

Session I- Enhancing Climate Crisis Preparedness through Climate Service

Dr Lynette Bettio

Team Lead – Extended and Long-Range
Forecasting

Australian Bureau of Meteorology



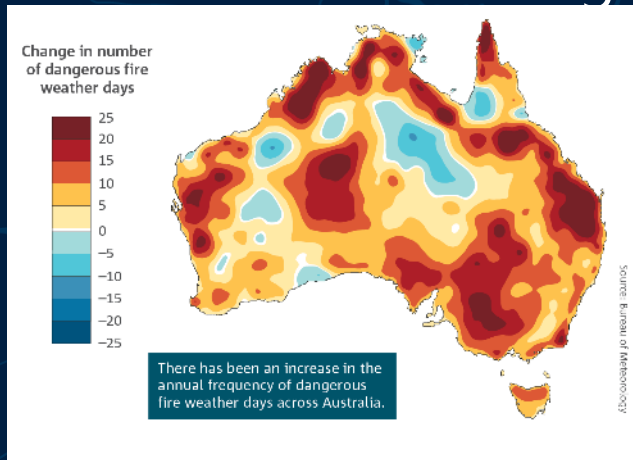
Discussion Points

- Efforts to increase resilience and mitigate around extreme events
- Enhance the use of a climate information service in response to a climate crisis
- How to minimize and/or accommodate uncertainty of climate information in implementing climate information services in decision-making
- Governmental policy or mechanisms that promote the use of climate information services in application sectors in Australia



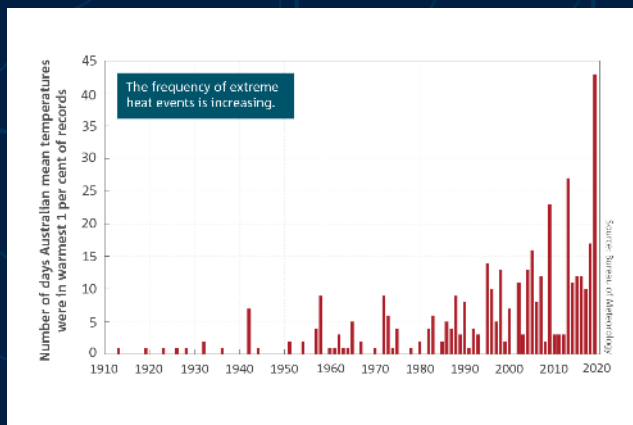
Increasing resilience and mitigating around extreme events: How are extreme events changing?

- It is important to know how extreme events are changing.
- Increased risk of more frequent and intense extreme events
- Extreme events that haven't been observed before.
- Compounding extreme events such as long-term drought and heatwaves
- Important to have awareness and education around the changing risk landscape.



State of the Climate report, released every two years details how Australia's climate is changing.

In the two years between the release of each report the report's content is strongly communicated to all sectors



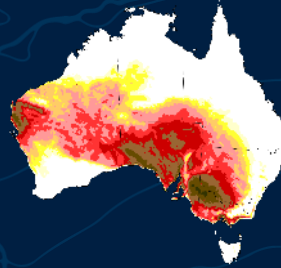
Increasing resilience and mitigating around extreme events: How are extreme events going to change?

Australian Climate Service

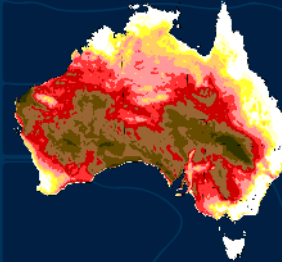
www.acs.gov.au/

- Natural hazards of the future will not be the same as in the past.
- Many hazards will be more intense, happen more often, in unprecedented combinations and in unexpected locations, and affect more of Australia's land or sea area.
- Our population is also changing, and with it our demands on urban environments, infrastructure, housing, industry, and land management practices. This means the cost of natural hazards is also increasing

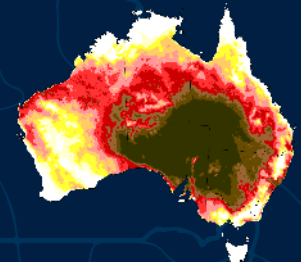
NB: This is not a prediction—it is a *sample* of a plausible future high impact weather scenario such as may be used for strategic planning purposes.



