperatures falling to between 8 and 11 with daytime temperatures reaching around 17.

Chance of *any* rain

- Likelihood of >0.2mm in your area
- 20% chance no rain at all



Climate drivers

1. ENSO (Enso)
2. IOD (Indy)
3. STR (Ridgy)
4. SAM (Sam)
- — —
5. ECLs (Eastie)
6. MJO (Mojo)





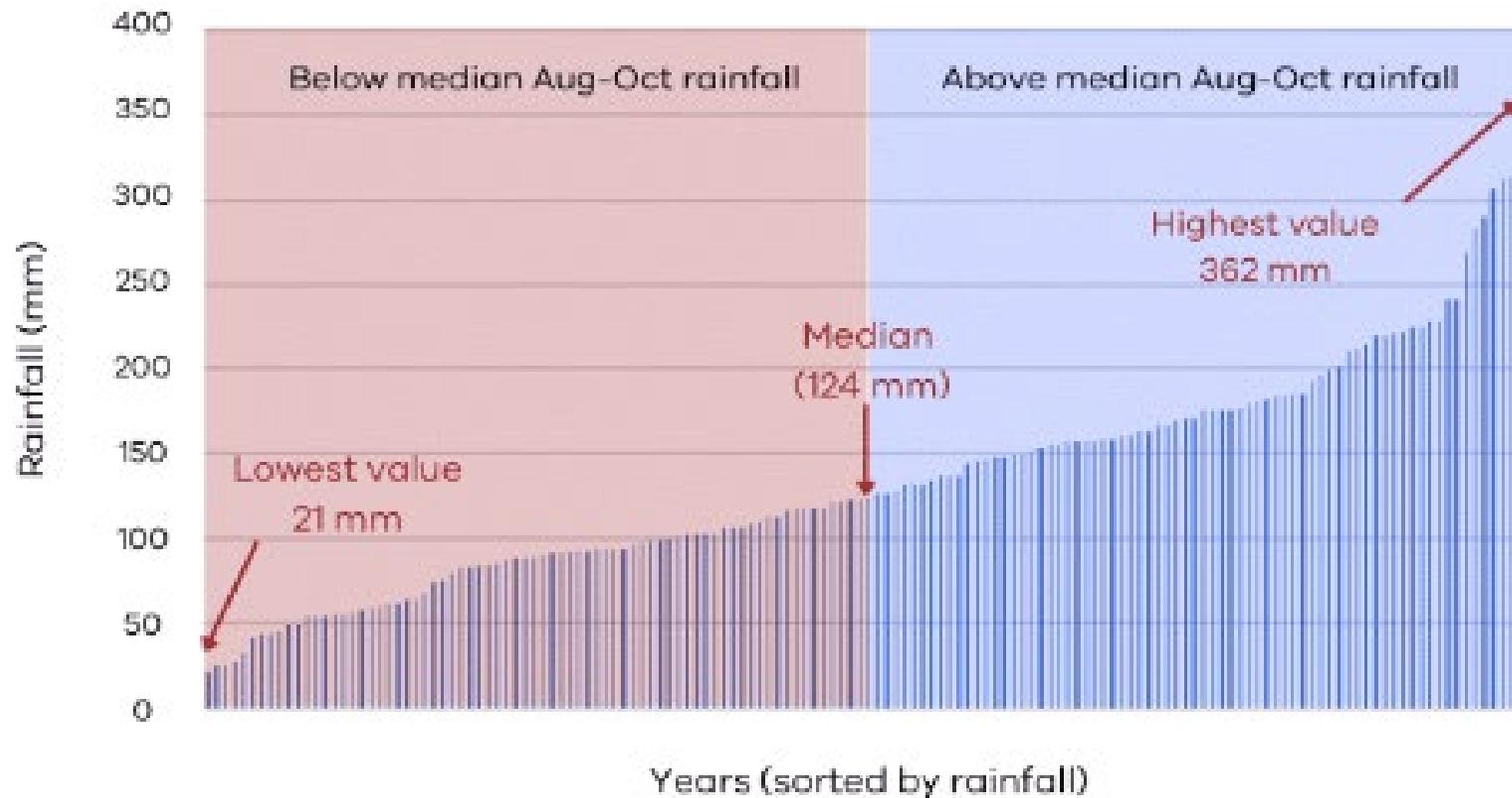
The five FWFA tools

Terminology



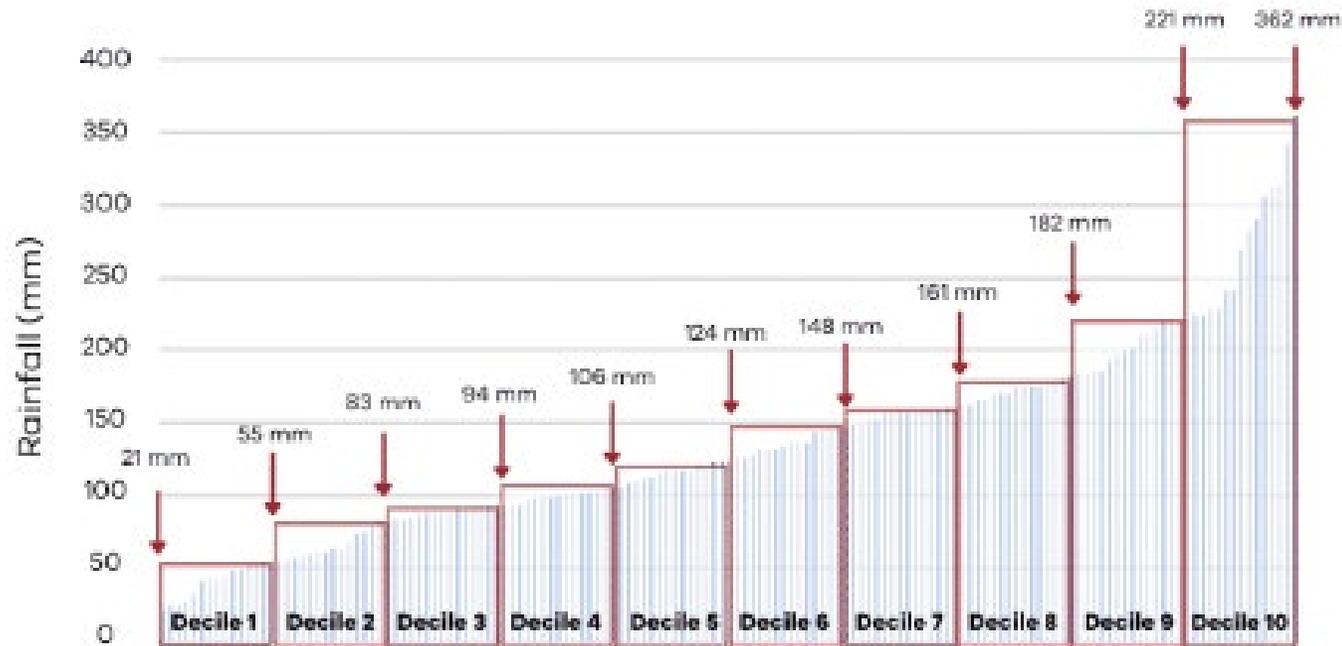
Forecasting language

