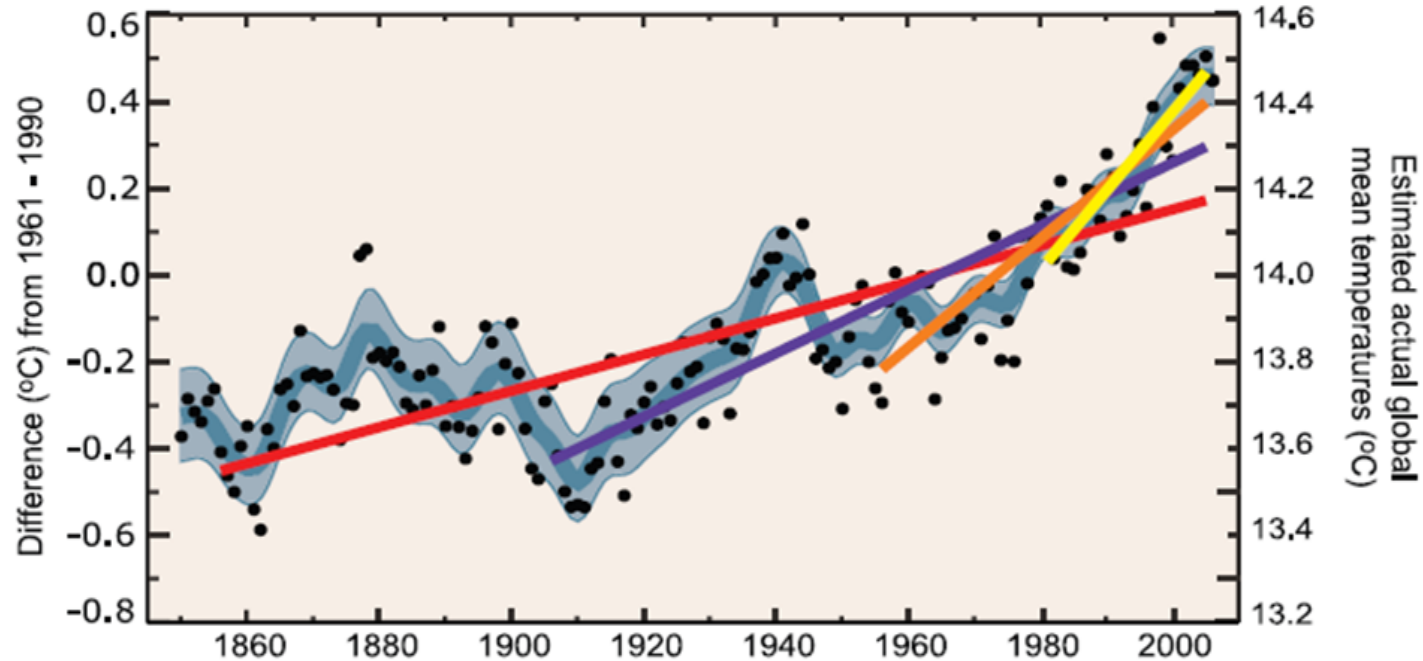


# Challenges of climate change to Truffles

## *Lessons for the Wine Industry*



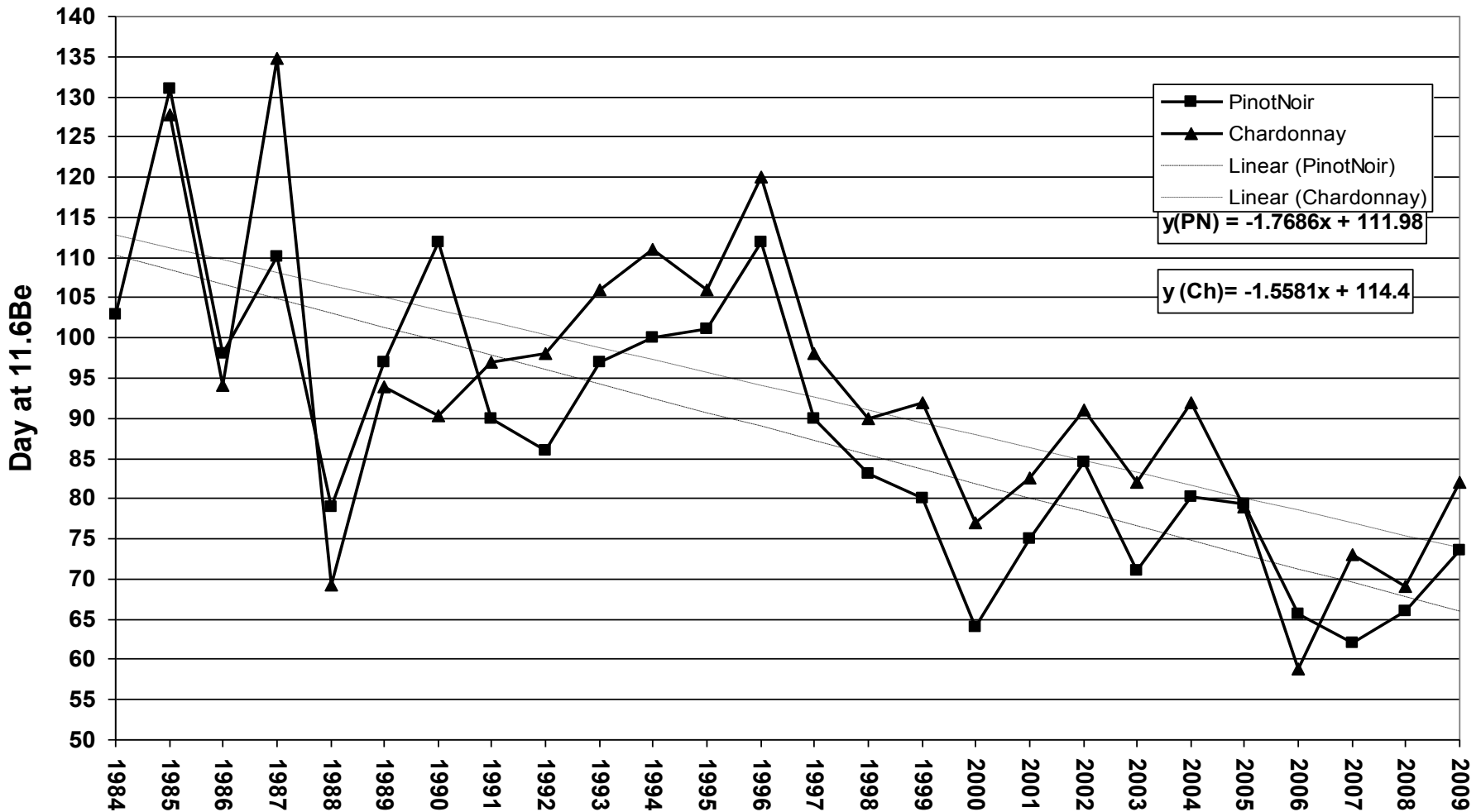
**Professor Snow Barlow FTSE, FAIAST**  
**University of Melbourne**

# Grapevine Phenology Has Been Profoundly Influenced by CC

*Globally vintages are moving forward in most regions under climate change*

*Some Australian regions have moved forward by 1.6 days per year over past 25 years*