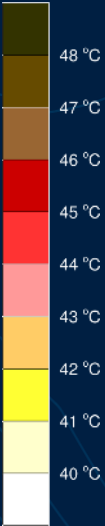
Highest maximum temperature from Bureau weather model 'reanalysis' during the Black Saturday heatwave:
27 January – 8 February 2009



Highest maximum temperature from Bureau weather model 'reanalysis' during the January 2013 heatwave:
1-15 January 2013



Highest maximum temperature from Bureau weather model using a future climate scenario:
1-14 January 2050

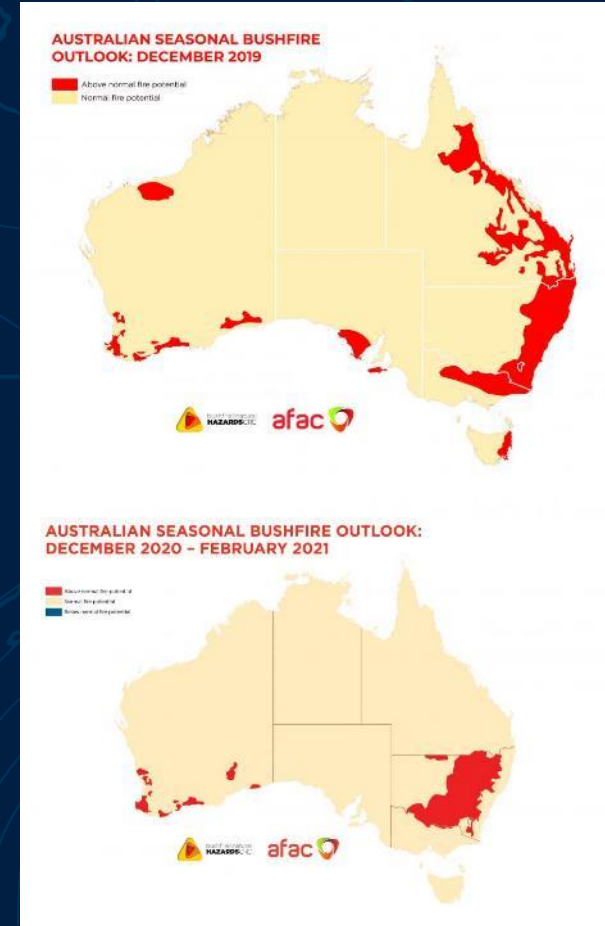


Enhancing the use of a climate information service in response to a climate crisis: Making information relevant for decision makers

Bushfire and Natural Hazards CRC

www.bnhcrc.com.au/hazardnotes. Forecasting the likely bushfire conditions for the coming season: Need to have mechanisms and relationships in place before the crisis.























- **Relevant information:** What information does the customer actually need. What decisions are they trying to make? What information can you provide to facilitate that decision making process?
- **Building trust:** Trust enables warnings of likely severe conditions to be heeded and acted upon. Trust also increases when they see the application and utility of climate information that you provide.
- **Education:** Customers are more satisfied, and comfortable with using the seasonal forecast information when they understand the science.



Enhancing the use of a climate information service in response to a climate crisis: Working directly with decision makers

Preseason Briefings:

- Number of standardised briefings across Australia prior to the severe weather season.
- All levels of government and multiple Emergency Service Agencies ensuring consistency of messages.
- Includes fact-based (but not a forecast) scenario planning to stress test systems.
- This also includes pre-season briefing to emergency broadcasters so they are educated and aware of the likely issues.

