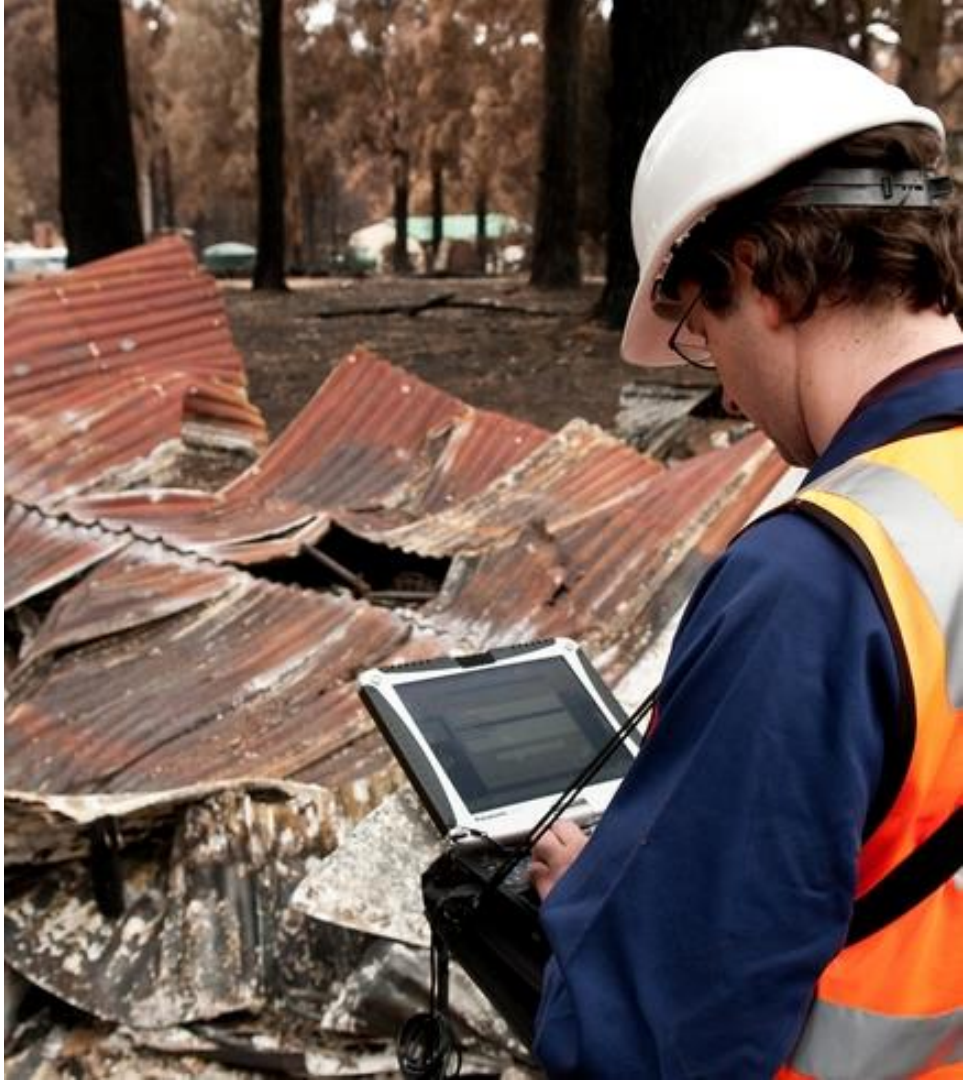
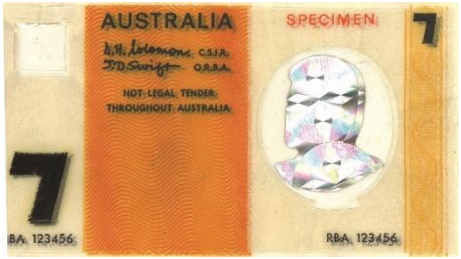
Research and Development for Bushfire Resilience

