Australia & Surrounding Regions: Impact of Global Warming on Farms & Food Security

Food Industries Association Queensland: Annual Conference 2021

Who said it? (Round 1)

- "Agriculture is the prism through which we have historically thought about the effect of climate on the economy. Today, climate change presents significant risks and opportunities for a broader part of the economy than agriculture, though the impact on agriculture continues to be significant."

Who said it? (Round 2)

“There is no company whose business model won’t be profoundly affected by the transition to a net zero economy—one that emits no more carbon dioxide than it removes from the atmosphere... Companies pursuing a well-defined long-term plan to transition to ‘net zero’ will “distinguish themselves” with the full scope of their stakeholders by demonstrating confidence in their ability to navigate the transition. **Those who are unable to deliver such a plan will suffer financially.”**

Who said it? (Final Round…)

“It might be green electricity, it might be green ammonia, it might be green hydrogen. If you really care for what your citizens want, make sure you’re not building a dinosaur or licensing a dinosaur.”

The Takeaway?

"…this is not all about some expensive politically correct, green act of bunny-hugging, or however you want to put it… This is about growth and jobs…"

A short history

- Starting the story in 1978 – Telecom had developed reliable solar cells that could be installed affordably across the country and be infrequently maintained.
- 1983 – Perth hosts Solar World Congress
- Energy Research & Development Corporation launched 1990 - scrapped in 1996
- Howard's RET – 1997
- Kyoto – Land Sector Implications- 1997
- Bipartisanship on ETS – early 2000s
- Carbon Tax debacle - $100 lamb roasts - 2012
- 2020? Still no national strategy on climate change and agriculture, no energy policy or investment framework and emissions are rising

- The last thing people need, at this time… is the ravings of some pure, enlightened and woke capital city greenies" Deputy Prime Minister and Leader of the National Party, Hon Michael McCormack, Nov 2019

- "It is 2020, we're talking about 30 years in advance and a lot of people, I know, set their hair on fire about climate change and all the rest of it…" Deputy Prime Minister and Leader of the National Party, Hon Michael McCormack Feb 2020

Australian agriculture

- Contributes nearly $60 billion to the nation's economy.
- 2.2% of value added (GDP) and 2.6% of employment in 2018–19
- 11% of goods and services exports in 2018–19;
- Direct employment for around 228,000 on-farm domestic workers
- Indirect employment for an additional 1.5million Australians (supply chain and supporting industries)
- 58% of Australian land use (446 million hectares, excluding timber production) and 59% of water extractions (9,434 gigalitres used by agriculture in 2015–16);
- $30 billion worth of food annually, daily providing food for up to 40 million people outside the country
- Australian agricultural sector was responsible for approximately 13% of Australia's total GHG emissions in 2017

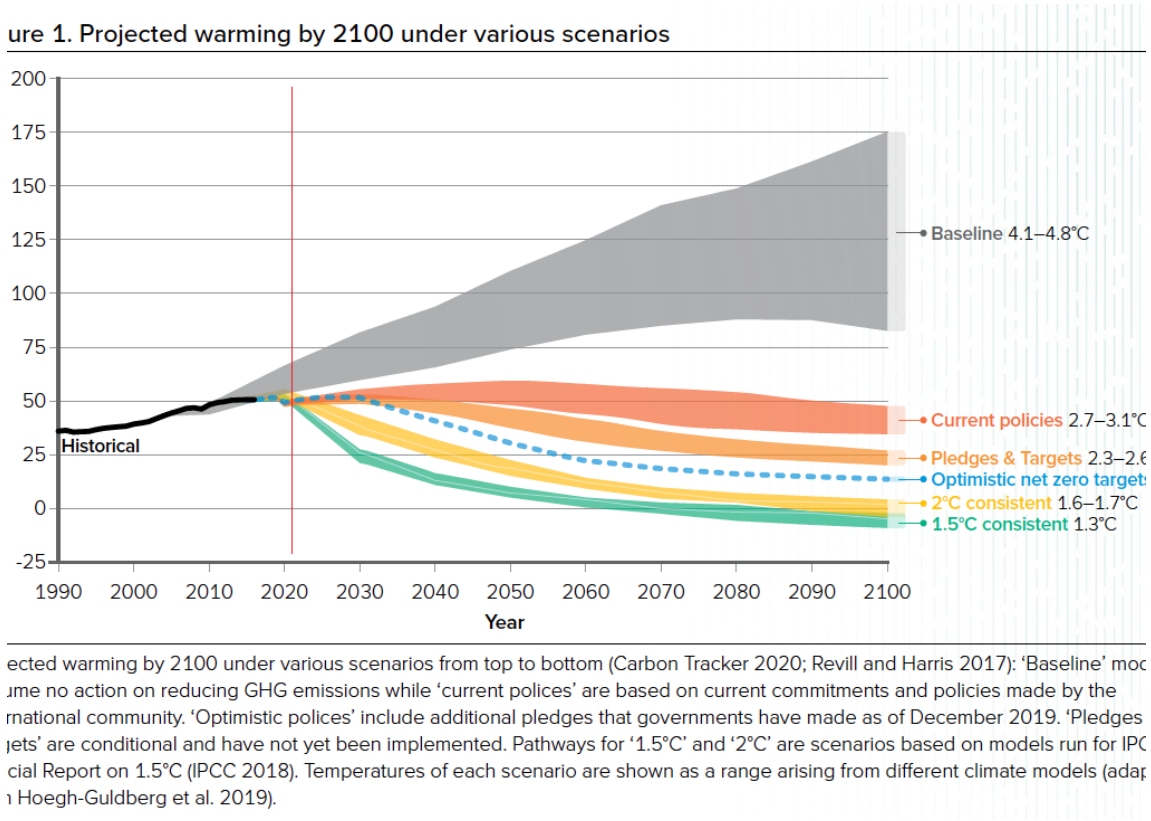
Global Mega Trends

- **A hungrier world:** population growth will drive global demand for food and fibre
- **A wealthier world:** a new middle-income class will increase food consumption, diversify diets and eat more protein
- **Choosy customers:** information-empowered consumers of the future will have expectations for health, provenance, sustainability and ethics
- **Transformative technologies:** advances in digital technology, genetic science and synthetics will change the way food and fibre products are made and transported
- **A bumpier ride:** globalisation, climate change and environmental change are reshaping the risk profile of agriculture.
- **Rising political domestic unrest**