Impact	Likelihood compared to most years
 Bushfire activity	Similar (east) Slight increase (WA)  
 Heatwave	Similar 
 Widespread flooding	More likely 
 Severe storms	Similar 
 Drought	Improvement likely 
 Dust	Similar 
 Coral bleaching	Similar (east) Slight increase (WA)  
 Marine heatwave	Average to above average 
 Tropical cyclones	Average to above average 
 Coastal flooding / erosion	More likely 



Enhancing the use of a climate information service in response to a climate crisis: Decision relevant and action orientated information

- Increased chance of La Niña meant increased chance of flooding in Australia.
- Collaboration with Emergency Services to provide relevant public safety messages.
- Shown here is representative of the Bureau and head of an Emergency service agency demonstrating "A car can float in just 15cm of water".
- This was a public safety message consistently used throughout the season



Enhancing the use of a climate information service in response to a climate crisis: Timely information

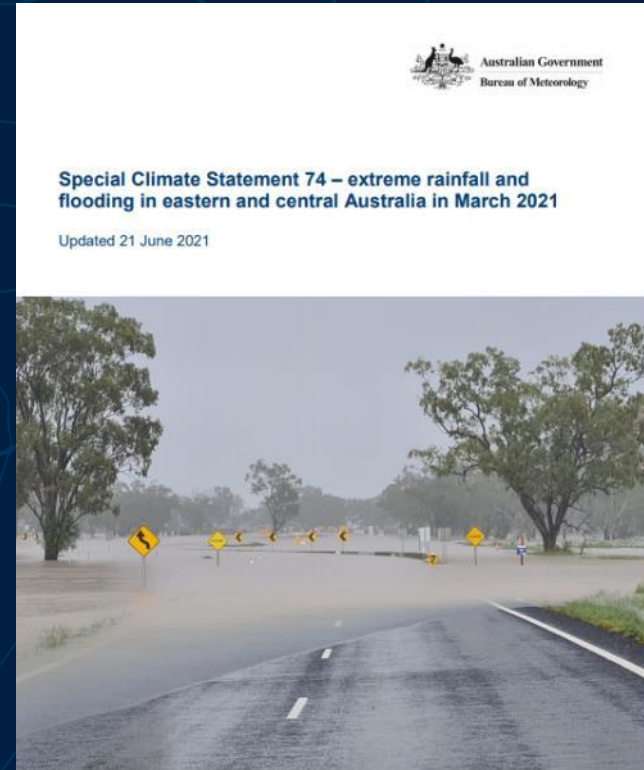
www.bom.gov.au/climate/current/statements/

- How unusual is this event?
- Are there any records or near records.

This information can influence actions. It can also reinforce the risk information provided. Post-event it can highlight the need to incorporate climate information into planning.

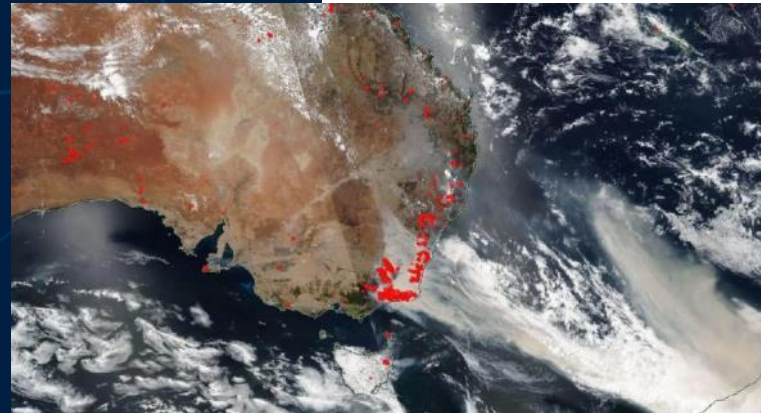
- An increased risk of widespread flooding was highlighted in the pre-season briefing.
- Reinforces the importance and relevance of the seasonal forecast.

Helps recovery and resilience



Accommodating the uncertainty of climate information in implementing climate information services : Building trust

Trust – A long-standing relationship demonstrating the application of information to those needs over time builds up a strong relationship of mutual respect and trust. Trust enables warnings of likely severe conditions to be heeded and acted upon.











Accommodating the uncertainty of climate information in implementing climate information services : Education

Education – Customers are more satisfied, and comfortable with using the seasonal forecast information when they understand the science and the drivers behind the forecast. General audience or working directly with customers

- If customers are more aware of the probabilistic nature of the forecasts and applications, they are more likely to trust the information provided.
- If there is a physical mechanism such as ENSO or IOD which may be influencing the forecast, there can be more confidence placed in the forecast, meaning customers are more likely to use the information.

