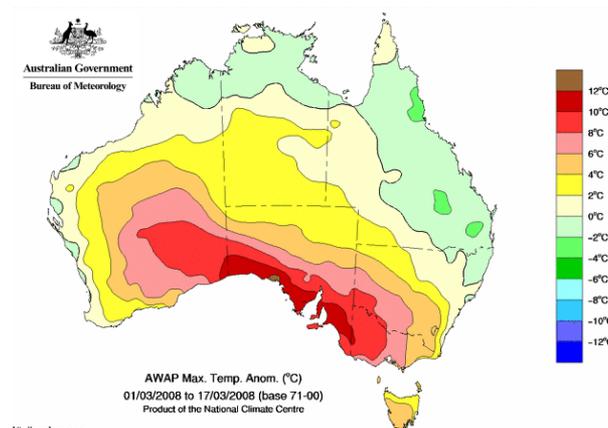
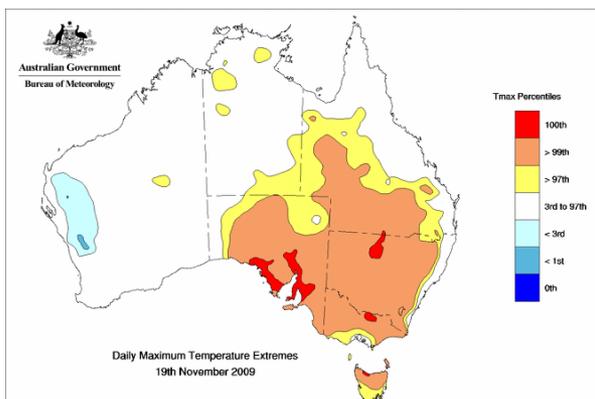


# Managing vines during heatwaves to maintain quality

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Acknowledgements:

Drs. Dane Thomas & Peter Hayman - SARDI

Dr. Mardi Longbottom - AWRI

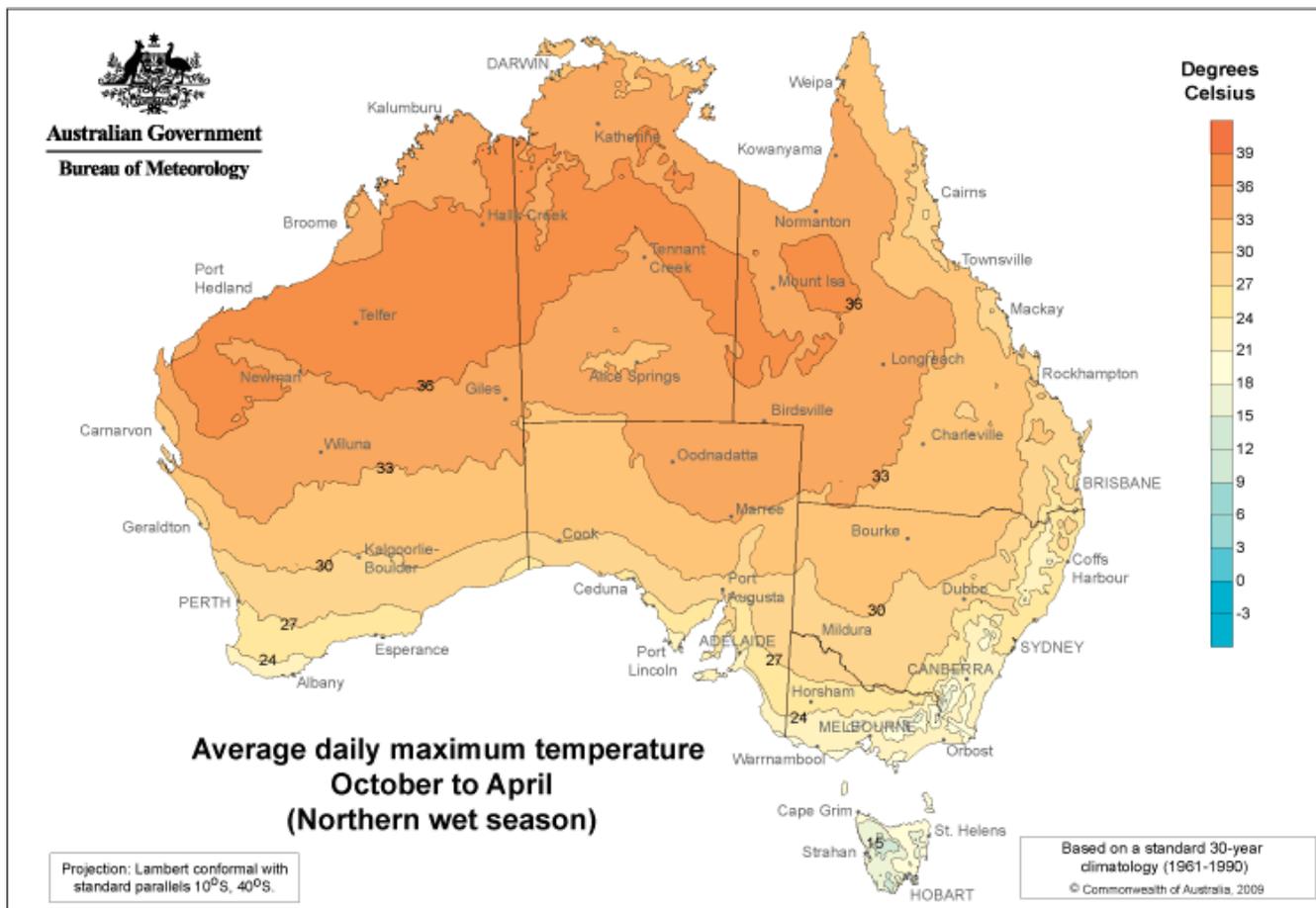
FACT SHEET JANUARY 2012

## Managing grapevines during heatwaves

Dr Peter Hayman (SARDI), Dr Mardl Longbottom (AWRI),  
Dr Michael McCarthy (SARDI) and Dr Dane Thomas (SARDI)



# What's a heatwave for you?



Is it *how* hot or how much hotter than average for your region?

## How often is it hotter than average?

The number of heat events from 1957 to present (55 years) in which all days (11660) meet or exceed the criteria of mean maximum temperature of the month

Location	+ 5°C		+ 7.5°C		+ 10°C		+ 12.5°C		+ 15°C	
	3 days	5 days	3 days	5 days	3 days	5 days	3 days	5 days	3 days	5 days
Healesville	265	68	95	21	28	4	8	0	1	0
Hamilton	255	59	113	12	49	4	10	0	1	0
Kyneton	248	56	94	13	25	3	2	0	0	0
Bright	84	17	18	0	3	0	0	0	0	0
Stawell	276	68	114	14	36	6	6	0	0	0
Mildura	258	69	84	20	23	3	2	0	0	0

$\bar{x}$  = mean maximum temperature for each month of the growing season. Growing season is from 1<sup>st</sup> October to 30<sup>th</sup> April.(212 days)

# The decision matrix

(are you a punter?)

	Heatwave forecast	No heatwave forecast
Heatwave 		
No heatwave 		

# The decision matrix

(are you a punter?)

	Heatwave forecast	No heatwave forecast
Heatwave 	<b>True positive</b> Some damage from heatwave but loss is reduced by extra water applied prior to the event	
No heatwave 		

# The decision matrix (are you a punter?)

	Heatwave forecast	No heatwave forecast
Heatwave 	<b>True positive</b> Some damage from heatwave but loss is reduced by extra water applied prior to the event	
No heatwave 	<b>False positive</b> No damage from heatwave but grower bears cost of extra water applied	

# The decision matrix

(are you a punter?)

	Heatwave forecast	No heatwave forecast
Heatwave 	<b>True positive</b> Some damage from heatwave but loss is reduced by extra water applied prior to the event	<b>False negative</b> Severe damage from heatwave as action was too late to minimise the damage
No heatwave 	<b>False positive</b> No damage from heatwave but grower bears cost of extra water applied	

# The decision matrix

(are you a punter?)

