

Adaptation of Agricultural Industries to Current and Future Climates

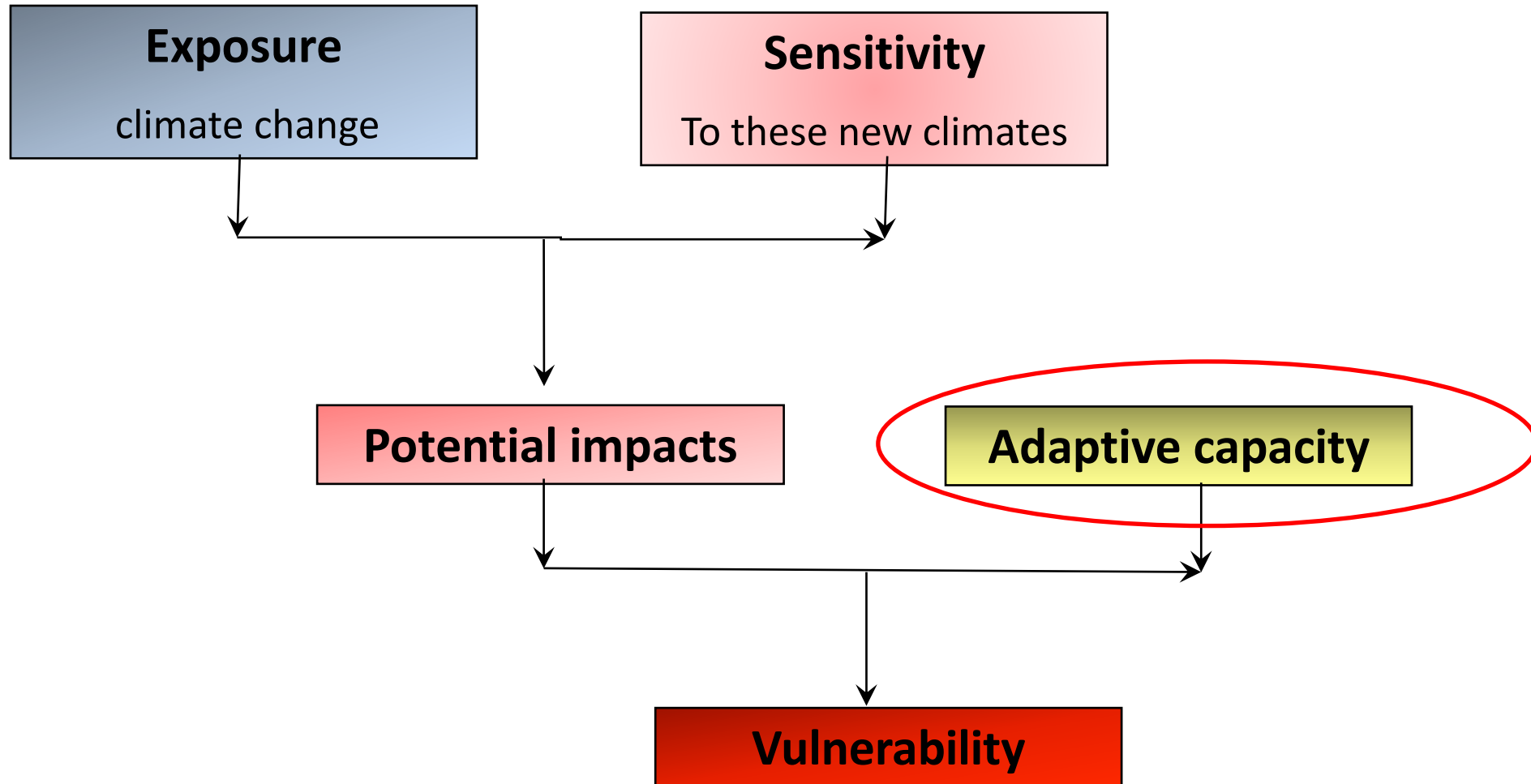
Land Use change Issues

Snow Barlow

The University of Melbourne

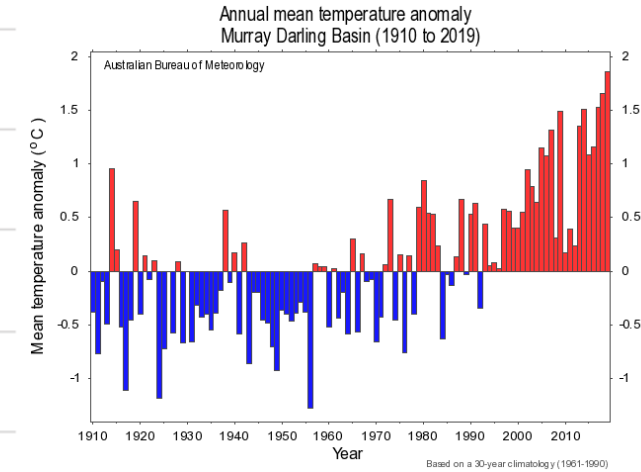
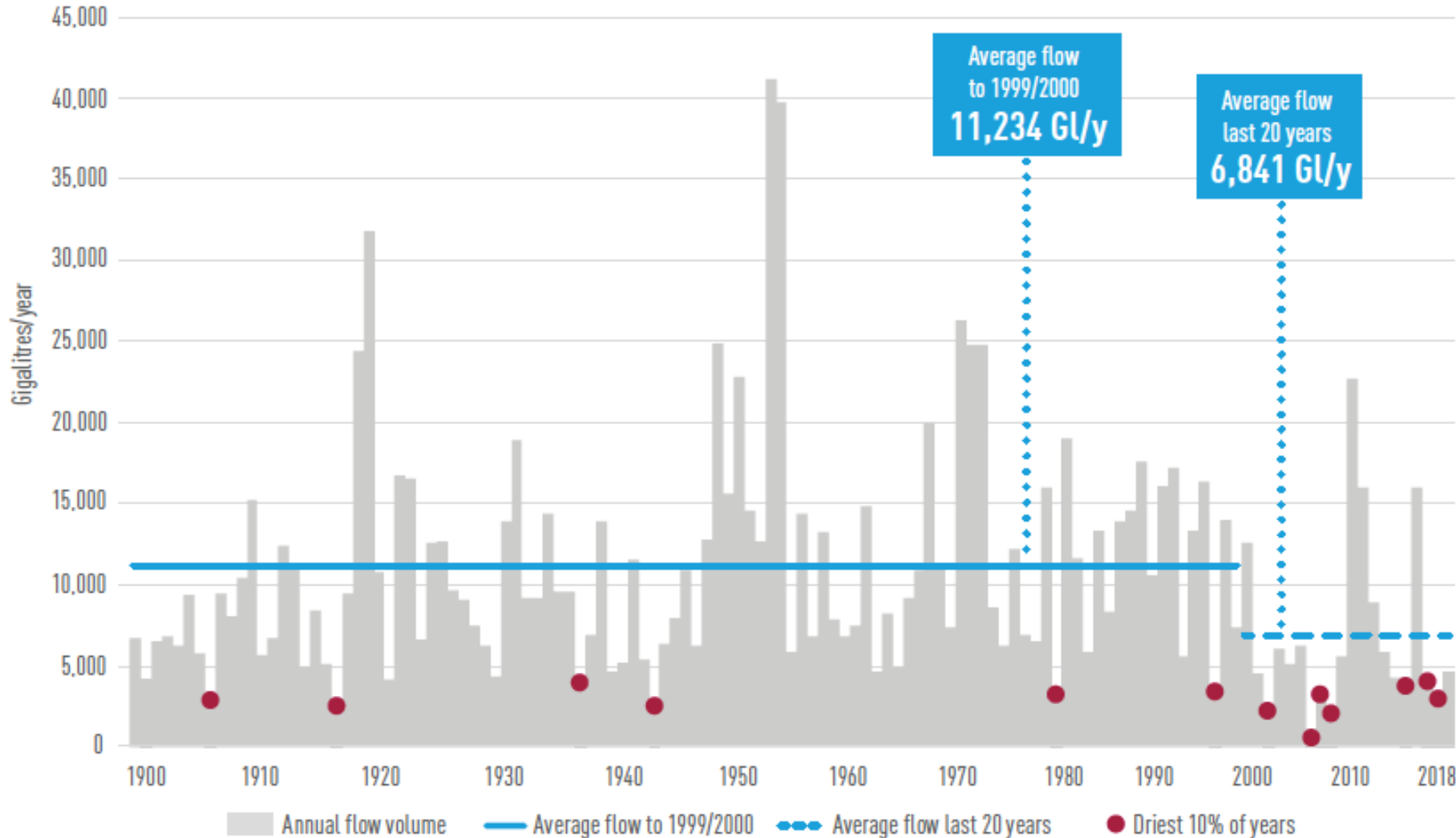
- Now Impossible to discuss adaptation without mitigation as well - *part of problem and solution*
- Very encouraging rise in engagement of agricultural and NRM communities in climate change
- Strong evidence that farmers are adapting to climate change as it accelerates with more 'extreme' extreme weather events
- As we progress towards +2°C more transformational change is likely and need to consider planning for it and ensuring it is integrated the the needs of NRM to adapt and Mitigate as well
- Climate change is initiating substantive agricultural land use changes in Southern Australia
- Important to appreciate that CC can create opportunities as well as threats