Grand Challenges for Australian Agriculture

- Climate change
- Seasonal variability and the increasing risk of more extreme events
- Degradation and loss of natural resources affecting land, water and air quality
- Efficiency of nitrogen-use in production systems
- Food losses and waste of approximately 30%
- Compounding changes to operating environments: incompatible land use and resource ownership
- Erosion of connections between the rural and urban sector (inadequate internet, limited medical services etc all combine to decrease the resilience of our food and fibre supply chains)

Climate Change: the Global Picture



ected warming by 2100 under various scenarios from top to bottom (Carbon Tracker 2020; Revill and Harris 2017): 'Baseline' moc
ume no action on reducing GHG emissions while 'current polices' are based on current commitments and policies made by the
rnational community. 'Optimistic polices' include additional pledges that governments have made as of December 2019. 'Pledges
jets' are conditional and have not yet been implemented. Pathways for '1.5°C' and '2°C' are scenarios based on models run for IPC
cial Report on 1.5°C (IPCC 2018). Temperatures of each scenario are shown as a range arising from different climate models (adap
ı Hoegh-Guldberg et al. 2019).

The world is now 1.1°C warmer than in the preindustrial period.

Dangerous impacts of climate change are here and are increasing (especially the last 5 years). The Australian continent is 1.44°C warmer than it was in the pre-industrial period.

The UN Framework Convention on Climate Change Paris Agreement (paraphrased) is to keep global warming "well below 2°C, preferably to 1.5°C."

Taken together, the sum of current policies held by the world's nations are likely to deliver mean global temperatures of 3°C above preindustrial temperatures by mid-to-late century.

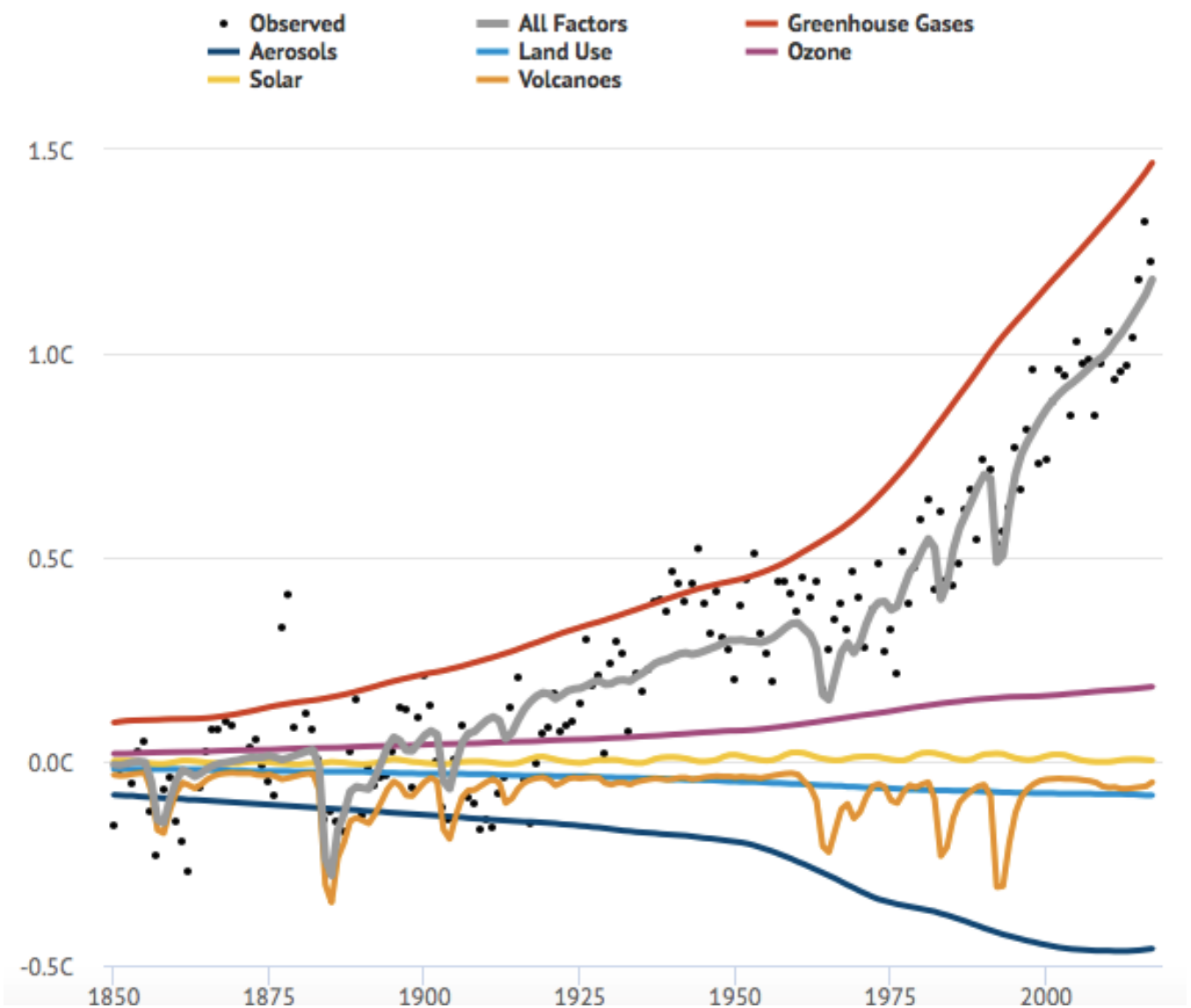
Are we on track to a safe climate future?

"We are very far away from a pathway that will meet the Paris agreement goal. We are collectively walking into a minefield blindfolded. The next step could be disaster."