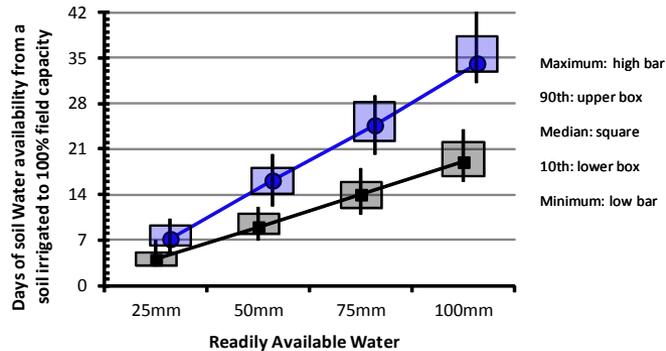
	Heatwave forecast	No heatwave forecast
Heatwave 	<b>True positive</b> Some damage from heatwave but loss is reduced by extra water applied prior to the event	<b>False negative</b> Severe damage from heatwave as action was too late to minimise the damage
No heatwave 	<b>False positive</b> No damage from heatwave but grower bears cost of extra water applied	<b>True negative</b> No damage and no cost

# What to do immediately before a forecast heat wave

- Check irrigation infrastructure
  - PSVs, PRVs, filters etc.
- Check soil water sensors/phenology
  - Soar et al – 16% reduction in berry size with approx. 2 °C warming post set
- What if the grid power supply fails/brown-out?
- Identify susceptible/high value blocks.
  - Sensitive varieties
  - Shallow soils
  - Blocks due to be irrigated
  - How much soil water buffer in each block/soil type?

## How soon do I need to irrigate specific blocks?

### Barossa Valley



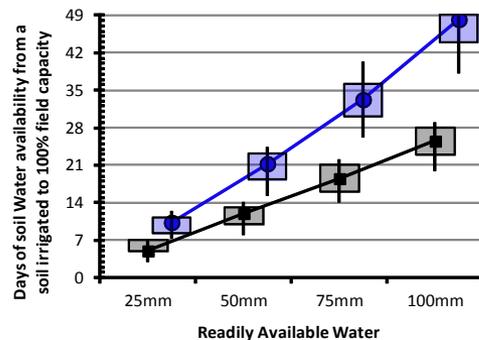
Crop coefficient  $\approx 0.6$

Photos courtesy  
Cassandra Collins

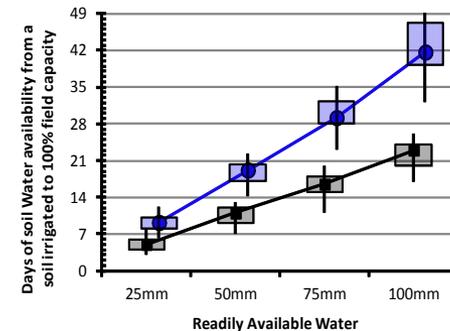


Crop coefficient  $\approx 1.0$

### Mornington Peninsula - Mornington



### Yarra Valley -Tarrawarra Monastery



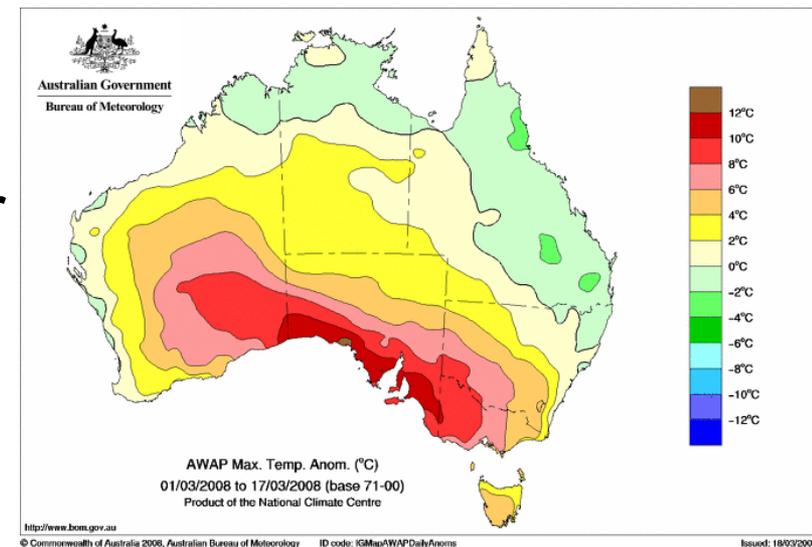
Readily available water – that portion of the total that can be accessed without reducing vegetative growth i.e. the range a tensiometer reads