- Median vs average

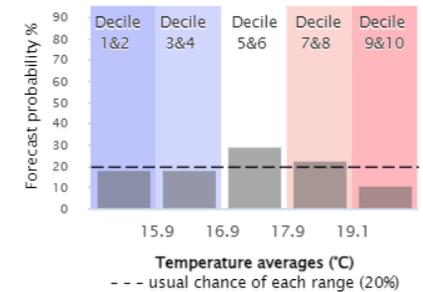
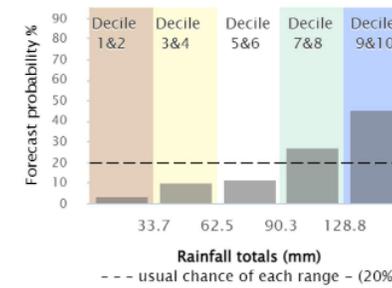


Forecasting language

- Deciles and quintiles



Years 1875 - 2021 (sorted by rainfall)

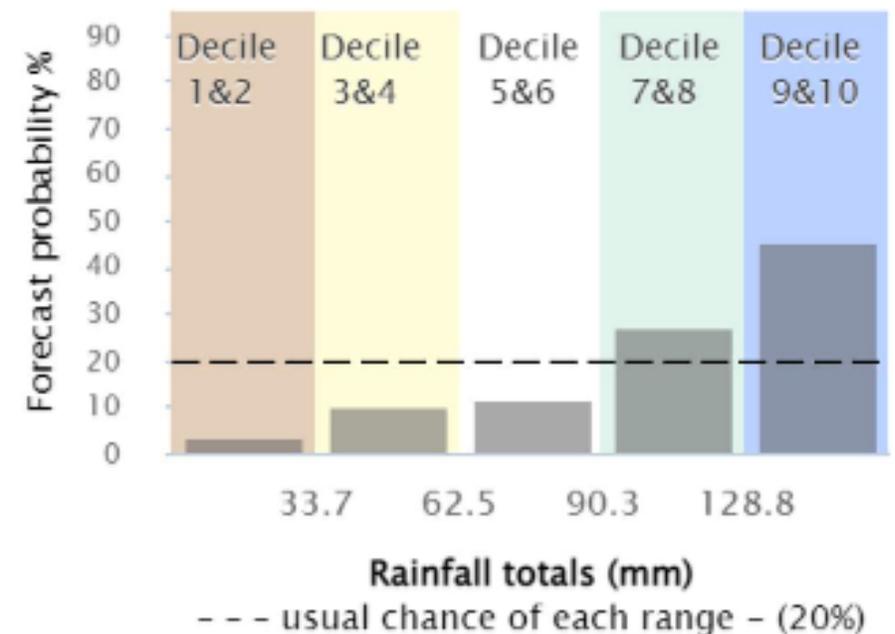


	Rainfall	Temperature
Decile 1 & 2	Unusually dry	Unusually cool
Decile 3 & 4	Drier	Cooler
Decile 5 & 6	Average	Average
Decile 7 & 8	Wetter	Warmer
Decile 9 & 10	Unusually wet	Unusually warm