Patricia Espinosa, Executive Secretary

UN Framework Convention on Climate Change

NDC Synthesis Report, Feb 27, 2021


Observed
All Factors
Greenhouse Gases
Aerosols
Land Use
Ozone
Solar
Volcanoes
1.5C
1.0C
0.5C
0.0C
-0.5C
1850
1875
1900
1925
1950
1975
2000

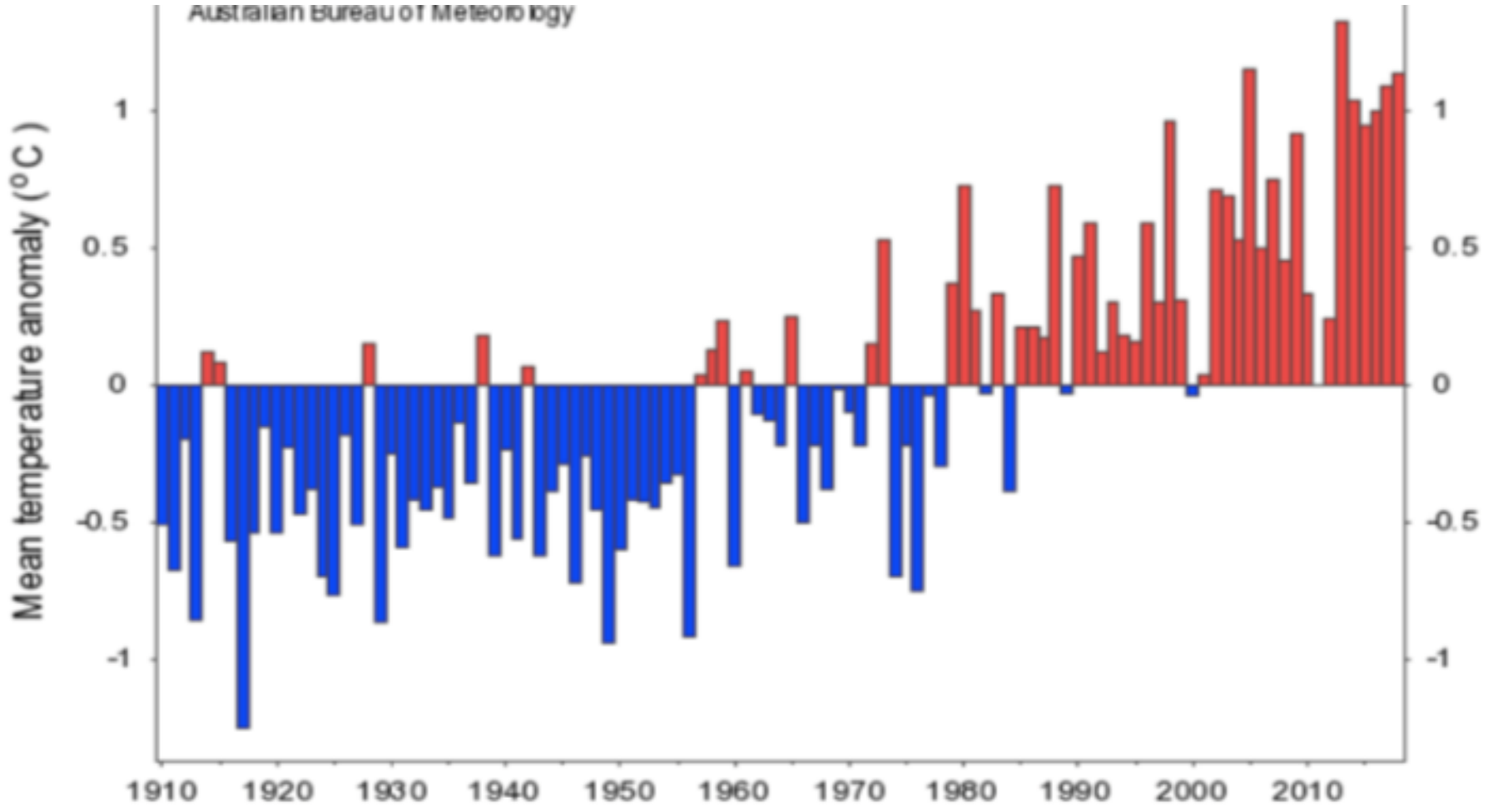
Australia in a 3 degree warmer world

Degrading ecosystems

Declining food production

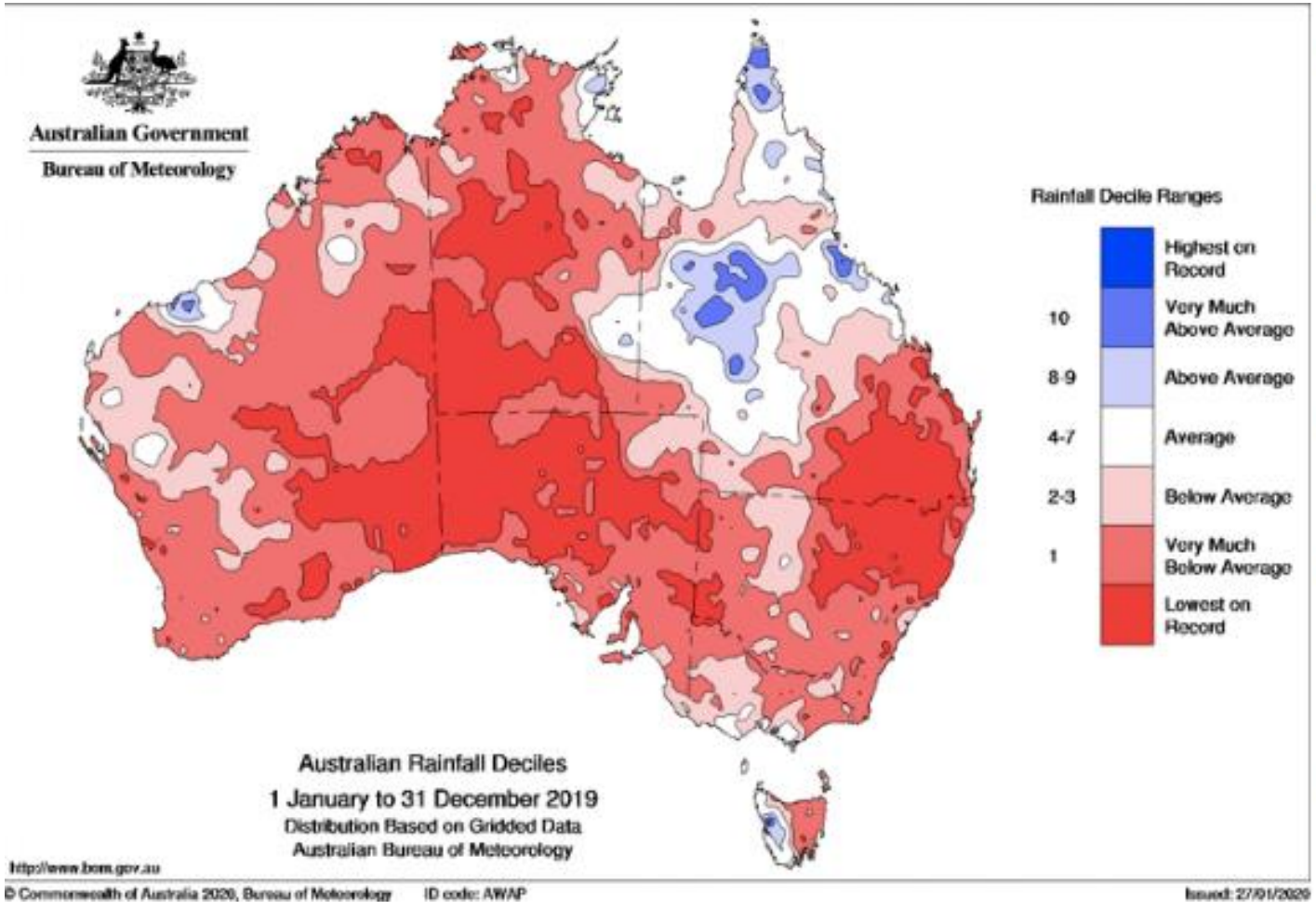
Increasing vulnerable cities and towns

