KIA ORA - WELCOME TO THE CONFERENCE

SESSION ONE

Session One
Introduction and Welcome

New Zealand and Australia Avocado Grower's Conference'05
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Climate Change

Risks and Opportunities for the Avocado Industry

Peter Deuter[1], Mark Howden[2] and Simon Newett[1]

[1]Department of Primary Industries and Fisheries, Queensland

[2] CSIRO Sustainable Ecosystems, Canberra

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"Climate is the weather you are supposed to be having"

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Climate Change

- What is changing - and by how much?
- Projections of future change
- Risks for the avocado industry
- Opportunities for the avocado industry
- How can the industry adapt?
- Key research challenges

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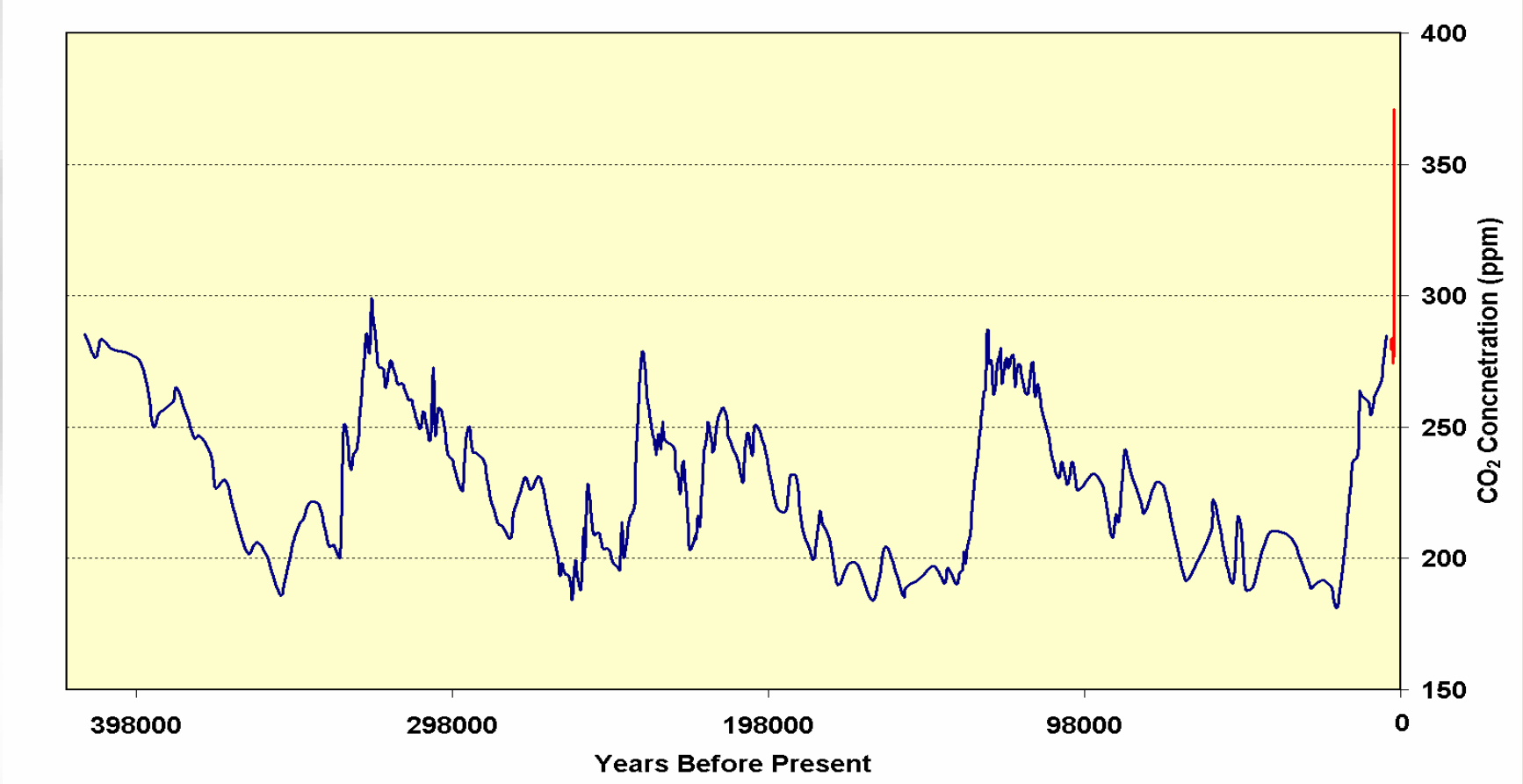
What is changing - and by how much?