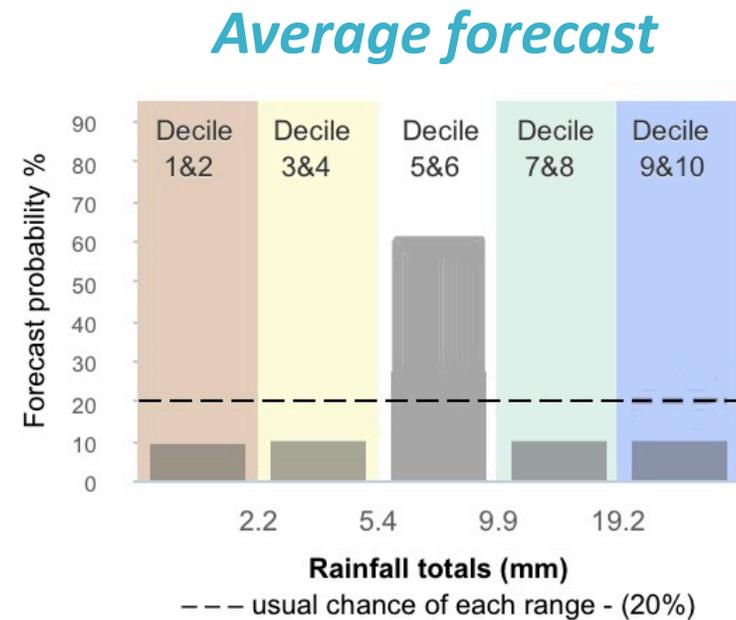
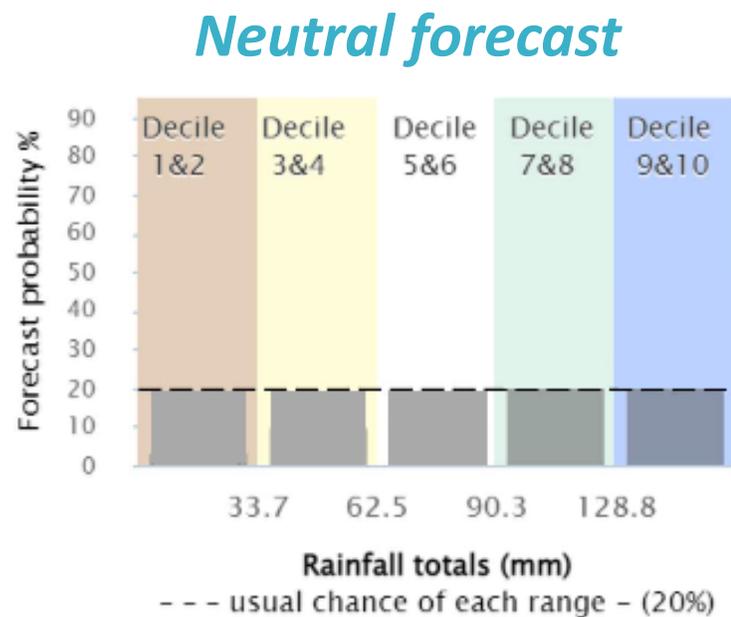
Probability

- Chance of something occurring
- *Based on 130 year rainfall data, what's the chance in **any** week/month/year of*
 - *Unusually dry (D1&2)?*
 - *“Average” rainfall (D5&6)?*
 - *Unusually wet (D9&10)?*
- Predictions: 99 model forecast runs
 - *Unusually dry (D1&2)?*
 - *“Average” rainfall (D5&6)?*
 - *Unusually wet (D9&10)?*



Probability

- Neutral forecast means an equal likelihood that any outcome can be expected
- Neutral forecast doesn't mean average