Reduced health and wellbeing

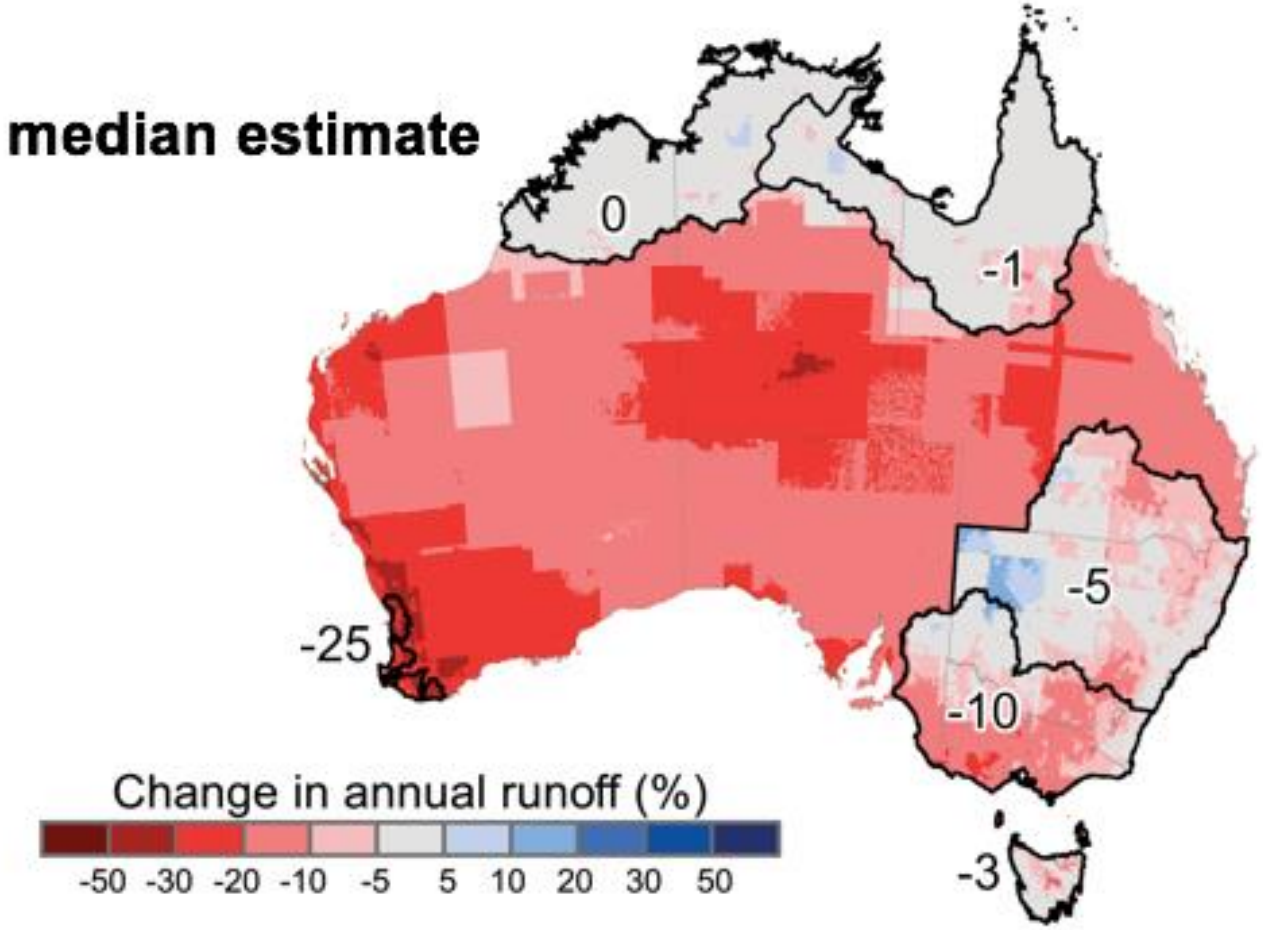


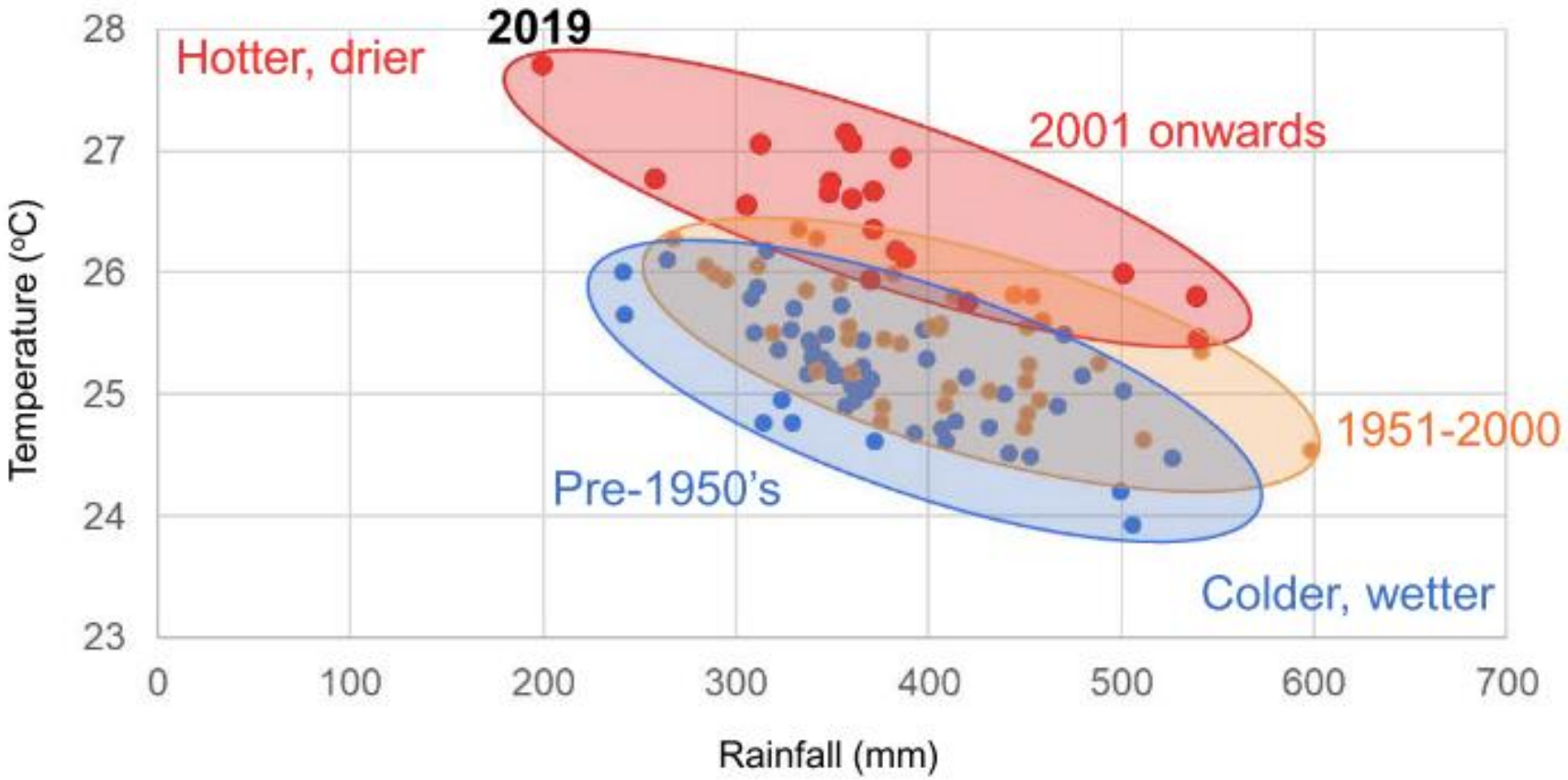
https://www.youtube.com/watch?v=PhbdyNnUliM

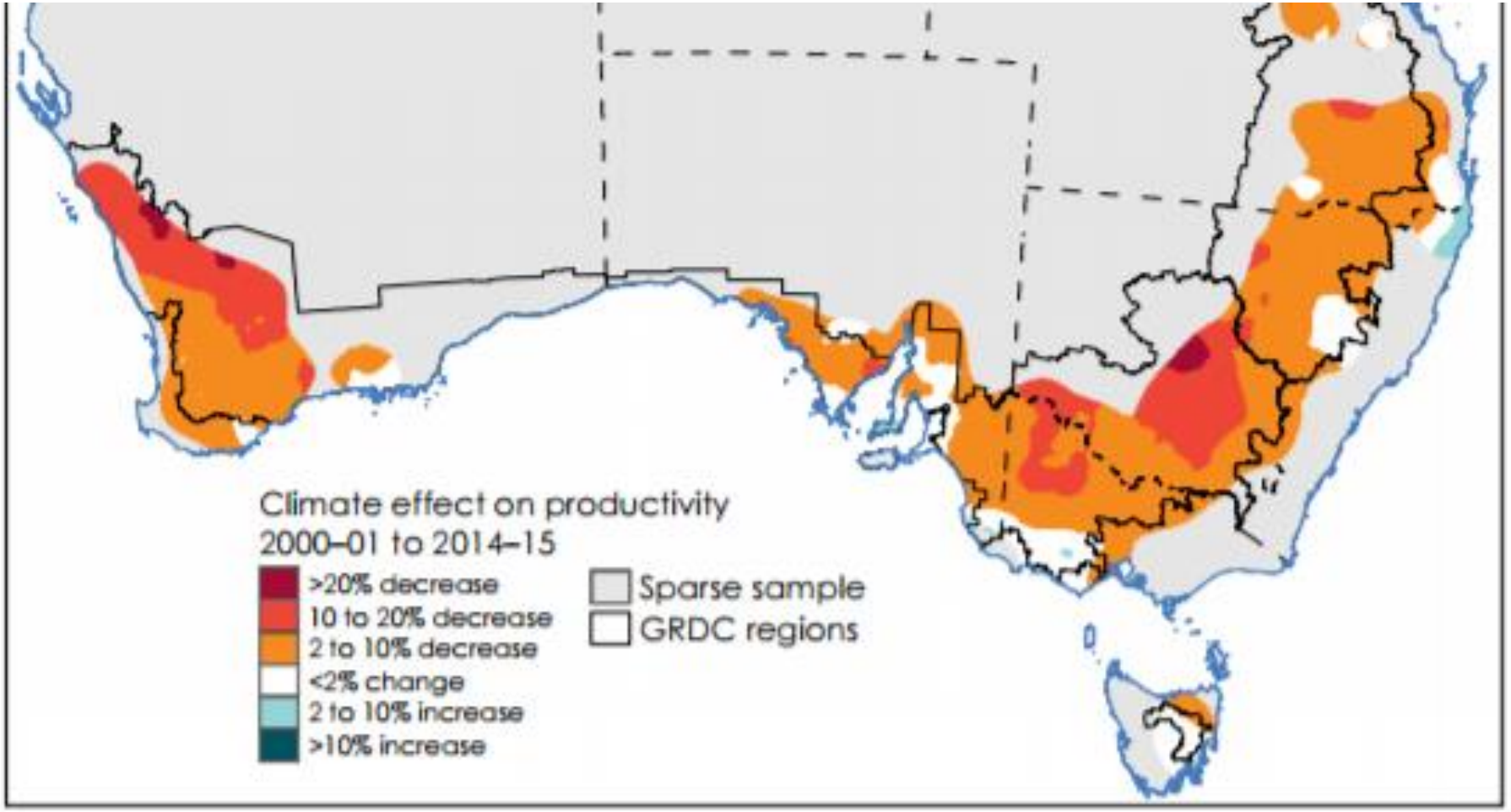
Temperature Anomalies by Country
Year (1880, 2021)
1880