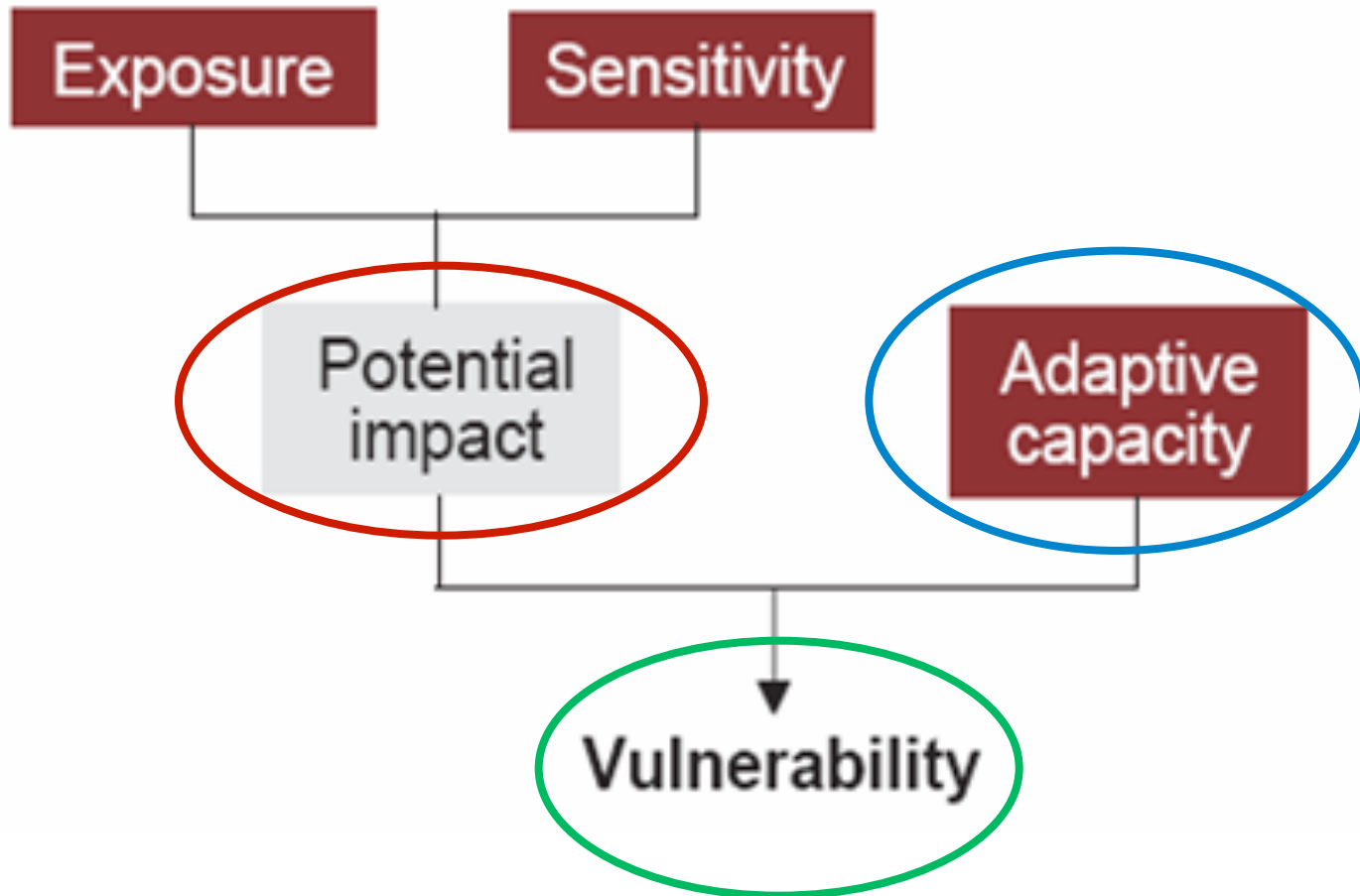
Mornington Peninsula  
Trended TSS



# Climate Change Adaptation Framework

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## VULNERABILITY AND ITS COMPONENTS