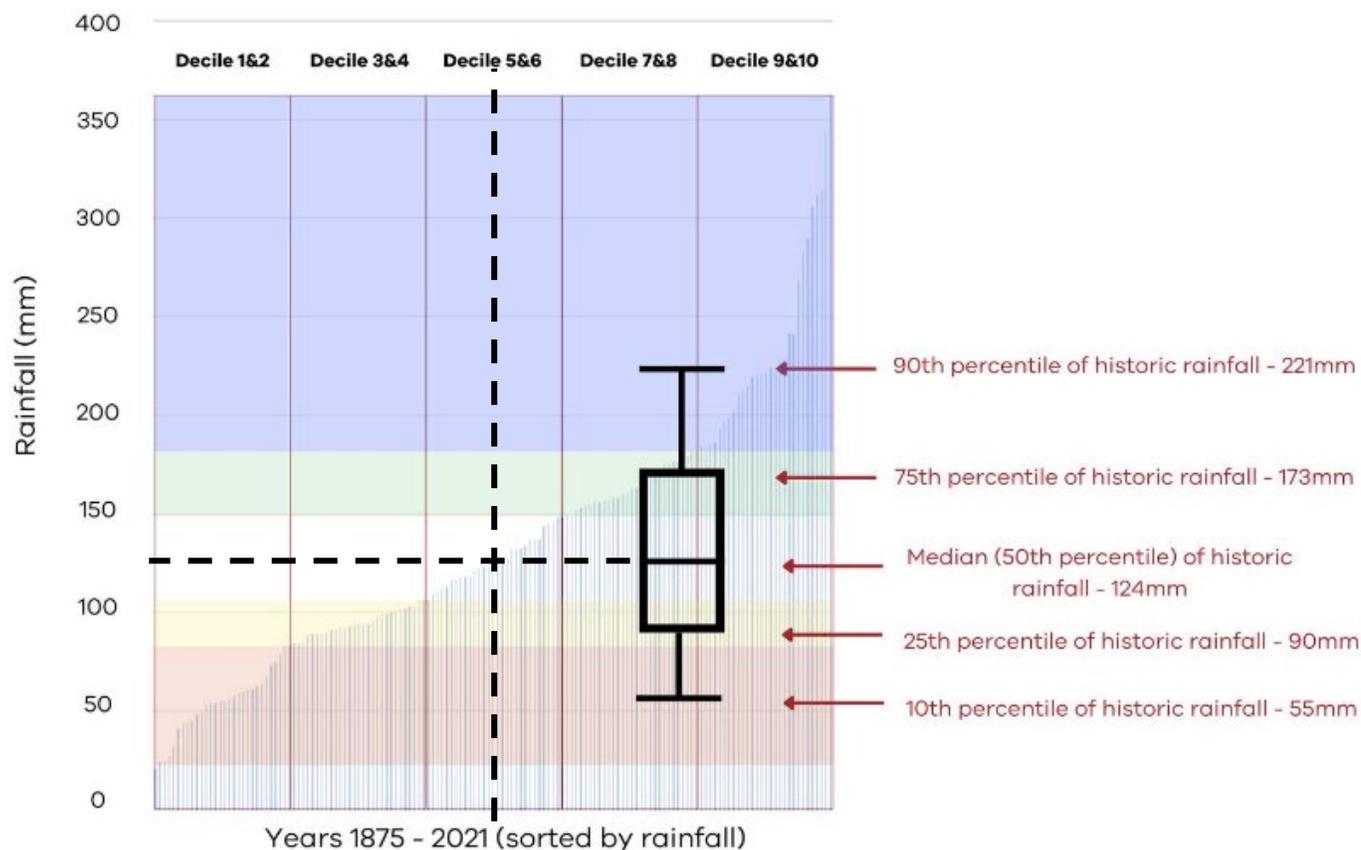




Forecasting language

- Box and whisker plots

Historic rainfall (Aug - Oct) for Dubbo, NSW





Forecast versus hindcast

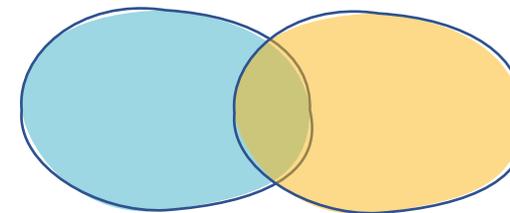
- A **forecast** is a prediction of weather conditions, for a specific time and place, in the near future.
- A **hindcast** considers what the weather was like in the past (usually for a period ranging from a few days to several decades).



Model accuracy

- Determines how well a weather prediction model is able to make accurate forecasts of future weather conditions based on past and current data.

Hindcast & forecast



- The time of year and location for which the forecasts are made can make a difference.

“Too good to ignore, but not good enough to be sure.”

- Peter Hayman, SARDI

The four key weather extremes

1. Heat
2. Cold
3. Wet
4. Dry



Image: [Tim J Keegan](#)



The five FWFA tools

The tools

The five FWFA tools

Tool	Location	
1. The chance of extremes maps for rainfall and temperature	Australia-wide	
2. The chance of three-day totals maps	Australia-wide	
3. The decile bar charts for rainfall and temperature	Location specific	
4. The timeline graphs for rainfall and temperature	Location specific	
5. The probability of exceedance graphs for rainfall	Location specific	

The five FWFA tools

- The 5 FWFA climate outlook tools help you plan operations past the seven-day weather forecast by including the decile distribution of forecast model runs and their likelihood.

- There are two types of tools:



Australia-wide maps (*the chance of extremes and 3-day totals*)