# What to do immediately before a forecast heat wave

- Apply irrigation and refill as much of the root zone as possible ahead of the forecast heatwave.
- If a deficit irrigation strategy is being employed, resupply irrigation.
- Consider applying a sunscreen spray (next presentation).
- Reconsider any planned leaf removal or canopy manipulation (e.g. foliage wires) strategy that may lead to increased bunch/berry exposure.
- *Remember that if the heatwave does not eventuate, it is still very likely to be hot to very hot, so any pre-emptive action will not be wasted.*

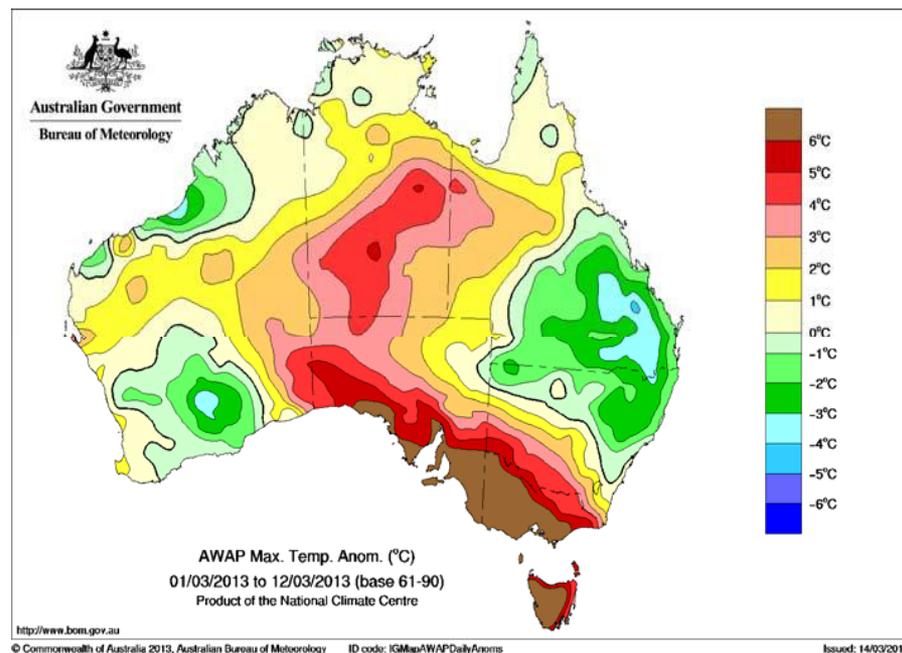
# What to do during heat wave

- Apply irrigation to maintain soil moisture at a level that enables vines to regain their turgor overnight in preparation for the next hot day.
- If using overhead irrigation, apply at night to avoid foliage burn (salinity)



# What to do after a heat wave

- Irrigate to replace lost soil water and lower soil temperature
- Monitor for pests & diseases that may have exploited heat damaged berries
  - Damage may take a few days to appear
  - If secondary invasion occurs seek advice re chemical applications
- Redo irrigation budget



## Short -long term management changes

- Irrigation infrastructure
  - Greater flexibility?
- Variety mix
- Rootstocks
- Pruning
  - Permanent arm vs. rod & spur?
- Row direction /canopy management
  - Fruit shading on western side of N/S rows
- Vineyard floor management

# Future heat waves

- The frequency of heat waves is likely to increase.
- Economic and human cost of heat waves will mean they will be a high priority for research.
- The risks of bushfire and human heat stress will mean adequate warning of future heat waves.
- How will the wine grape industry access this information and use it in practical risk management frameworks?
- The challenge will be for grape growers to appropriately manage the risk once warned.