Dr Andrew Moore
CSIRO Resilience Coordinator



CSIRO Innovations

Fast WiFi



Plastic Banknotes

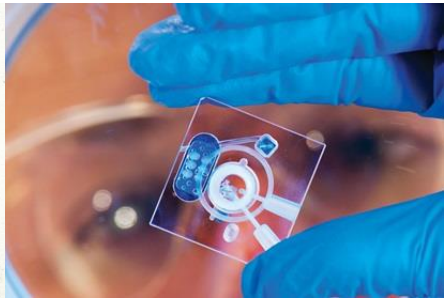
Equivac HeV:
Hendra virus vaccine

Extended wear
contact lenses

Softly Washing Liquid

Total Wellbeing Diet

Aerogard



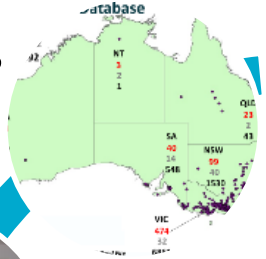
RAFT Polymerization

Resilience in the Face of Hazards

Understanding bushfires

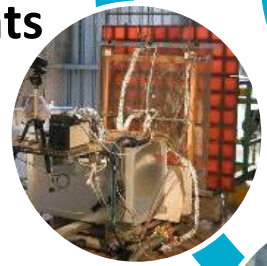
Application of Bushfire Science

Historic Loss



Surveys

Experiments