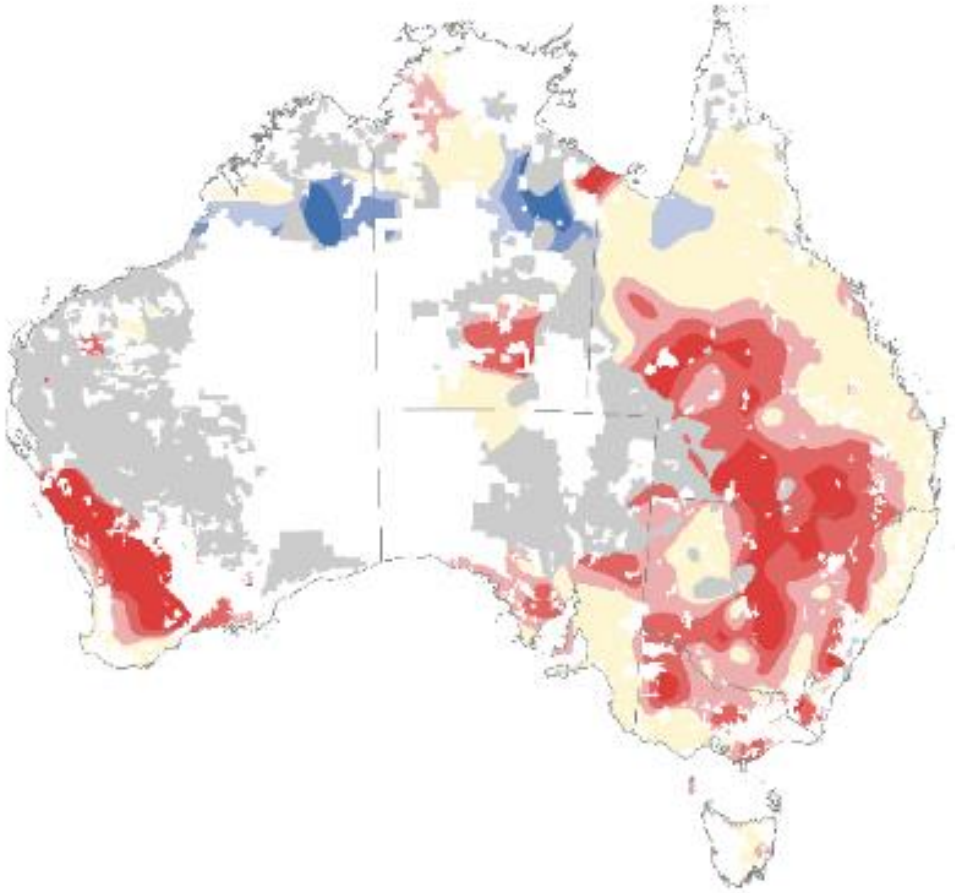


- Driest year on record (277.6mm)
- Record positive Indian Ocean Dipole event
- Many places worst drought on record
- Towns and rivers running dry, massive fish kills
- But also record rains and severe floods

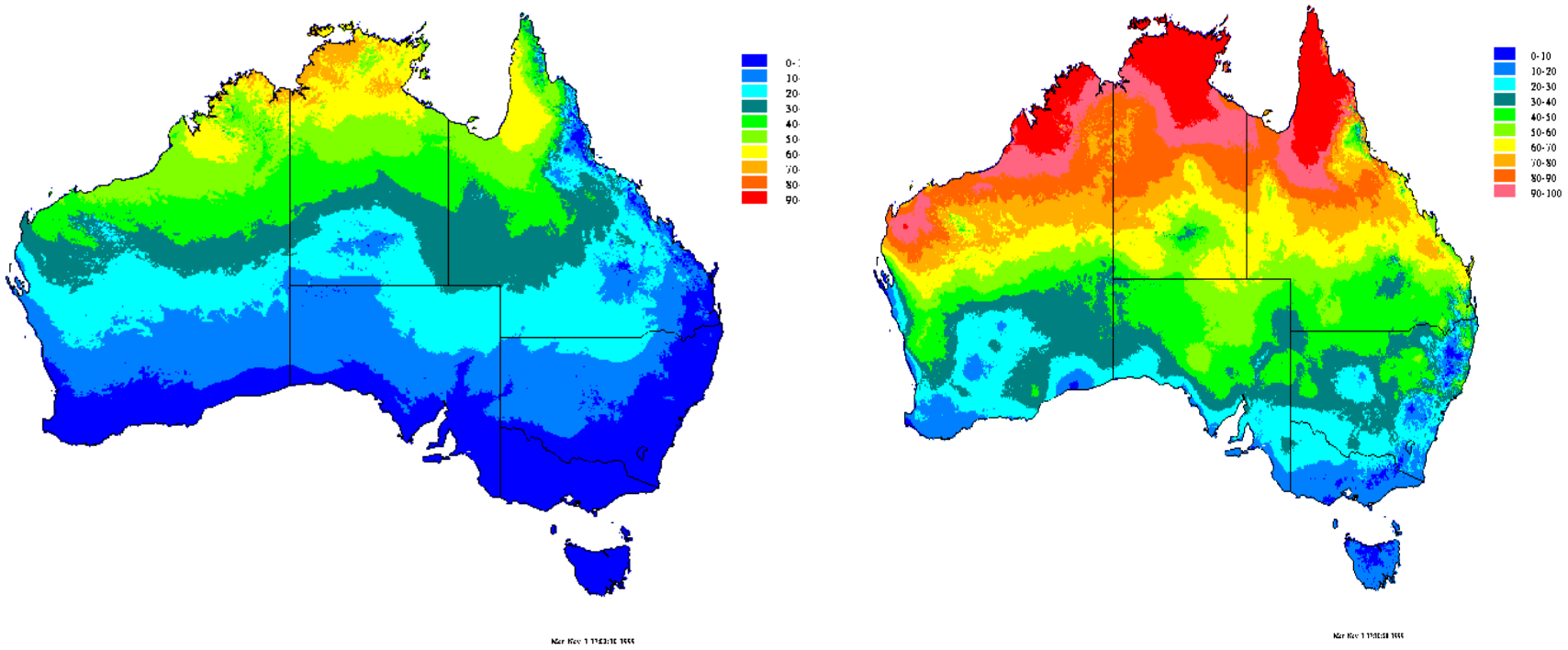

median estimate
0
-1
-5
-25
-10
-3
Change in annual runoff (%)
-50 -30 -20 -10 -5 5 10 20 30 50