Climate Change Adaptation - a risk management framework



Impact of Climate Change on the Average inflows into the Murray River

Reduction in long-term average inflows to the River Murray

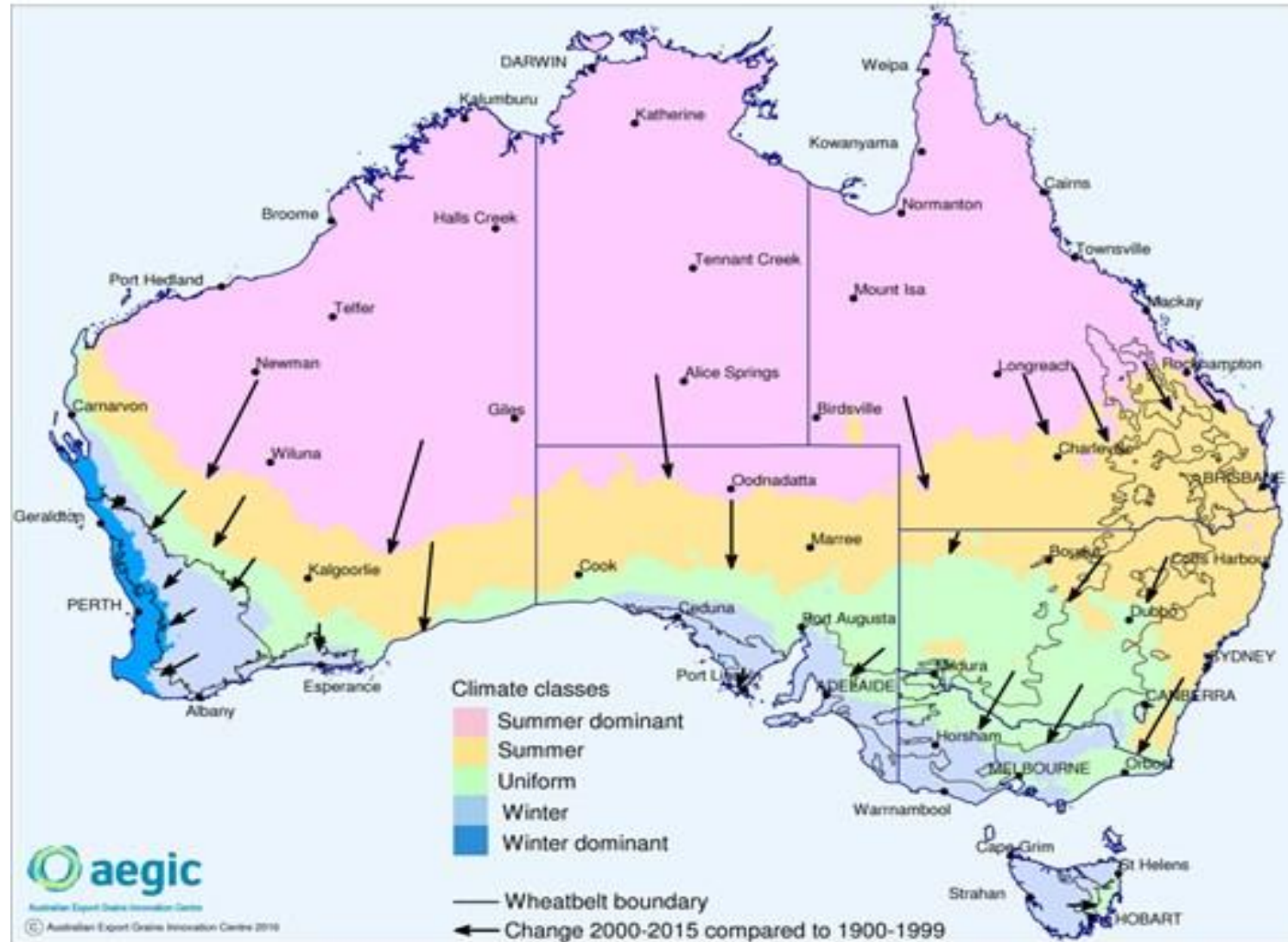