Changing Carbon Dioxide Concentrations in the Atmosphere



Current carbon dioxide concentrations are the highest in 400,000 years

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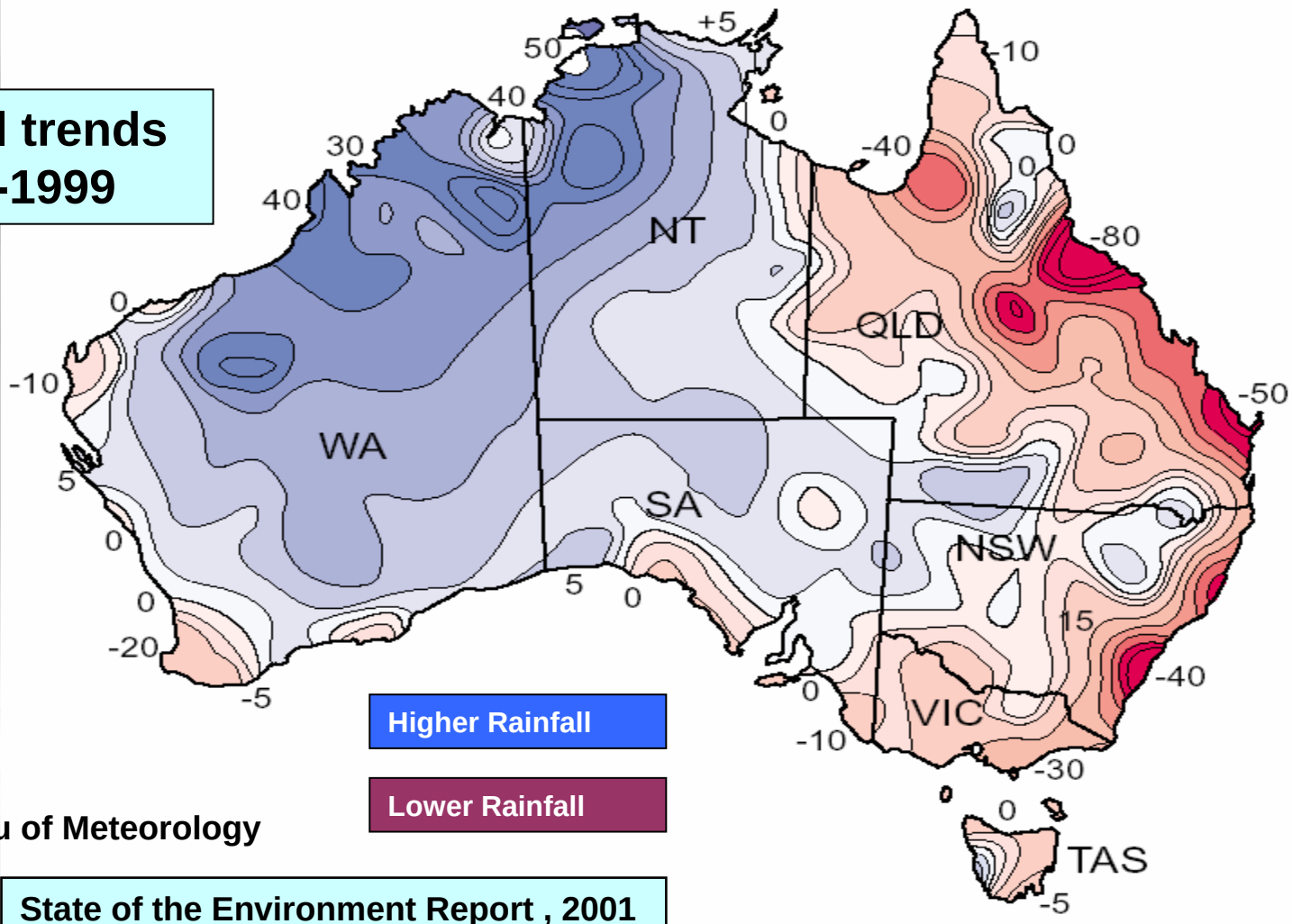
What is changing - and by how much?