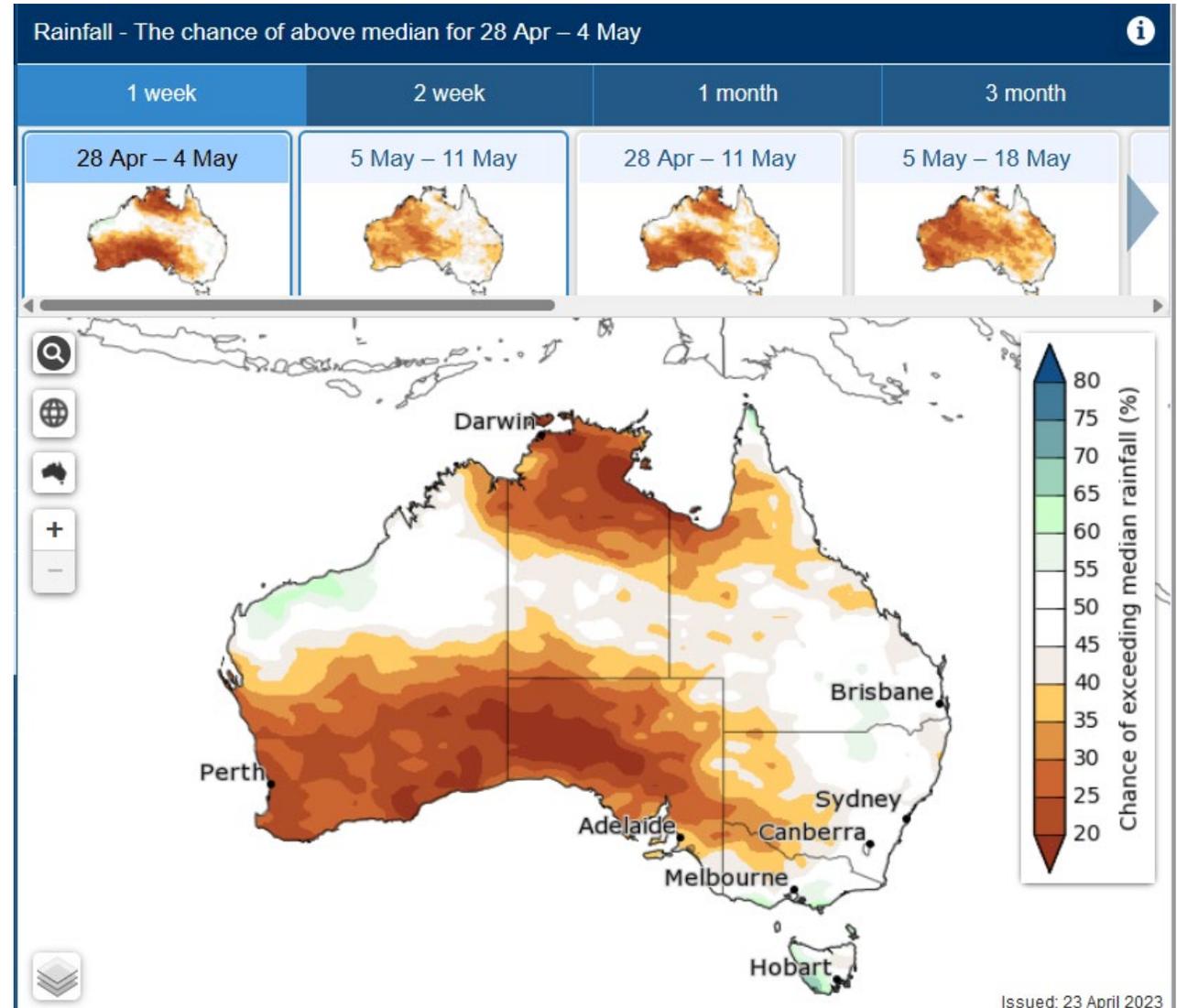


location-specific graphs (*decile bar charts, timeline graph and probability of exceedance*)

- They build on the Chance of above median maps.

Foundational tools

- Chance of above median...



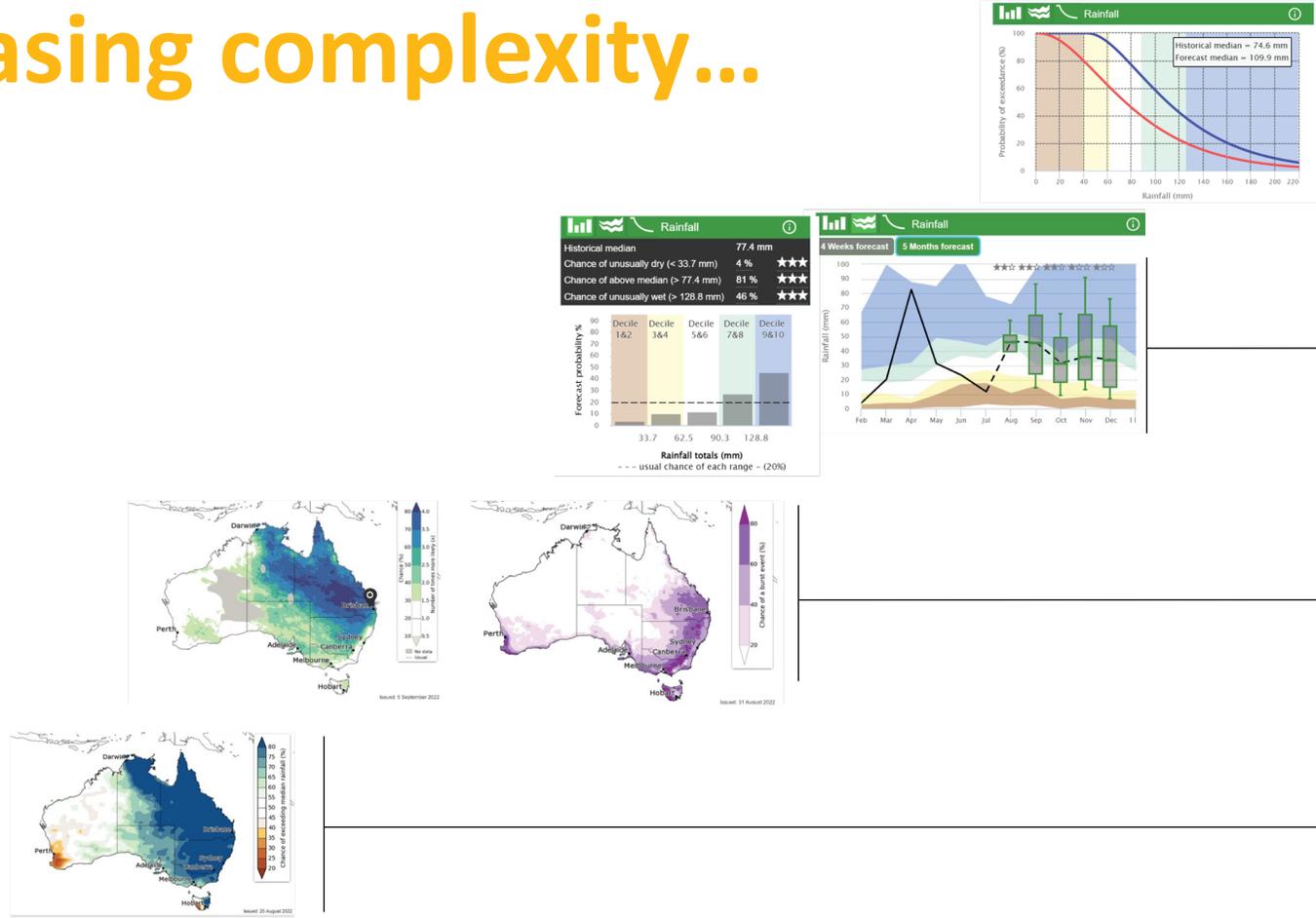
Issued: 23 April 2023

Increasing complexity...