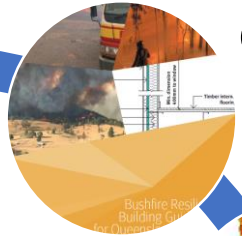


Modelling

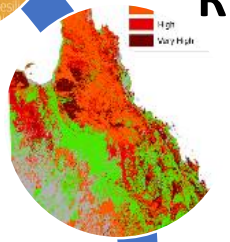
Integration Science

Adaptation tools

Guidelines



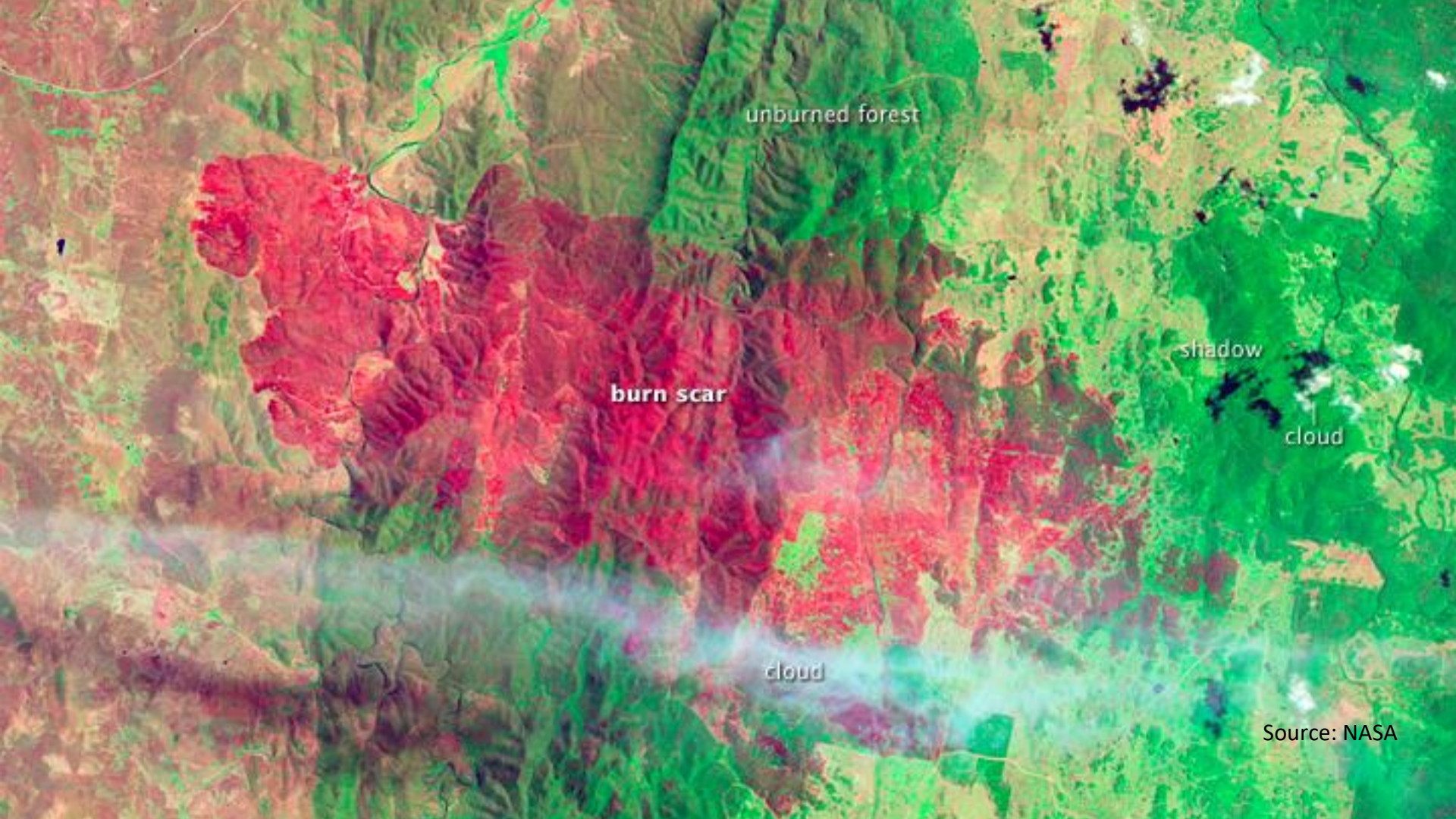
Risk Maps



Community Education

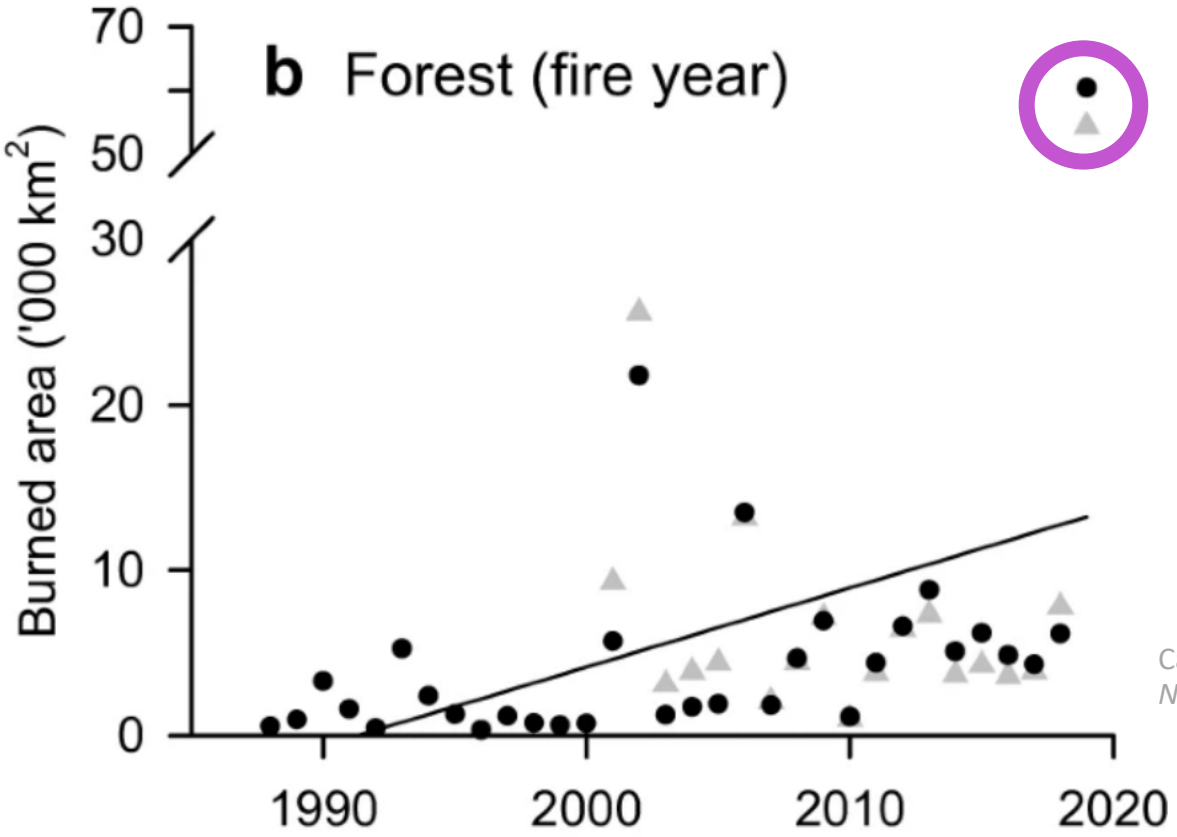
Policy support

CSIRO



Source: NASA

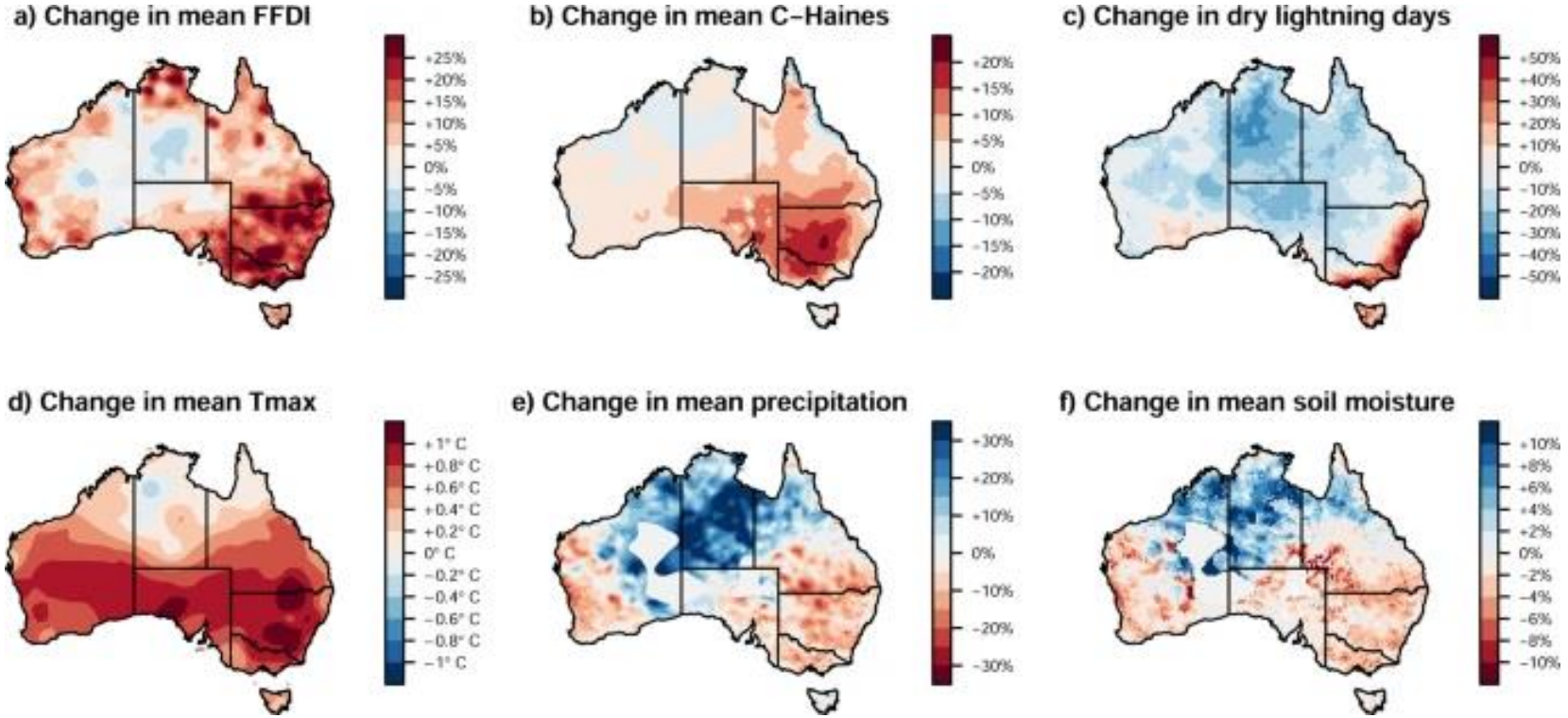
Burned areas are increasing…



Canadell et al. (2021),
Nature Communications

…and yes, it's linked to climate change

2000-2019 vs 1980-1999



Canadell et al. (2021), *Nature Communications*

Ever seen inside a bushfire research facility?

Burning down the house…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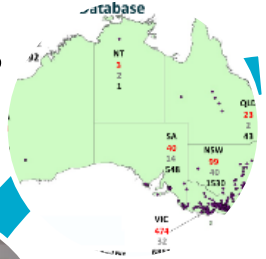
Putting bushfire research to work

Application of Bushfire Science

Historic Loss



Surveys

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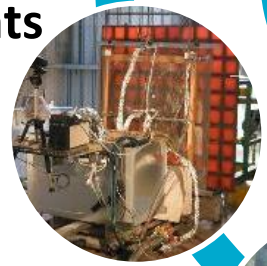

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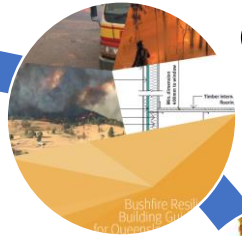
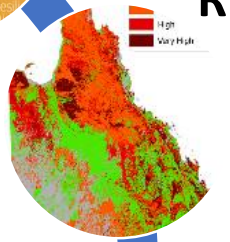