- 40% reduction in Murray inflows over past 20 years
- Coincides with 1° C warming over these past 20 years
- Of the Driest 10% of years 6/13 occurred in past 20 years

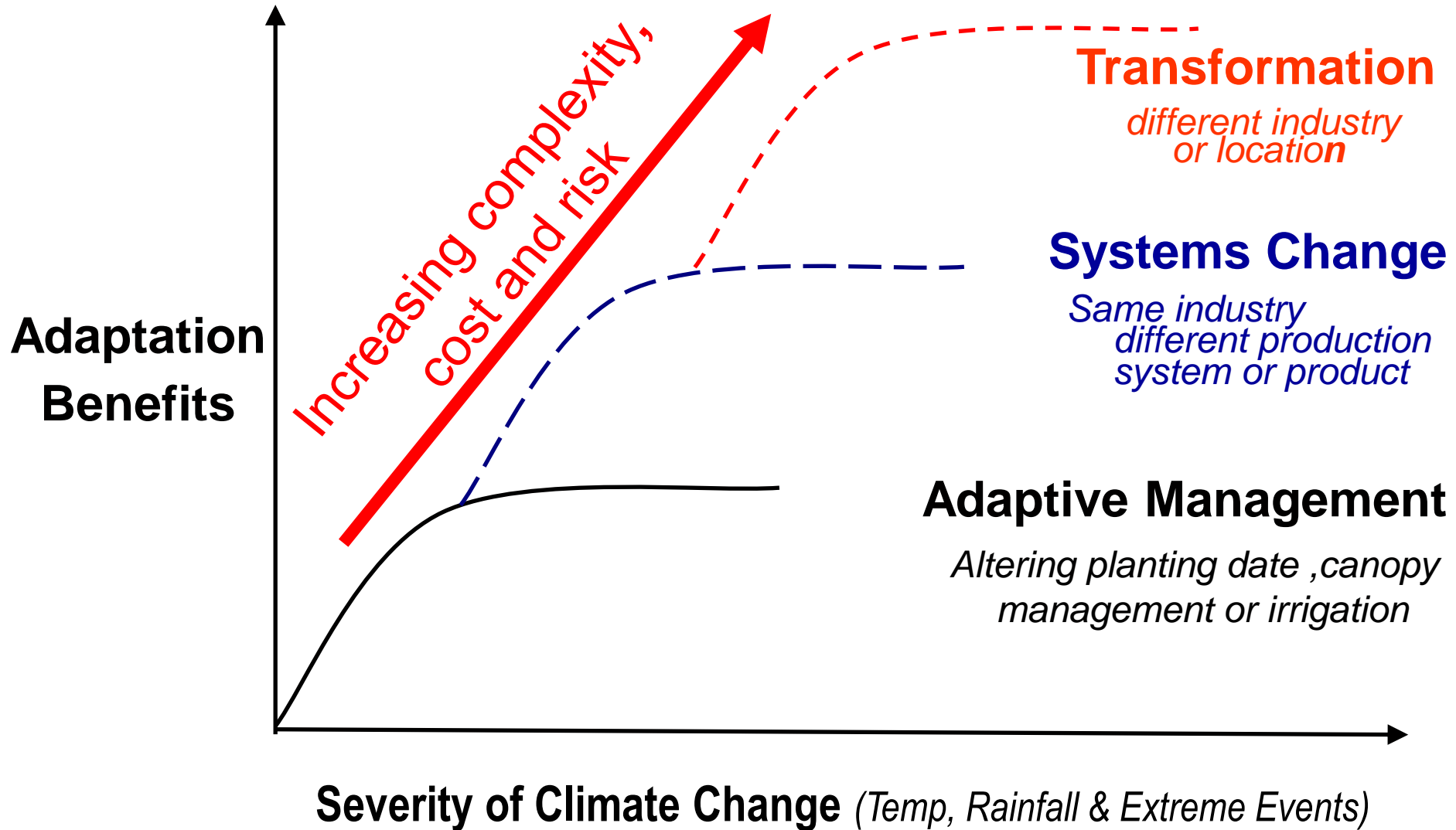
Climate Impacts - *Changing patterns of rainfall seasonality*