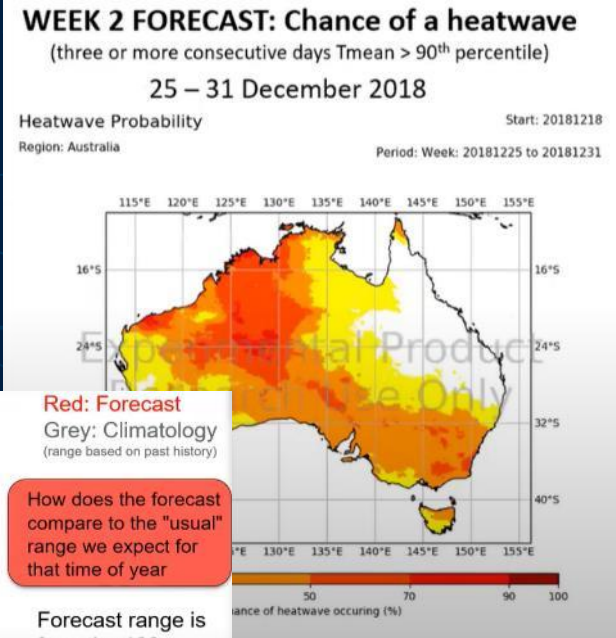
www.bom.gov.au/climate/ahead/#tabs=About-outlooks-and-influences

The screenshot displays a web interface with three tabs: 'Outlooks and influences', 'Historical patterns', and 'About outlooks and influences'. The 'About outlooks and influences' tab is active, showing a grid of resource cards. Each card includes a thumbnail image, a title, and a list of links.

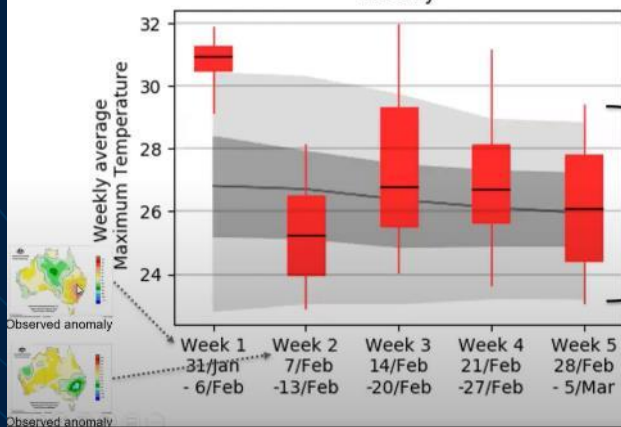
Outlooks and influences	Historical patterns	About outlooks and influences
 About the outlooks <ul style="list-style-type: none">• About the outlooks Information collection 'About the climate outlooks', including videos, maps, text and links.	 Videos <ul style="list-style-type: none">• About climate outlooks View• About ENSO View• About the Indian Ocean Dipole View• About the Madden-Julian Oscillation View• About the Southern Annular Mode View	 Interpreting climate outlooks <ul style="list-style-type: none">• Animations, videos, case studies and quizzes about the Bureau's Climate Outlook service. Registration free, via COMET-MetEd View
 Influences on Australian climate <ul style="list-style-type: none">• ENSO El Niño La Niña• Indian Ocean• Madden-Julian Oscillation (MJO)• Southern Annular Mode (SAM)	 Influences – Climate Dogs <ul style="list-style-type: none">• Climate Dogs View from Climate Kelpie	 Climate influences – infographics <ul style="list-style-type: none">• El Niño• La Niña• Indian Ocean Dipole• Madden-Julian Oscillation (MJO)

Accommodating the uncertainty of climate information in implementing climate information services : Improved tools for decision-making

Tools – Impact-based forecast



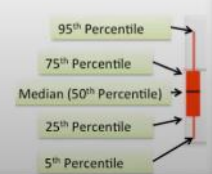
Weekly averaged Maximum Temperature for Sydney Weekly



Red: Forecast
Grey: Climatology (range based on past history)

How does the forecast compare to the "usual" range we expect for that time of year