Changing Rainfall Trends

Rainfall trends 1950-1999



Higher Rainfall

Lower Rainfall

Source :- Bureau of Meteorology

State of the Environment Report , 2001

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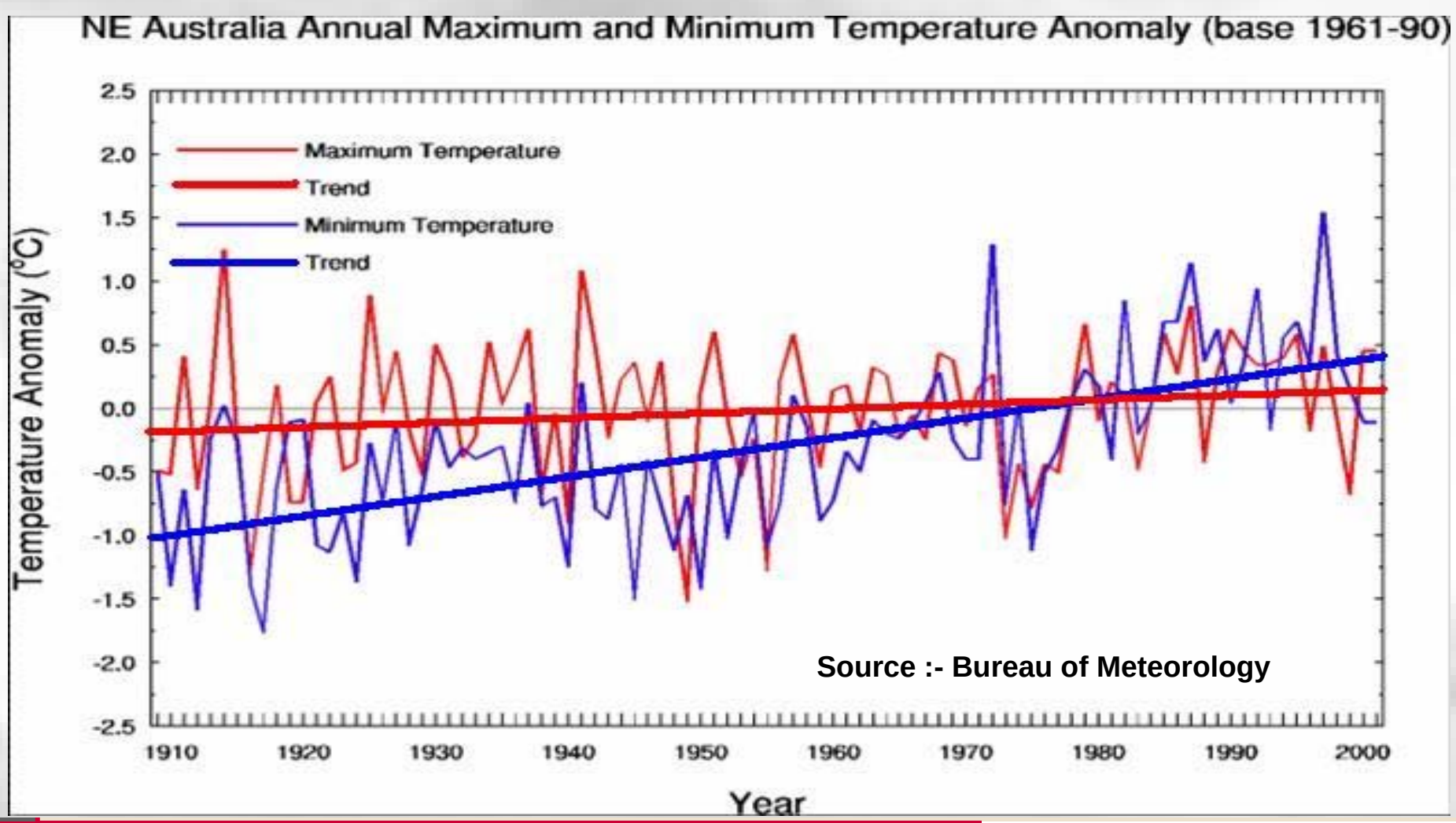
What is changing - and by how much?