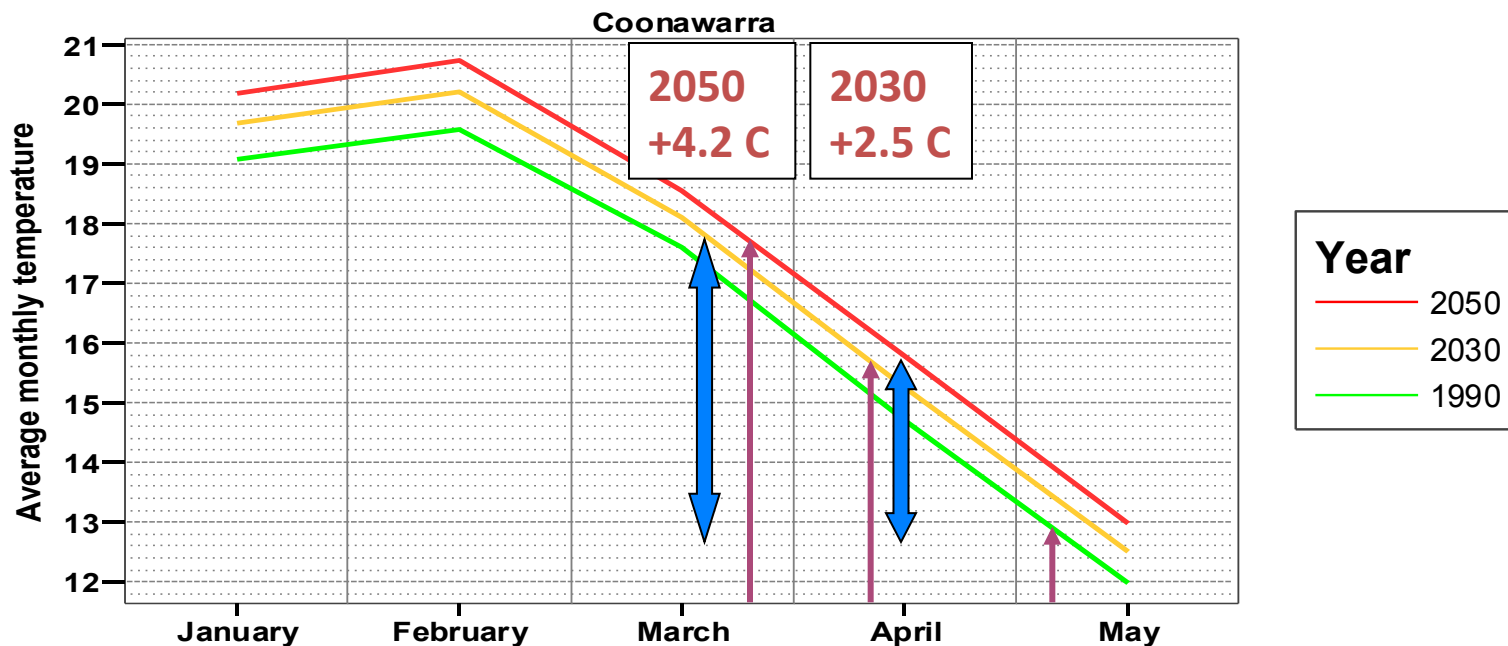


# Improving Adaptive Capacity requires industry engagement

*But How ?*



# Potential Impacts of Climate Changes in Grape Maturity



**+ -Altered fruit composition**



**--Vintage compression**



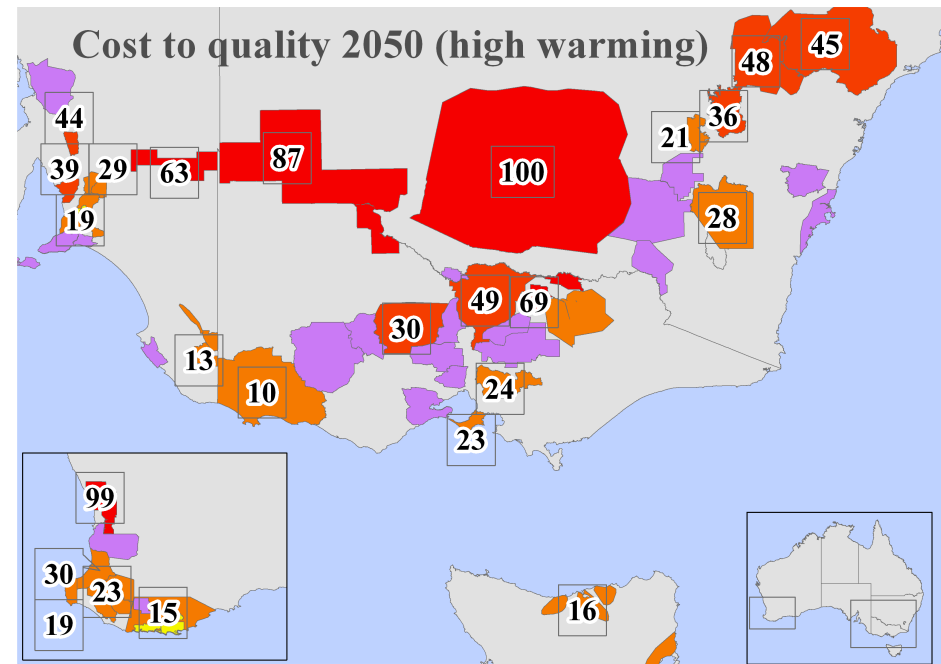
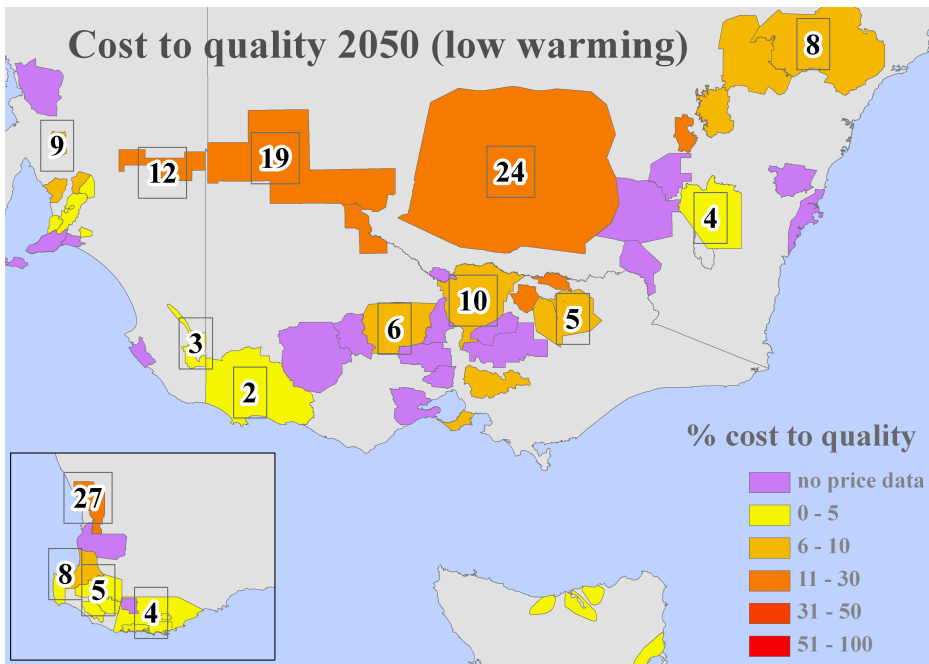
**--Pressure on winery infrastructure**