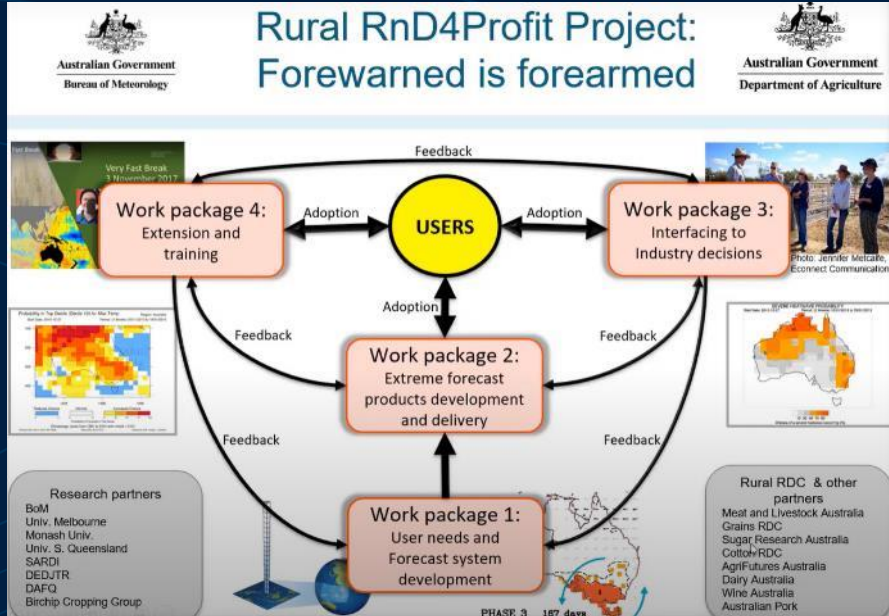
Forecast range is from the 100 model scenarios



Tools – Giving the range of the forecast

Governmental policy or mechanisms that promote the use of climate information services in application sectors in Australia: Agriculture

www.bom.gov.au/climate/ada/fmd.shtml



FMD Rainfall Analyser

Select a location or click on the map to get results

Date: May 2021 | Latitude: -23.0627 | Longitude: 150.0580

Assessment period: 01/12/2020 to 31/05/2021

Rainfall Deficiency Ranking
Location (-23.0627, 150.0580)
Location has experienced a 1 in 20 year deficiency
Period of lowest rainfall: 01/12/2020 to 31/05/2021

Climate Overview for Benalla

Select your commodity:

Climate Variables	Rainfall (mm)					Temperature (days)	
	Annual Jan to Dec	Autumn Mar to May	Winter Jun to Aug	Spring Sep to Nov	Summer Dec to Feb	Annual Heat Risk Days > 35°C	Annual Frost Risk Days < 2°C
Historical Climate Averages for period 1901 - 1990	677	170	216	173	118	14	40
Current Climate ¹ Averages for period 1991 - 2020	622	134	196	161	132	18	44
Future Climate ¹ Projections for 30 years centred around the selected year	643 (376 - 901)	134 (52 - 262)	214 (114 - 328)	165 (71 - 274)	120 (41 - 222)	25 (10 - 40)	33 (14 - 51)

2030

Governmental policy or mechanisms that promote the use of climate information services in application sectors in Australia: Emergency Services- Australian Climate Service a large coordinated response

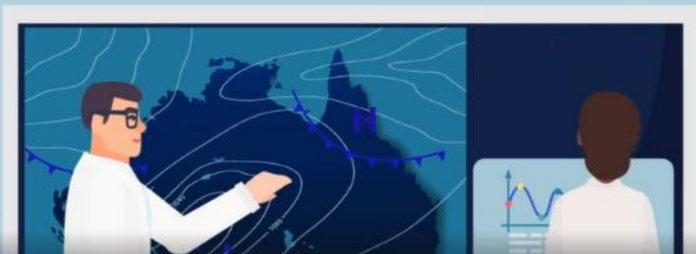
and will deliver information to support our emergency services and target our climate adaptation.



This service will bring together our best scientists



to help better anticipate, manage and adapt to climate impacts now and for generations to come.



By being more prepared, we can reduce the impacts of disasters and make our communities more resilient.





Australian Government
Bureau of Meteorology

Thankyou

lynette.bettio@bom.gov.au