Changing Temperature Trends



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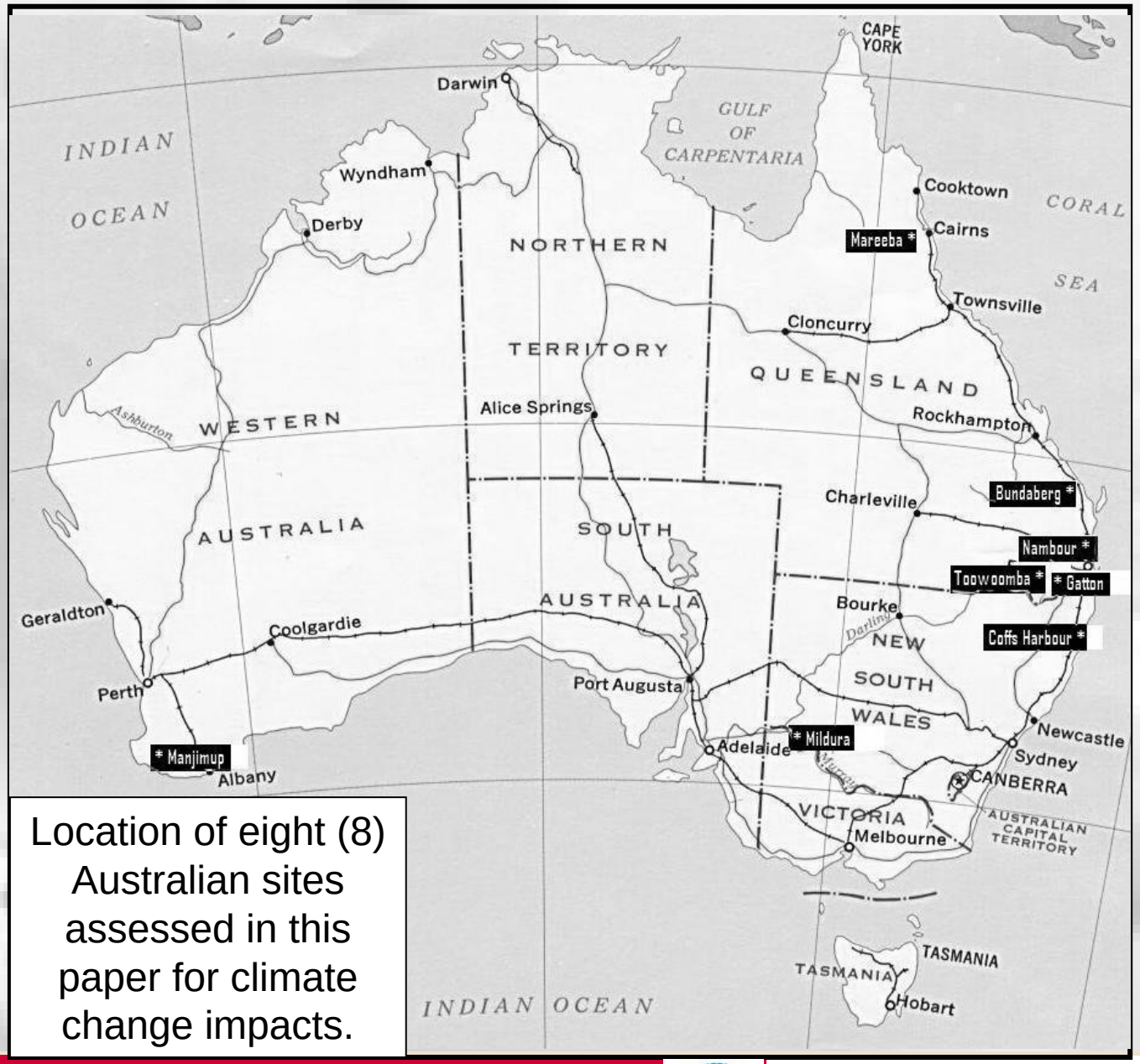

Location of eight (8) Australian sites assessed in this paper for climate change impacts.