Increased information



Increased time and effort to understand



• Probability of exceedance graph

• Decile bar chart (LHS)
• Timeline graph (RHS)

• Chance of extremes graph (LHS)
• Chance of 3-day totals graph (RHS)

• Chance of exceeding media rainfall



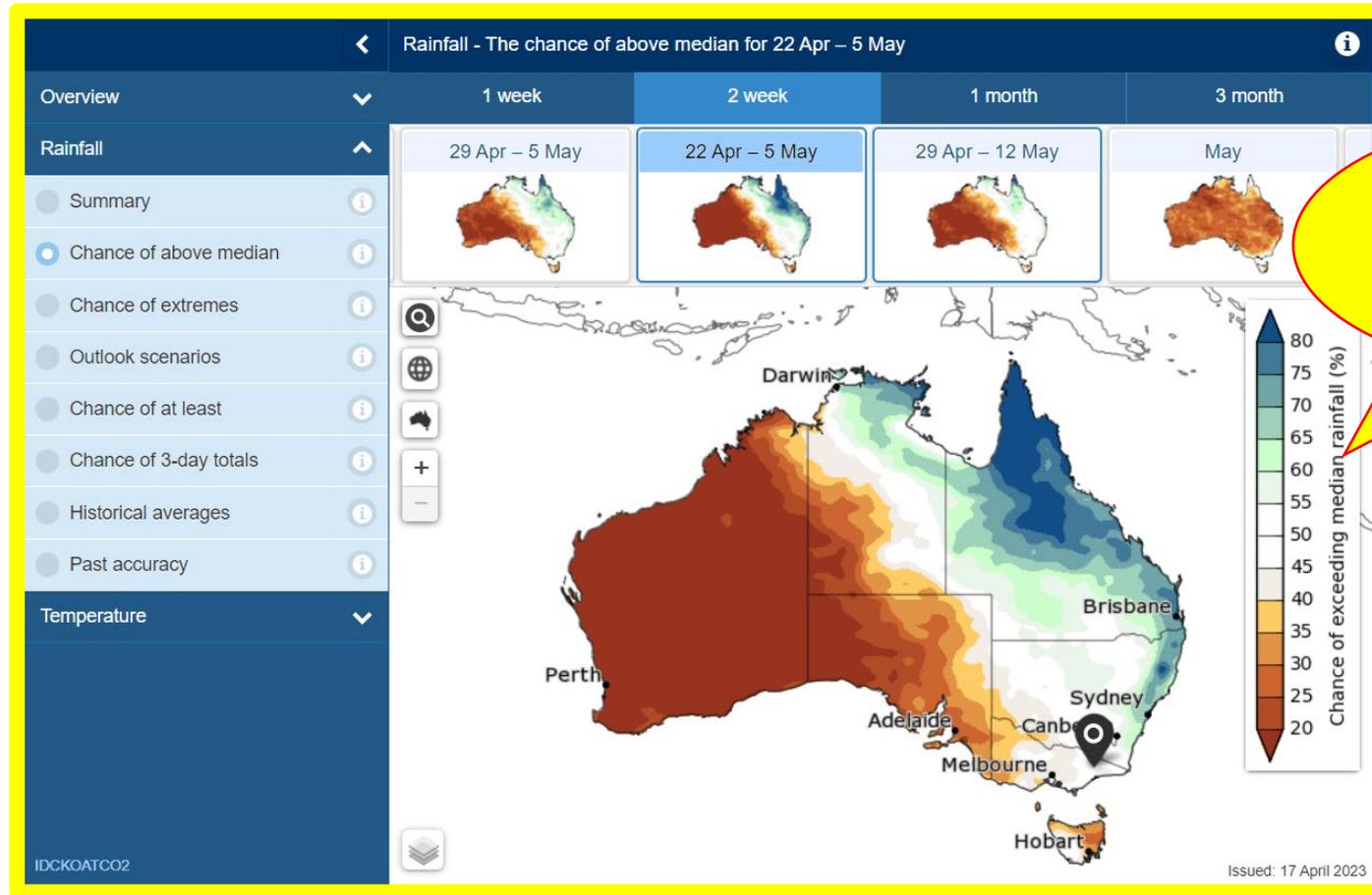
Finding the tools

A screenshot of a Google search interface. The search bar contains the text "bureau climate outlook tools". Below the search bar, the first search result is titled "Overview—Summary - Climate Outlooks". The snippet for this result reads: "Information for screen reader users. This outlook page includes **text summaries, a video, and interactive maps**. The summaries identify key map ...".

A screenshot of the Australian Government Bureau of Meteorology website. The top navigation bar includes links for HOME, ABOUT, MEDIA, CONTACTS, and climate outlooks (highlighted). A search box is located on the right. Below the navigation bar, a breadcrumb trail shows Bureau home > Climate > Outlooks (highlighted). The main heading is "Climate outlooks—weeks, months and seasons", with a sub-heading "Issued Thursdays, one and two week outlooks also issued Mondays". On the right side, there are four buttons: Archive, Download, Subscribe, and Feedback.