2019
Hotter, drier
2001 onwards
1951-2000
Pre-1950's
Colder, wetter
Temperature (°C)
28
27
26
25
24
23
0
100
200
300
400
500
600
700
Rainfall (mm)


Climate effect on productivity
2000–01 to 2014–15
>20% decrease
10 to 20% decrease
2 to 10% decrease
<2% change
2 to 10% increase
>10% increase
Sparse sample
GRDC regions



- Climate changes (post 2000) affecting farm profits from -37% (Vic.) to +8.7% (NT)



Heat stress 2.7 degrees warmer

The impacts

- Reduced farm profits by 22% since 2000 (avg $18,600 per farm)
- Reduced revenue of cropping farms by $1.1b per year
- Water-limited yield potential of wheat declined by 27% between 1990-2015
- 45 species of fish have shifted south due to rising ocean temperatures since the 1800s
- Beef production in Qld and the NT could decline 19% by 2030 and 33% by 2050
- Up to 70% of wine-growing regions could be unsuitable for grapes by 2050
- Cotton yields could decrease 17% by 2050
- Dairy cows are highly susceptible to heat stress, which can reduce milk yield by 10–25% (up to 40% in extreme heatwave conditions),

The response

National Farmers Federation calls for Australia to reduce net emissions to zero by 2050

ABC Rural / By national rural reporter Kath Sullivan

Posted Thu 20 Aug 2020 at 8:16am, updated Thu 20 Aug 2020 at 10:52am

Moving forward

- Red meat sector aiming for carbon neutrality by 2030 (CN30)
- Grains industry supporting net zero emissions in agriculture by 2050 – (grains 2030 target to be finalized within 18months)
- Chicken and egg industries carbon neutral roadmap under development
- Dairy industry work underway
- Australian grape and wine industry – carbon neutral by 2050 vision
- Climateworks Land Use Futures Project
- Mars Global + CSU Cool Soil Initiative
- Sustainable intensification & regenerative agriculture

Work to be done

- Cotton industry on farm emissions still increasing – mainly due to nitrogen fertilizer
- Horticulture …

We know what we need to do…

- **Action on climate change:** 75percent reduction in emissions by 2030 and net zero by 2035
- **Rapid transition to renewable energy sources across all sectors**
- **Restoring our landscapes and regenerating our regions.**
- **Value and invest in our rural communities…** building regional resilience, climate and carbon literacy and prioritising research and extension into climate adaptation and mitigation by improving conservation practices, ecological and enterprise diversity, soil health, integrated pest management to reduce pesticide and herbicide dependence and water management.
- **National Strategy on Climate Change & Agriculture???**

Action on climate: A win / win for the land sector

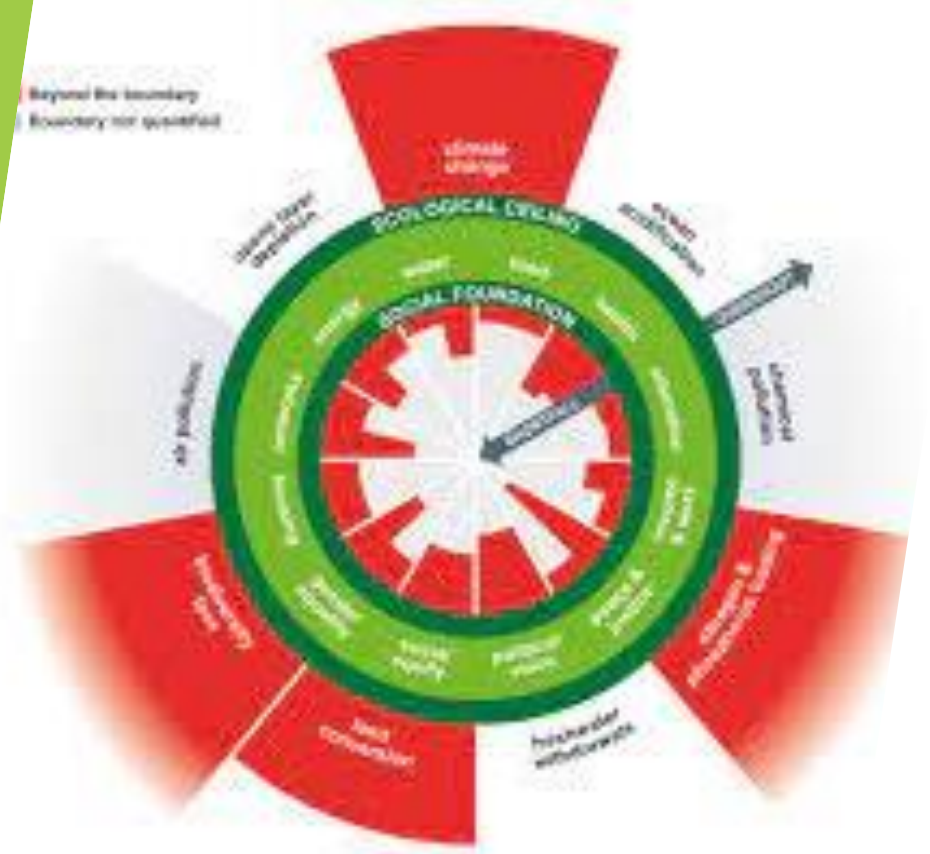
Response options based on land management		Mitigation	Adaptation	Desertification	Land Degradation	Food Security	Cost
Agriculture	Increased food productivity	L	M	L	M	M	———
	Agro-forestry	M	M	M	M	L	●
	Improved cropland management	M	L	L	L	L	●●
	Improved livestock management	M	L	L	L	L	●●●
	Agricultural diversification	L	L	L	M	L	●
	Improved grazing land management	M	L	L	L	L	———
	Integrated water management	L	L	L	L	L	●●
	Reduced grassland conversion to cropland	L	———	L	L	- L	●
Forests	Forest management	M	L	L	L	L	●●
	Reduced deforestation and forest degradation	M	L	L	L	L	●●
Soils	Increased soil organic carbon content	M	L	M	M	L	●●
	Reduced soil erosion	←→ L	L	M	M	L	●●
	Reduced soil salinization	———	L	L	L	L	●●
	Reduced soil compaction	———	L	———	L	L	●
Other ecosystems	Fire management	M	M	M	M	L	●
	Reduced landslides and natural hazards	L	L	L	L	L	———
	Reduced pollution including acidification	←→ M	M	L	L	L	———
	Restoration & reduced conversion of coastal wetlands	M	L	M	M	←→ L	———
	Restoration & reduced conversion of peatlands	M	———	n.a	M	- L	●
Response options based on value chain management							
Demand	Reduced post-harvest losses	M	M	L	L	M	———
	Dietary change	M	———	L	M	M	———
	Reduced food waste (consumer or retailer)	M	———	L	M	M	———
Supply	Sustainable sourcing	———	L	———	L	L	———
	Improved food processing and retailing	L	L	———	———	L	———
	Improved energy use in food systems	L	L	———	———	L	———
Response options based on risk management							
Risk	Livelihood diversification	———	L	———	L	L	———
	Management of urban sprawl	———	L	L	M	L	———
	Risk sharing instruments	←→ L	L	———	←→ L	L	●●