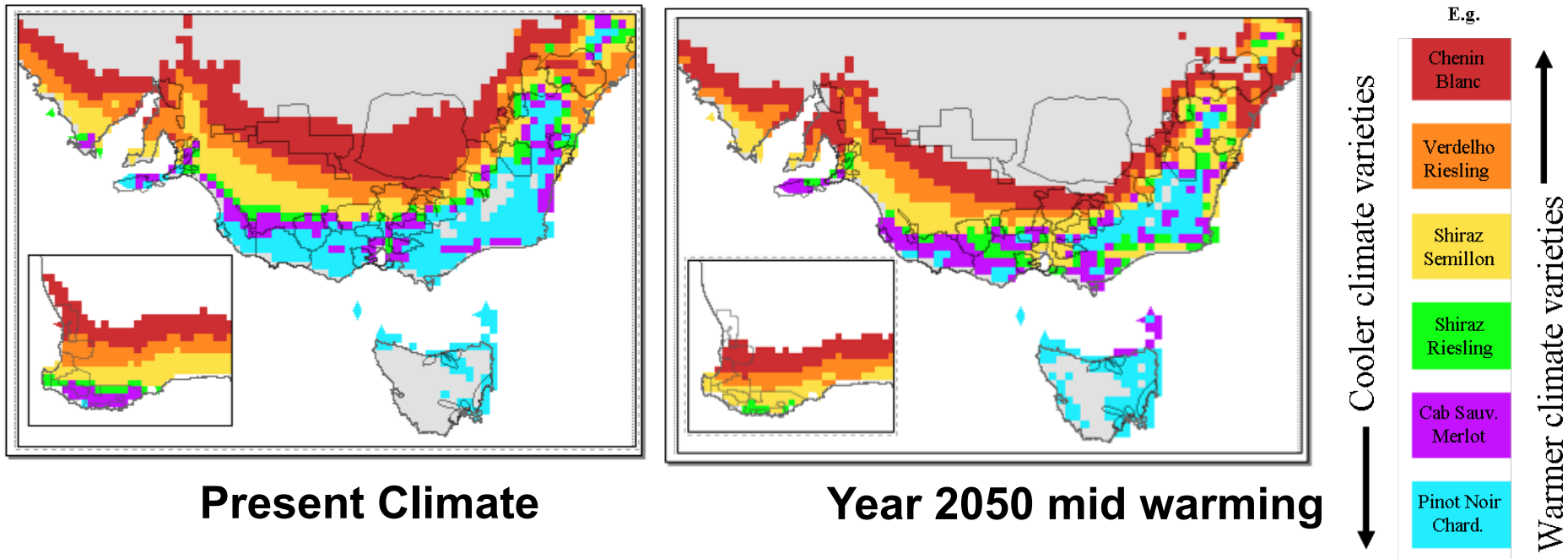
**+--Higher Alcohol wine**

# Potential Impacts of Climate Change on Grape Quality in major Australian wine regions

## Potential Impacts *-without Adaptive measures*



# How will wine growing regions 'move' in future climates



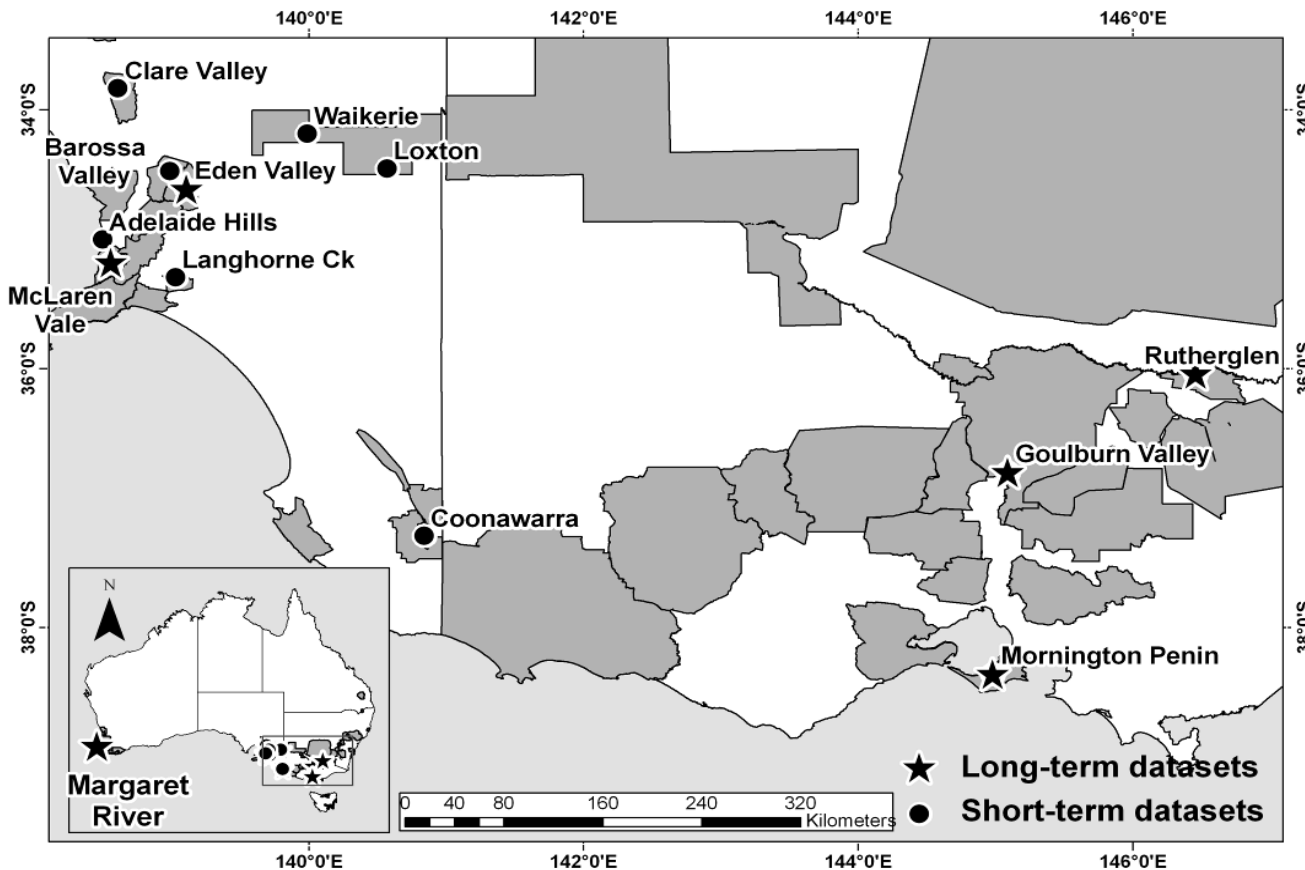
## *Adaptation Options*

- Stay where you are and change varieties.
- Move to suitable climate for existing variety.
- Develop adaptation strategies

# Immediate Management Responses to Changing Phenology

- 1. Are temperatures these changes in phenology solely due to increasing temperatures ?*
- 2. If not, what other factors are involved ?*
- 3. Are these factors able to be manipulated as part of a CC Adaptation Strategy ?*

*Retrospective study of vintage records -44 vineyard blocks ,12 Australian winegrape regions*



Long term (> 25yrs)