Australia Seasonal Rainfall Zones

Based on rainfall data 2000-2015

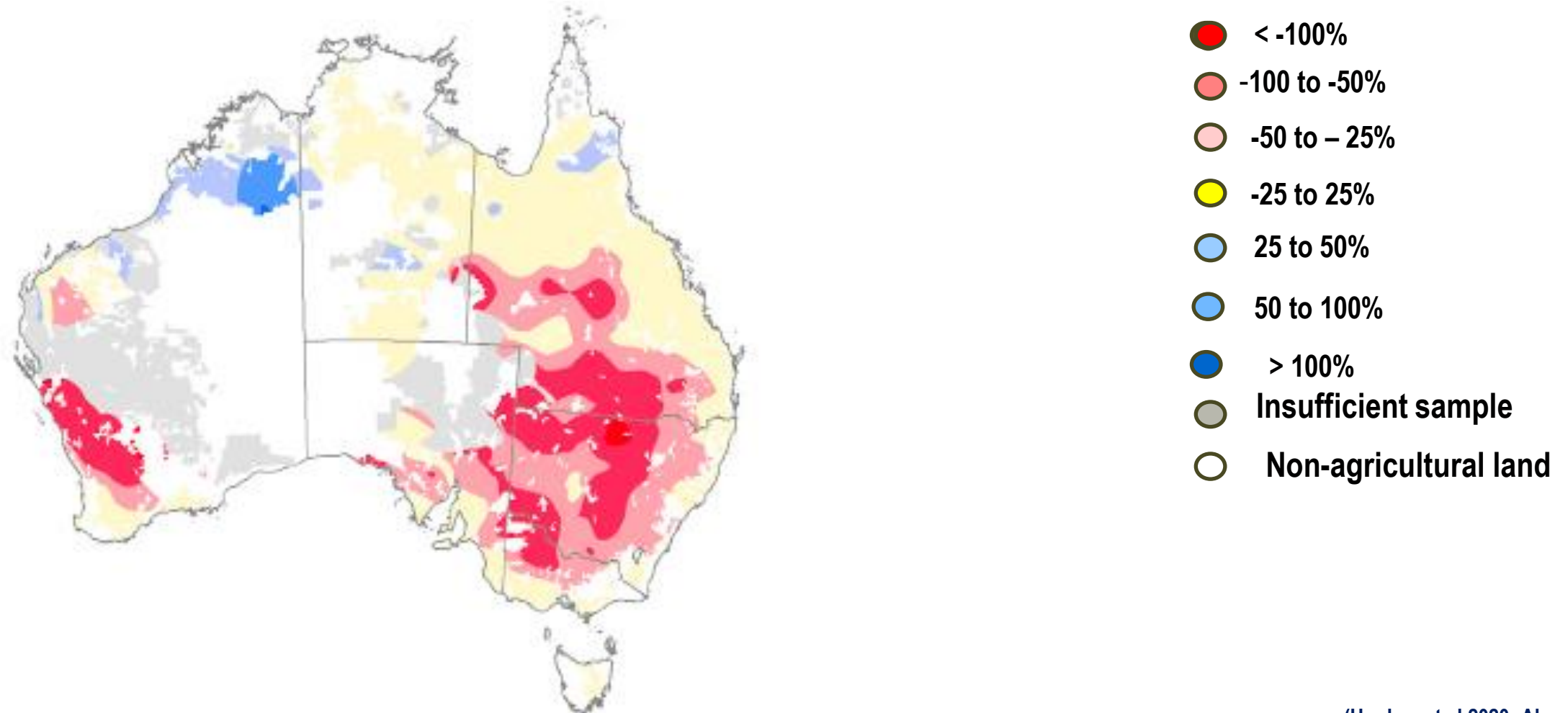


Successive 'levels' of adaptation

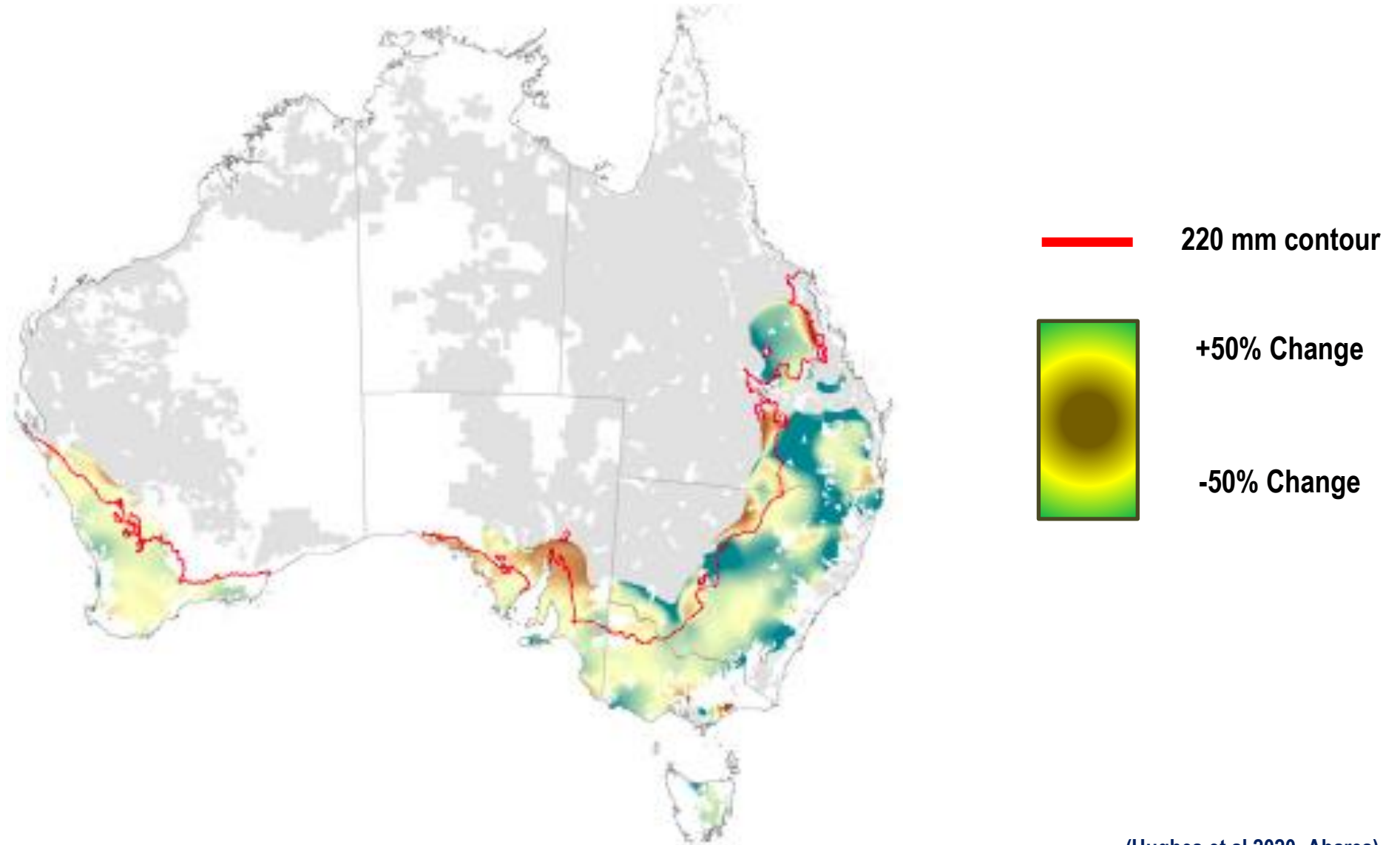


Farmers are already being affected by climate change

Effect of Recent (2001-2020) seasonal conditions on farm profit