A note on food waste

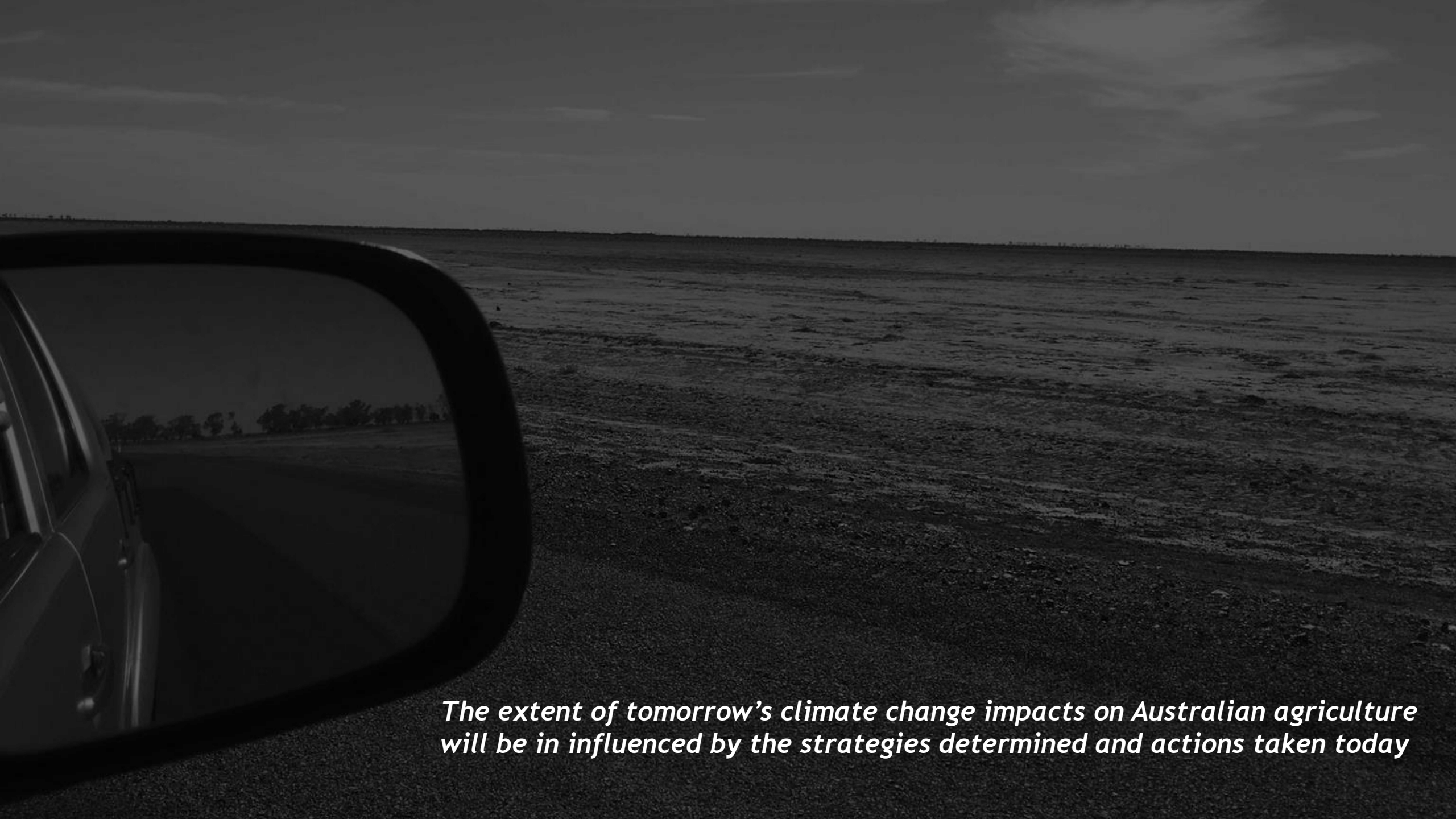
- One third of the world's food is wasted.
- 25% of water used in agriculture is used to grow food that is ultimately wasted – throwing away one burger wastes the same amount of water as a 90 minute shower.
- Food waste produces eight per cent of global greenhouse gas emissions. **If food waste was a country it would be the third largest greenhouse gas emitter, behind the USA and China.**
- In Australia… Food waste costs the economy around $20 billion each year.
- Each year we waste around 7.3 million tonnes of food – this wastage equals about 300kg per person or one in five bags of groceries.
- Food waste accounts for more than five per cent of Australia’s greenhouse gas emissions.

A role for the food sector

- Energy transition
- Procurement policies
- R,D & E
- Consumer education
- Public advocacy
- Organic waste mitigation and the circular economy



Anyone for a doughnut?


The extent of tomorrow's climate change impacts on Australian agriculture will be in influenced by the strategies determined and actions taken today