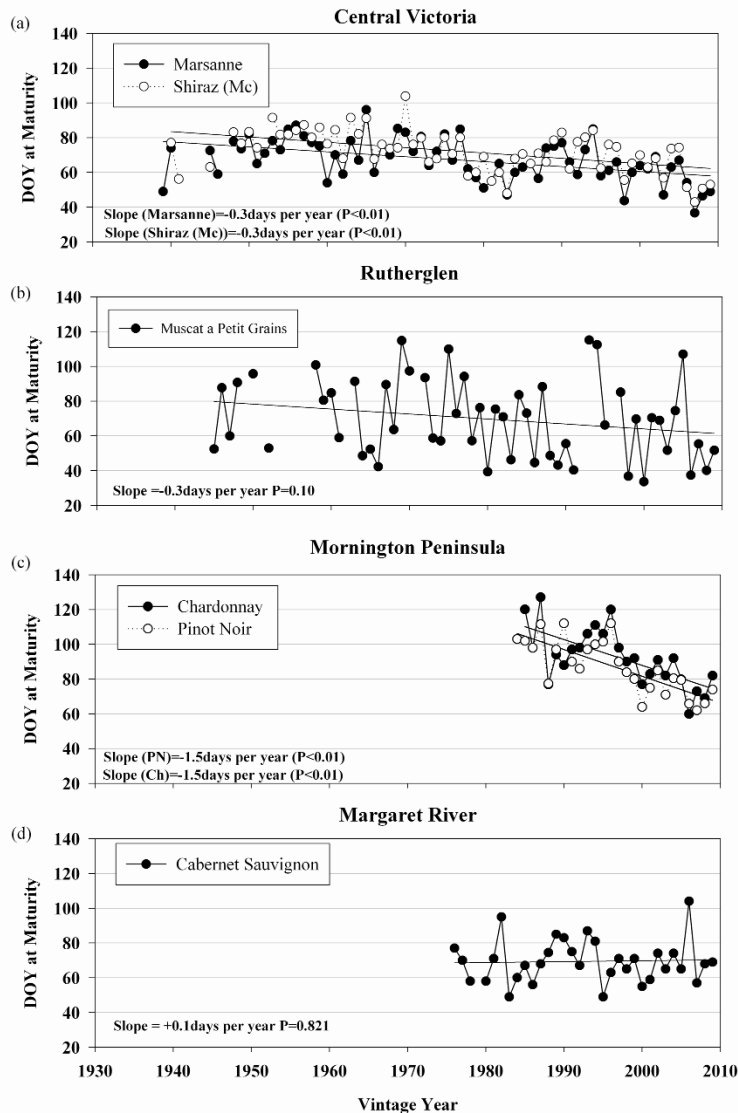
11 blocks (ave~50yrs)

Shorter term (<25yrs)

33 blocks (avg~17yrs).



# Observed Changes in Maturity



*A trend to earlier maturity of winegrapes was observed in 43 of the 44 vineyard blocks.*

*This trend was significant for six out of the 11 **long-term** blocks for the complete time period for which records were available.*