Chance of above median maps



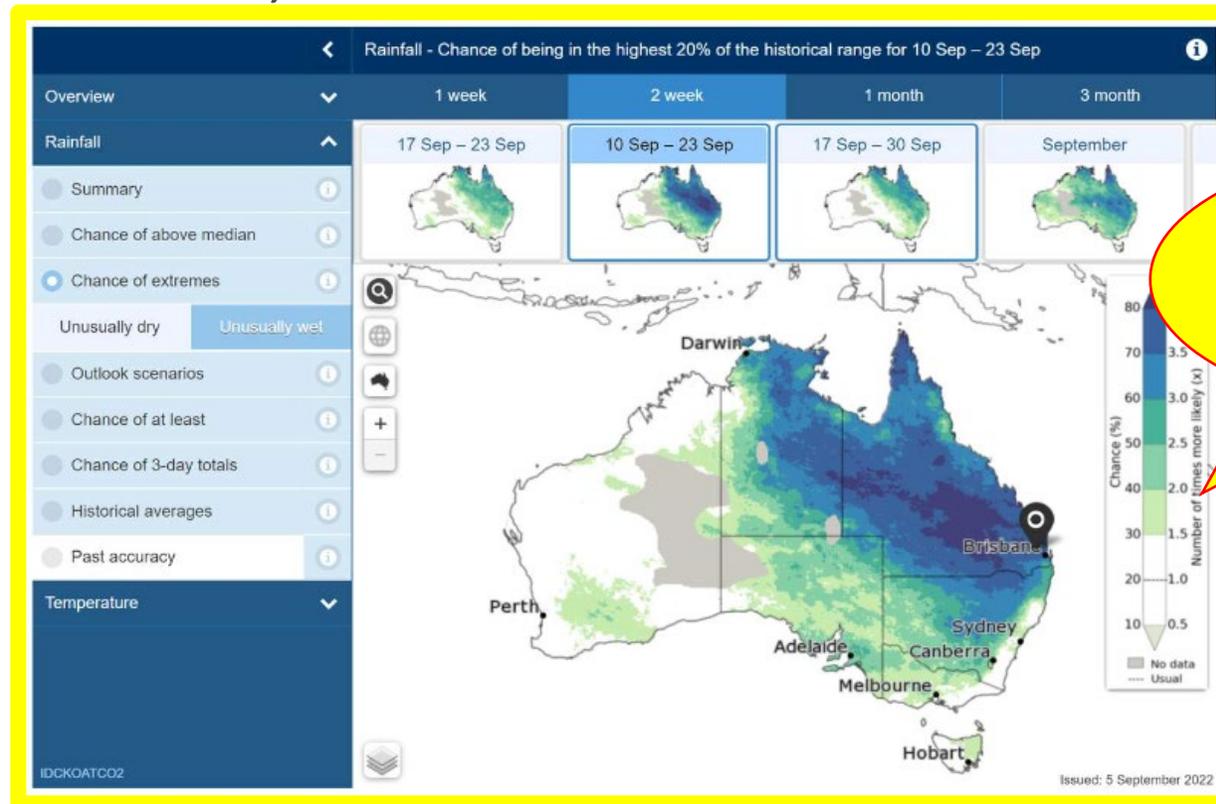
In preparation for your workshop, please add in a more recent snapshot for your area!



The chance of extremes map



- Shows the predictions for unusually high and low rainfall or temperatures over one week, two weeks, one month or three months.



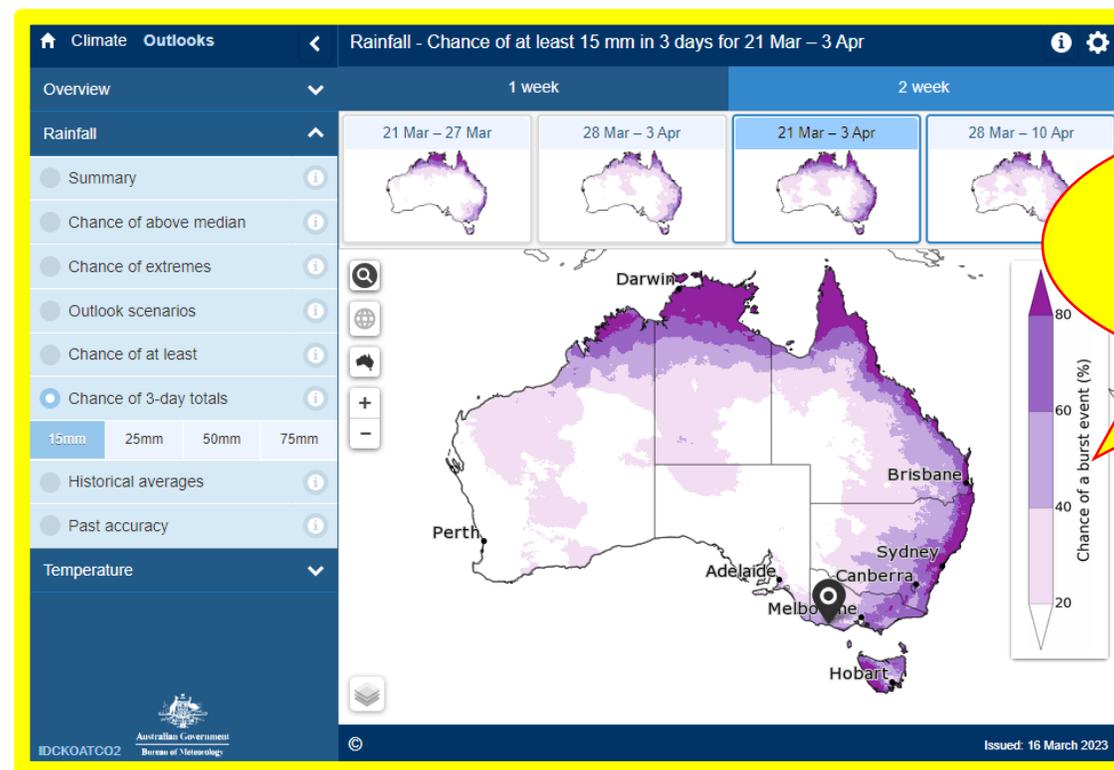
In preparation for your workshop, please add in a more recent snapshot for your area!



Chance of 3-day totals map



- Shows the chance of receiving ‘at least’ a given amount of rainfall total over three consecutive days in a specified period of time



In preparation for your workshop, please add in a more recent snapshot for your area!