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What is changing - and by how much?

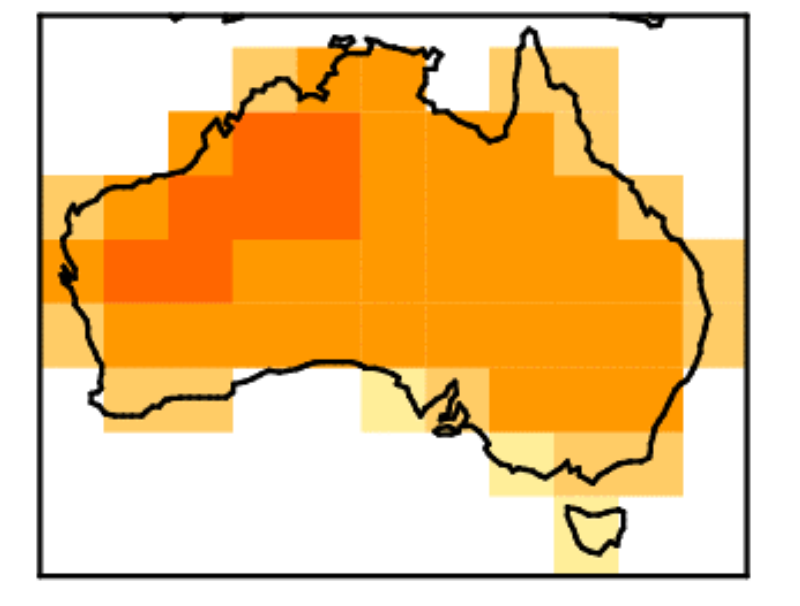
Changing Temperature Trends

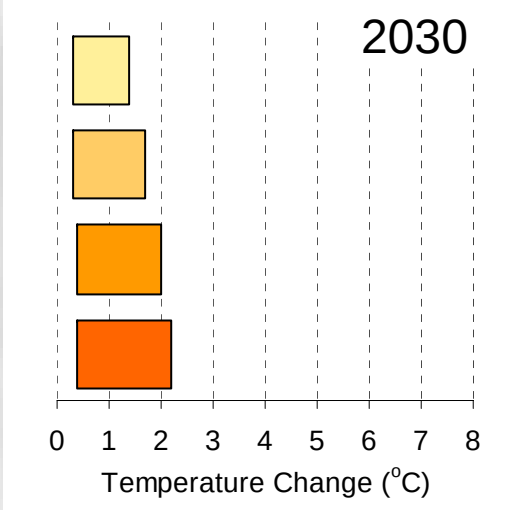
Temperature Change (°C) – 1957 to 2005.		
	Minimum Temperature	Maximum Temperature
Mareeba	2.8	0.5
Bundaberg	1.1	0.5
Nambour	3.1	0.6
Gatton	0.8	1.5
Toowoomba	1.4	0.7
Coffs Harbour	1.7	0.5
Mildura	-0.1	0.8
Manjimup	0.7	0.5

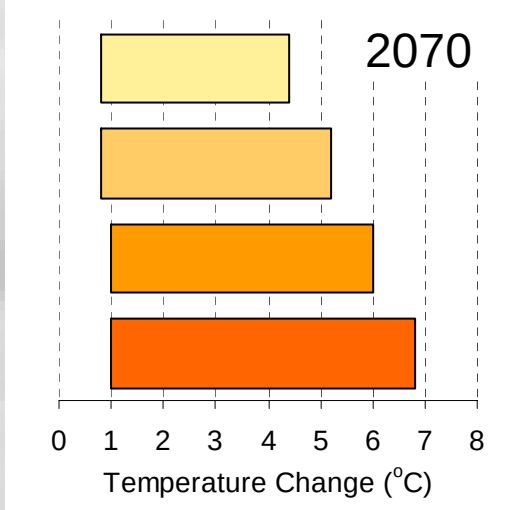
Projections of future change

Annual-mean warming (ºC)