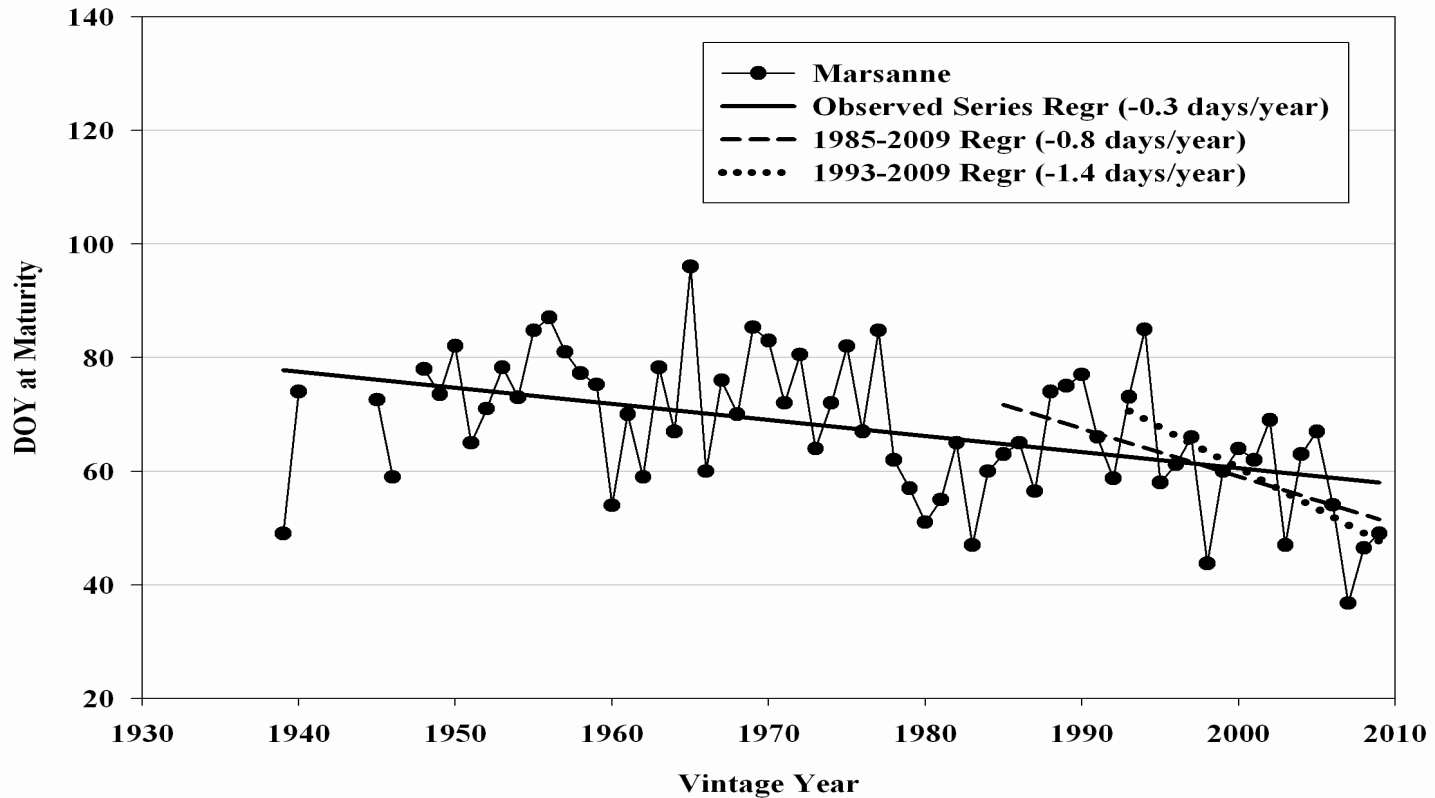
*For the period 1993-2009, 35 of the 44 vineyard blocks assessed displayed a statistically significant trend to earlier maturity.*

# Rate of change in Maturity increased with time

*Average rate of Advance*

**1985-2009: 0.8 days/yr**

**1993-2009: 1.7 days/yr**



# **OUTCOMES**

- *Trends in maturity observed across majority of regions*
- *These trends related to observed growing season temperature changes (GST)*
- *Maturity trends were accelerating with climate change*
- *Significant harvest compression*
- *Major drivers for change were*
  - *Growing season temperature (GST)- 36%*
  - *Seasonal subsoil moisture -34%*
  - *Yield manipulation -30*
- *In terms of adaptation strategies to minimize maturity shifts approximately 64% of the drivers could be manipulated by vineyard management*

*More than 85% of winegrape industry thinks that Climate Change is an issue to be addressed*

# APPETITE FOR CHANGE

GLOBAL WARMING IMPACTS ON FOOD AND FARMING REGIONS IN AUSTRALIA

PREPARED BY THE UNIVERSITY OF MELBOURNE FOR EARTH HOUR 2015



MELBOURNE SUSTAINABLE SOCIETY INSTITUTE

David Karoly

**Warming** of 0.5 to 1.6°C by 2030. More frequent **heat waves** and hotter **hot days**.



**Warming** of 0.6 to 1.2°C by 2030. Fewer frosts, more **heat waves**. 20% increase in days over 35. **Rainfall decline** and more frequent **droughts**.



**Warming** of 0.6 to 1.3°C by 2030. More frequent **heat waves** and hotter **hot days**.



**Warming** of 0.6 to 1.2°C by 2030. More **hot days**, fewer frosts. Increase in **heat waves**.



**Warming** of 0.5 to 1.2°C by 2030. More frequent **heat waves** and **hot days**.



**Warming** of 0.6 to 1.3°C by 2030. More frequent **heat waves** and **hot days**, fewer **frosts**. 20% increase in days over 35. **Reduced rainfall**.



# Future Climates

## *Manjimup*

### **2030**

- + 0.9°C
- -6% rainfall
- Current climates
  - Mudgee
  - Benalla

### **2050**

- +1.7°C
- -11% rainfall
- Current climate
  - Tenterfield
  - Stanthorpe

*Need to decide whether these climates are suitable for truffle production or how could you adapt to these climate conditions*

## A word from Charles Darwin

“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.”*