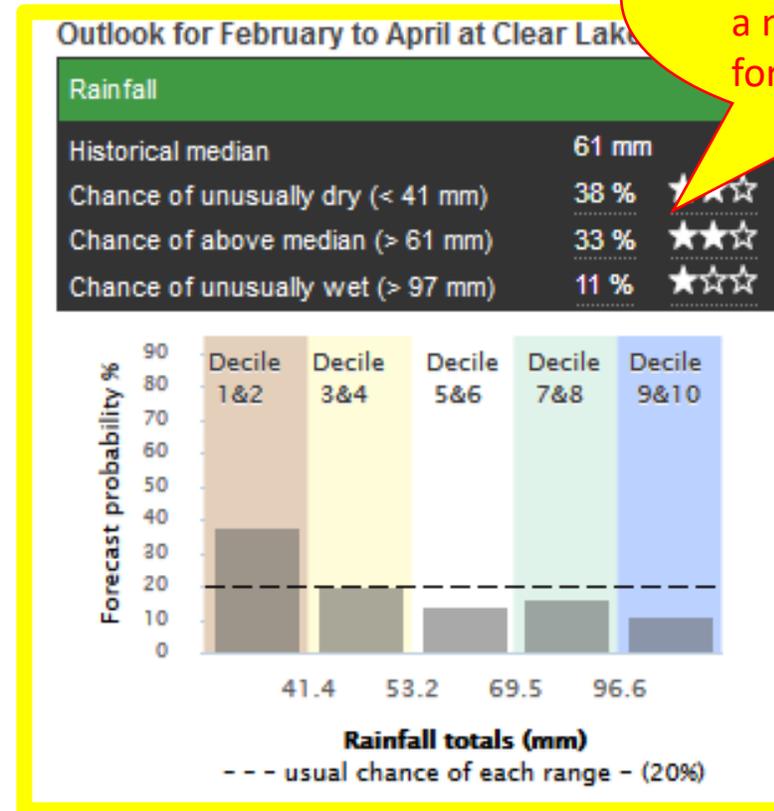


Decile bar charts



- Location-specific decile bars for rainfall and temperature
- Stars show past accuracy

In preparation for your workshop, please add in a more recent snapshot for your area!





Timeline graphs



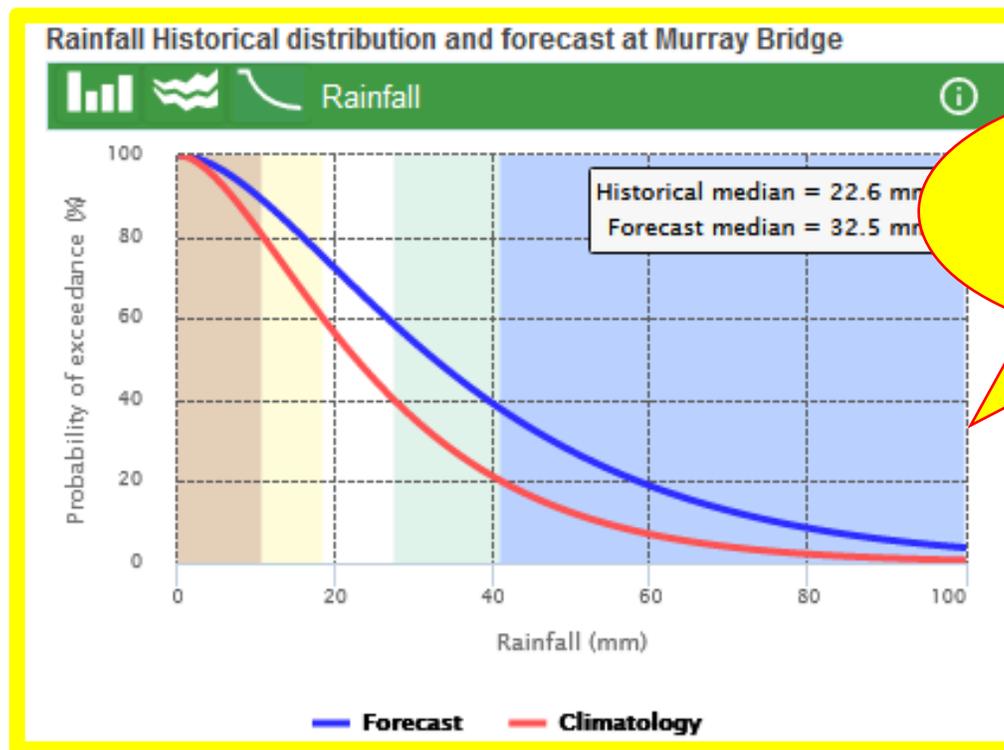
- Location-specific timeline of recent climatic observations from the previous weeks and months, against historic averages





Probability of exceedance

- Represents the forecast and historical data of a certain location for a particular rainfall total



In preparation for your workshop, please add in a more recent snapshot for your area!



Using the five FWFA tools with case studies

Key messages



- Making climate-risk decisions in farming is like playing poker it is decision making under uncertainty.
- The four weather extremes of most interest to farmers are heat, cold, wet and dry.
- Meaningful interpretation of forecasting information enables better decision making.

Key messages



- The 5 FWFA climate outlook tools help plan operations past weather forecast by including decile distribution and their likelihood.
- There are two types of tools:
 - Australia-wide maps (*the chance of extremes and 3-day totals*)
 - Location-specific graphs (*decile bar charts, timeline graph and probability of exceedance*)
- They build on the Chance of above median maps.



Questions, comments?



Using the tools for decision making



Local application

- Which extremes are relevant for our location and industry?

Local application

- Add material relevant for your location and industry here



In preparation for your workshop, please add material relevant for your location and industry!

Further resources

- Workshop booklet
- Follow-up email with links to key information
 - Bureau's website and links to the 5 tools
 - Agriculture Victoria's online course
 - Northern Australia Climate Program's online course
 - The Climatedogs website



You're welcome to e-mail
further questions to
agriculture@bom.gov.au

Evaluation

- Please complete the anonymous survey so we can further improve future workshops!



Thank you