Based on results from nine climate models







Generally: 0.4 to 2.0ºC warmer by 2030

1 to 6ºC warmer by 2070

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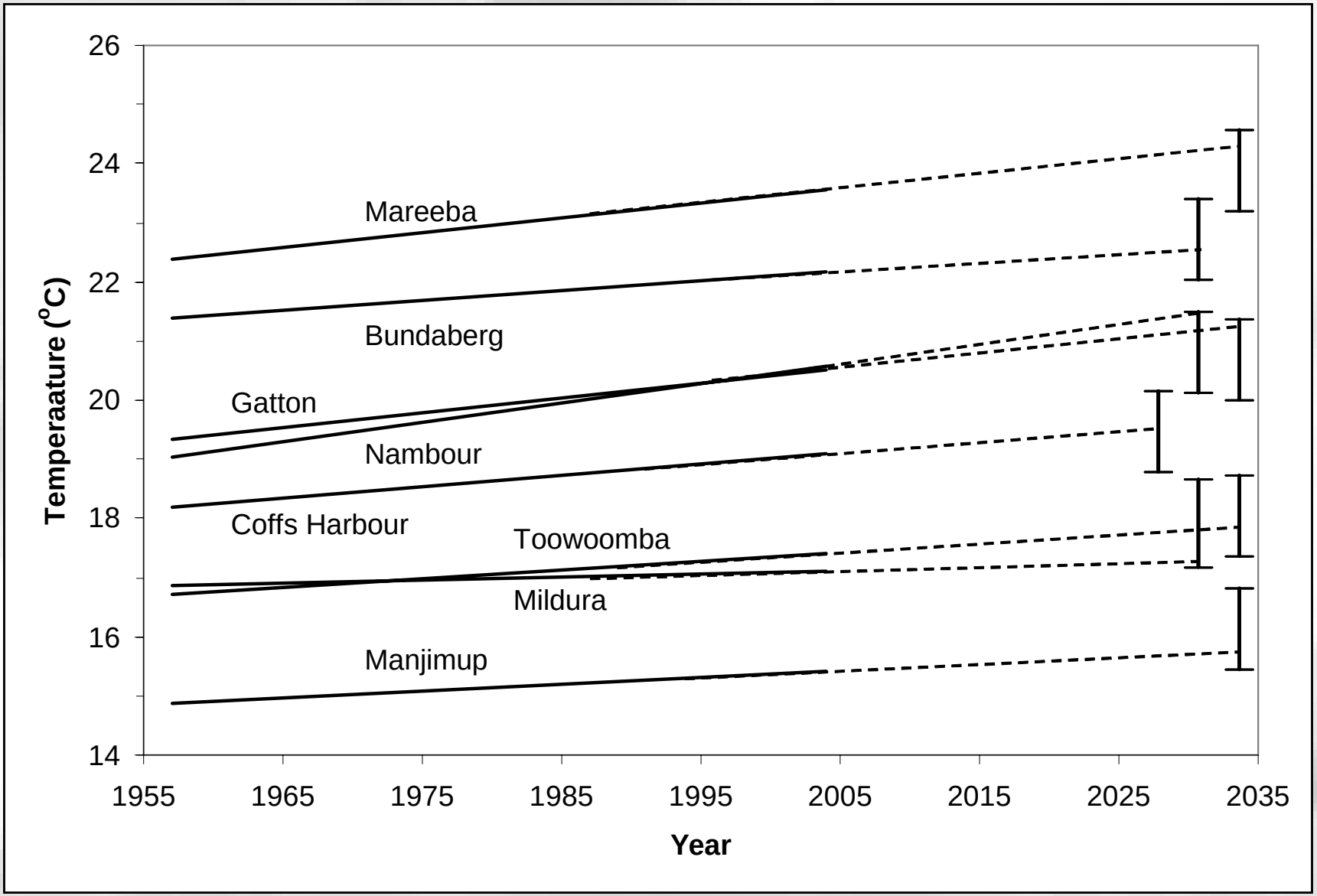
Projections of future change