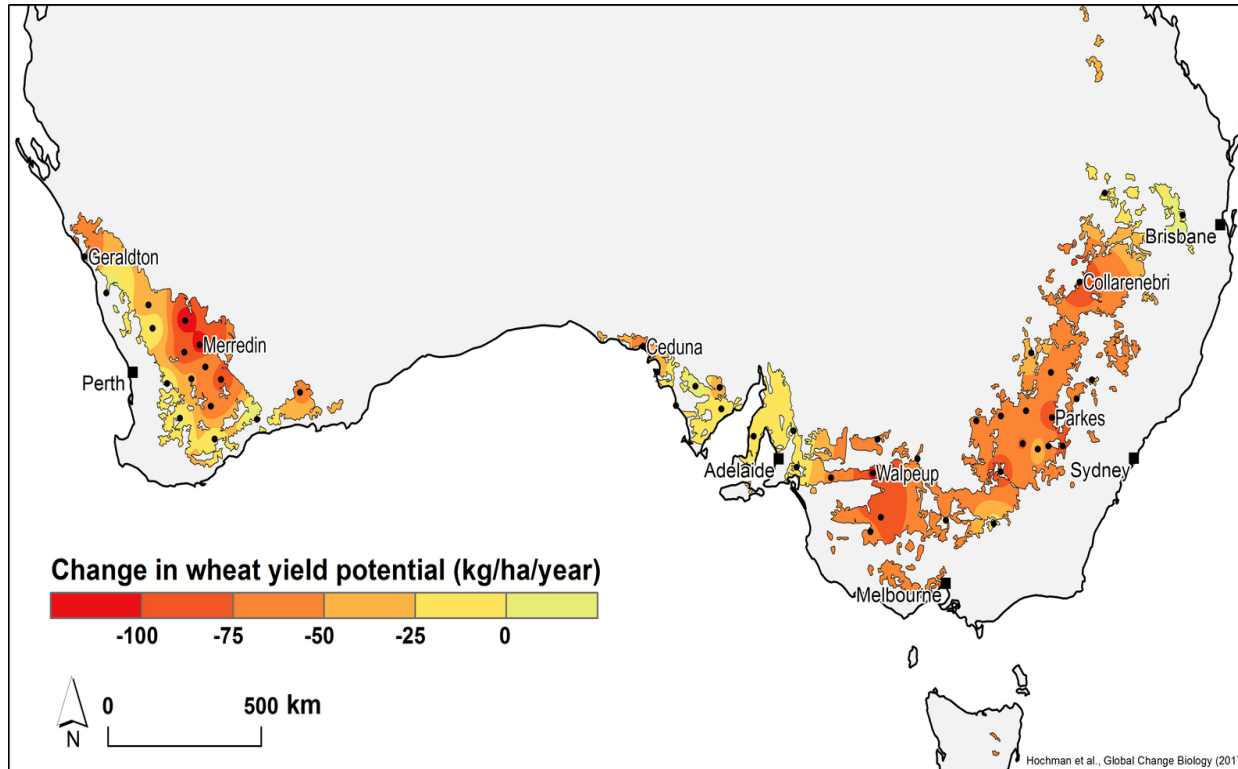


Land use changes to cropping 2016 -2020 relative 2006-2010



Actual wheat yields have remained constant since 1990, but

Potential Wheat Yield declined from 4.4 to 3.2 tonnes per hectare since 1990



Yield Decline Due to:

Decreasing rainfall	-83%
Increasing Temperature	-17%
Increasing CO ₂	+ 4%

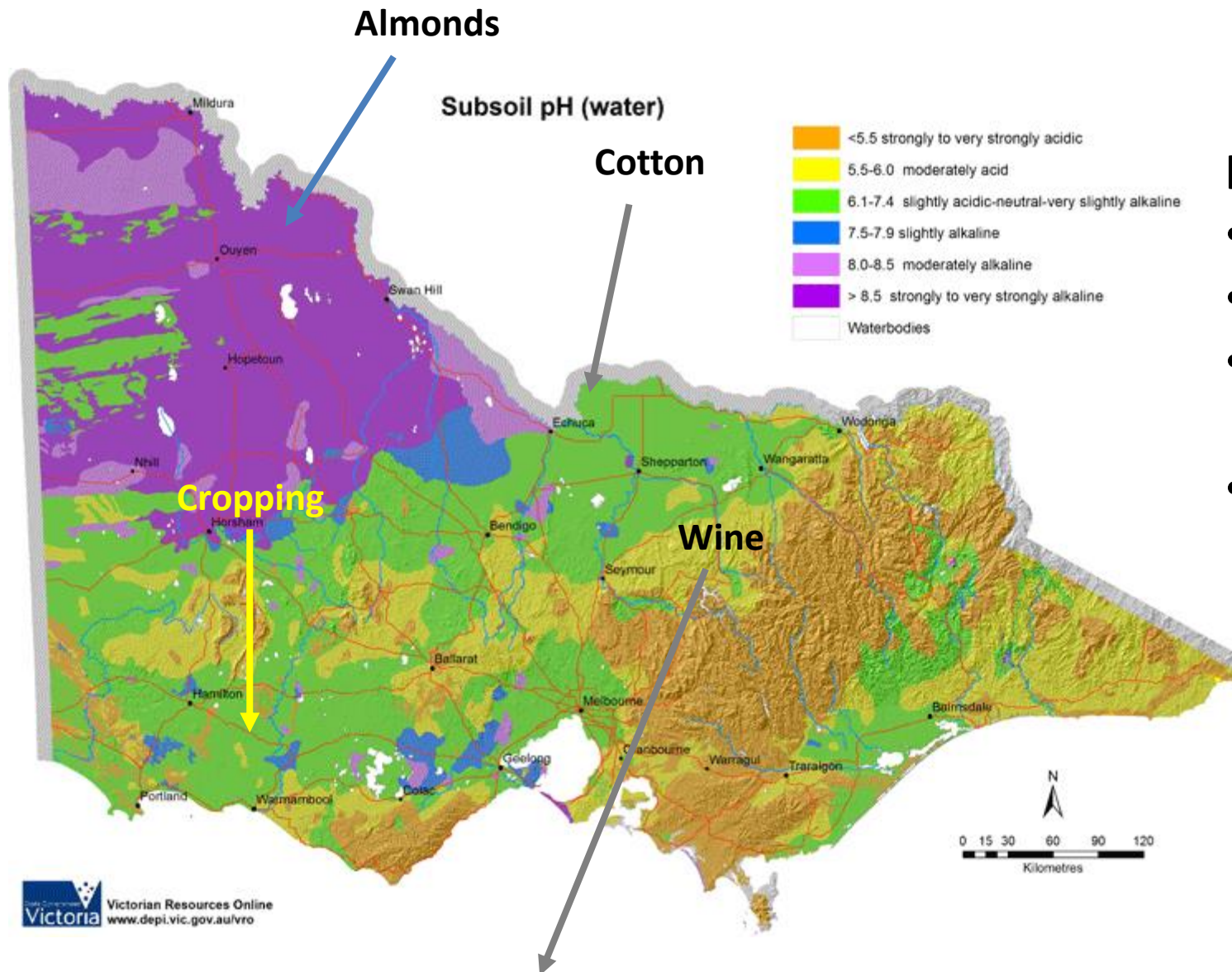
Climatic changes since 1990

- **28% decline in growing season rainfall**
- **Max daily temp increase 1.05°C**

Actual yields constant due to farmer uptake of new technology

But this cannot continue, as yield improvements are not limitless

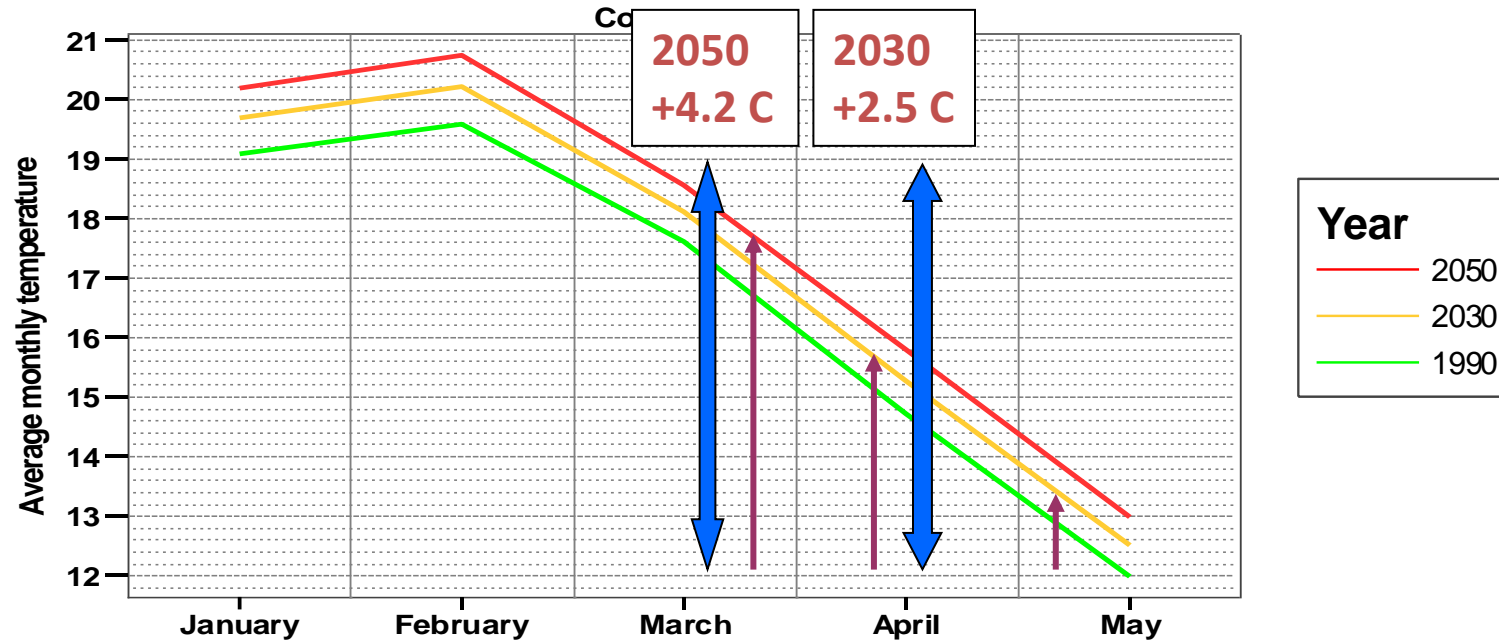
Land use changes in response to Climate Change and markets



Industries on the move

- **Almonds** –water and markets
- **Cotton**- water and warmth
- **Grain cropping** –rain and warmth
- **Wine** – cool climate and smoke

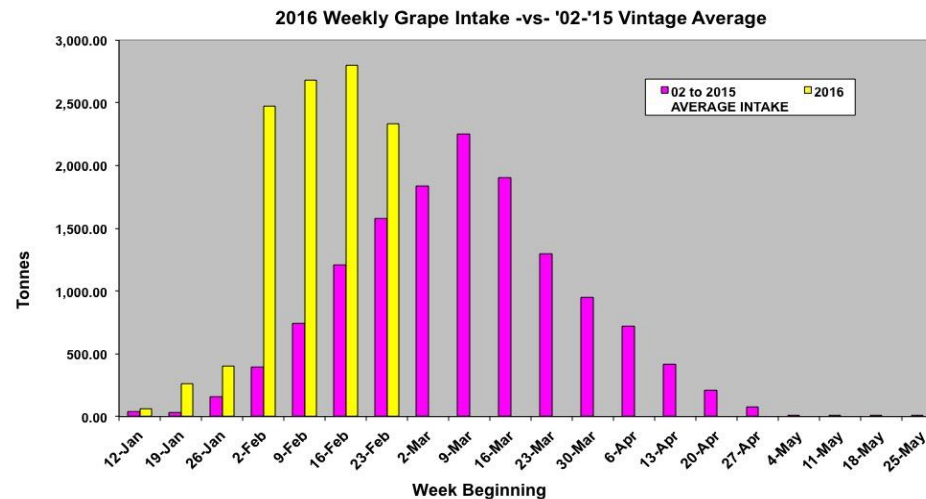
Impacts of Climate Change in Grape Maturity –what’s happening



Grape Quality



Vintage Compression



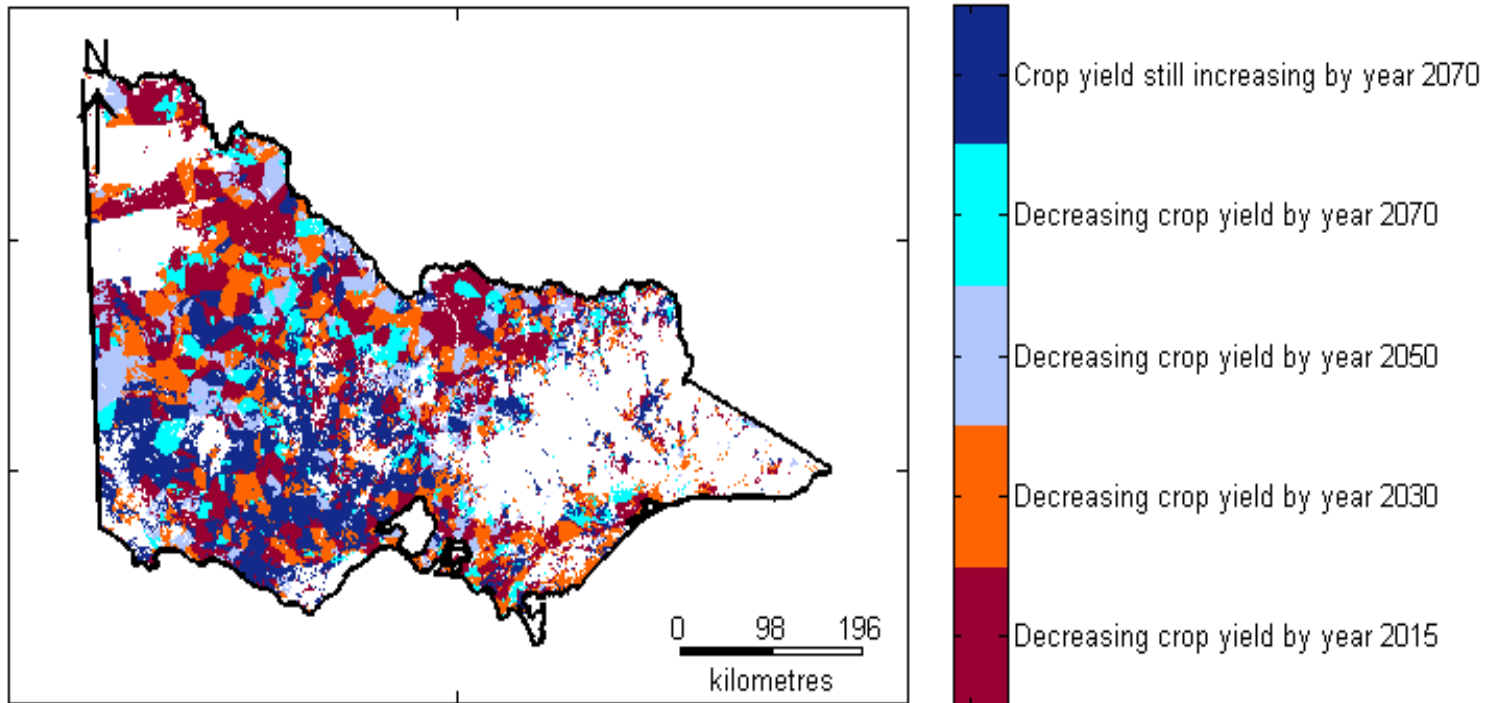
Alcohol Content



(Webb, Whetton, Barlow 2007)

Transformational change is already happening

250,000 ha of 'new' grain cropping in the Western Districts in past 20 years



Cotton industry is expanding South

Southern NSW and Vic

Since 2001

- Cotton acreages increased by 420%
- Cotton production increased by 700%
- Cotton now in Victoria !
- Combination of technology and climate change



“It is not the strongest of the species that survives, nor the most intelligent that survives.”



“It is the one that is the *most adaptable to change.*”