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Projections of future change

Site	Mean annual temperature increase (ºC/100 yrs)
Mareeba	2.52
Bundaberg	1.70
Nambour	3.26
Gatton	1.97
Toowoomba	1.46
Coffs Harbour	1.93
Mildura	0.49
Manjimup	1.14

Risks for the avocado industry

Issues	Potential impacts on avocado growth and development
Less diurnal temperature range	Potential to reduce the overlap between open stages of male and female flower parts thus decreasing the chances for pollination (an issue for single variety plantings)
Significantly warmer temperatures in general	A shift in the growing regions - away from the hotter producing areas towards areas currently regarded as cool
Time to reach maturity	Warmer temperatures suggest that fruit will set and reach maturity earlier in the season, shifting the harvest times for different areas

Risks for the avocado industry (cont.)

Issues	Potential impacts on avocado growth and development
On-tree fruit 'storage'	Warmer temperatures may reduce the period that fruit can be 'stored' on the tree and retain acceptable fruit quality
Phytophthora cinnamomi activity	A general rise in temperature means that the disease will be active for longer periods during the year
Higher summer temperatures	Smaller 'Hass' fruit
Insect activity	A rise in temperature suggests more active insect populations (e.g. spotting bug)
Increasing no. of heat stress days	Expect more pollination failures, fruit drop and sunburn

Opportunities for the avocado industry

Issues	Potential impacts on avocado growth and development
Warmer nights	• Less chance for fruitset failure in areas that currently experience crop failures due to cold nights during flowering
Time to reach maturity	• Warmer temperatures - earlier fruit set and maturity, shifting harvest times in different areas
Higher levels of atmospheric carbon dioxide	• Greater potential for fruit set and fruit retention

How can the industry adapt?

Issue	Potential management implications
Lower diurnal temperature range	• Inclusion of pollinator varieties may need to be considered
Warmer night temperatures	• Areas previously considered too cool may now have potential as avocado production sites
Higher summer temperatures	• Increased irrigation requirements, increased water storage capacity, more accurate moisture monitoring systems and more efficient irrigation systems • Re-locate to cooler micro-climates

How can the industry adapt? (cont.)

Issue	Potential management implications
Significantly warmer autumn and winter temperatures	• Long term - cease orchard operations in areas too warm to produce a consistent flowering • 'Shepard' may be successfully grown in more southerly districts
Phytophthora cinnamomi activity	• Even greater attention required to control this disease
Insect activity	• Closer monitoring and more responsive management of insect pests and predators
Increasing number of heat stress days	• More effective irrigation scheduling and application • Application of sunburn protection for fruit • Selectively harvest exposed fruit

Key research challenges

- **Continue research into rootstocks better able to handle harsh conditions & disease pressure**
- **Continue to assess 'Hass'-like alternatives**
- **Continue to improve *Phytophthora* control measures**
- **Determine shifts in crop maturity times, apply to marketing plans**
- **Better understand and take advantage of CO_2 fertilization**

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Key research challenges (cont.)

- Identify current "at risk" production sites and new areas that may be suitable for production, following climate change
- Understand current climate variability
- Monitor climate changes in existing production areas
- Identify options to manage climate variability and adapt to a changing climate
- Improve the reliability of climate change modelling outputs, to reduce the variation within future scenarios

Further Reading

The Intergovernmental Panel on Climate Change (IPCC)

- www.ipcc.ch/

Australian Working Group conclusions updated in 2003

- www.greenhouse.gov.au

Bureau of Meteorology - Climate Change

- www.bom.gov.au/climate/change/

CSIRO – Climate Change Projections and Solutions

- www.dar.csiro.au/publications/projections2001.pdf
- www.csiro.au/csiro/ghsolutions/index.html

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