Risk Maps



Community Education

Policy support

CSIRO

A guide to rate of

FIRE SPREAD MODELS

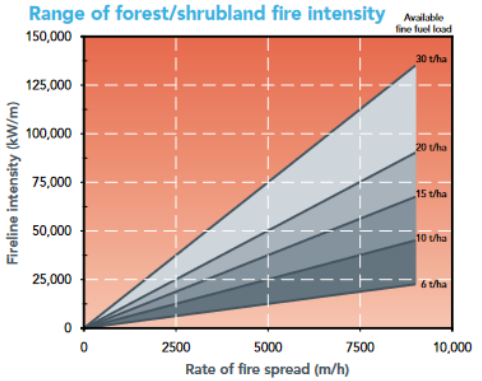
for Australian vegetation

CSIRO afac

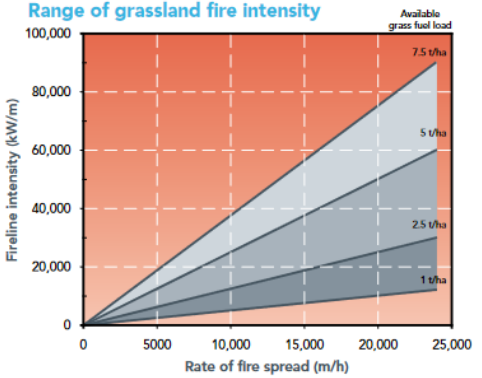
Rate of fire spread unit equivalencies

m/min	m/h
1	60
2	120
3	180
4	240
5	300
10	600
15	900
20	1200
30	1800
40	2400
50	3000
60	3600
70	4200
80	4800
90	5400
100	6000
125	7500
150	9000
175	10,500
200	12,000
250	15,000
300	18,000
350	21,000
400	24,000

Range of forest/shrubland fire intensity



Range of grassland fire intensity



Relative effect of slope steepness on rate of fire spread

	Downslope											Upslope									
Slope angle (°)	-20	-18	-16	-14	-12	-10	-8	-6	-4	-2	0	2	4	6	8	10	12	14	16	18	20
Slope (%)	-36	-32	-29	-25	-21	-18	-14	-11	-7	-3	0	3	7	11	14	18	21	25	29	32	36
Relative effect	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9	1.0	1.1	1.3	1.5	1.7	2.0	2.3	2.6	3.0	3.5	4.0

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Amicus: software tool for fire managers

- Makes fire behaviour models available for practical use:
  - Assessment of fuel hazards
  - Fire danger indices
  - Bushfire behaviour predictions
  - Forecasting bushfires as they burn
- Assists with fuel-management decisions, planning prescribed burns, responding to bushfires, training
- Updated as the science improves

Short-term planning: hazard mapping

With & for the Queensland Fire & Rescue Service

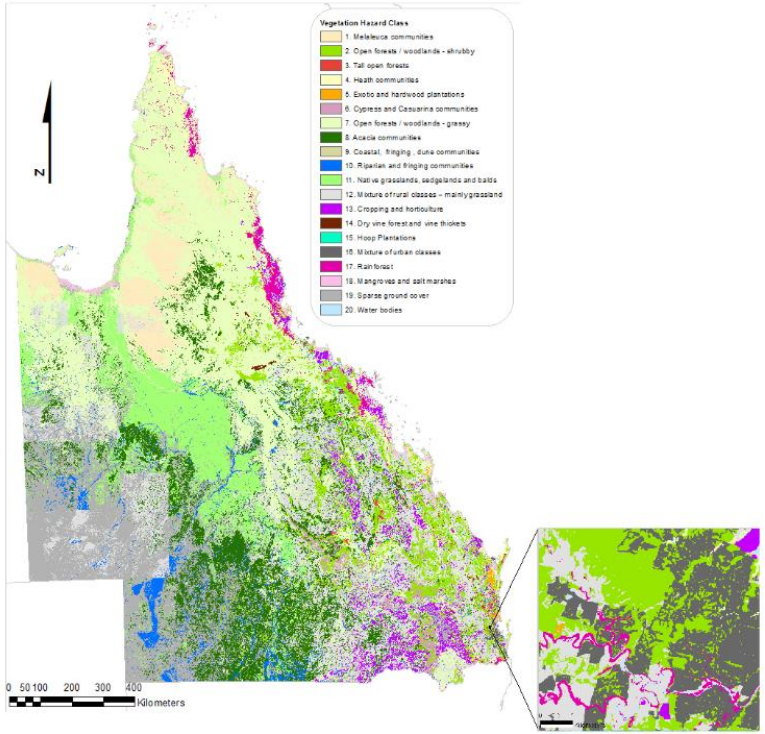


Figure 3: Vegetation Hazard Classes (VHC) for Queensland

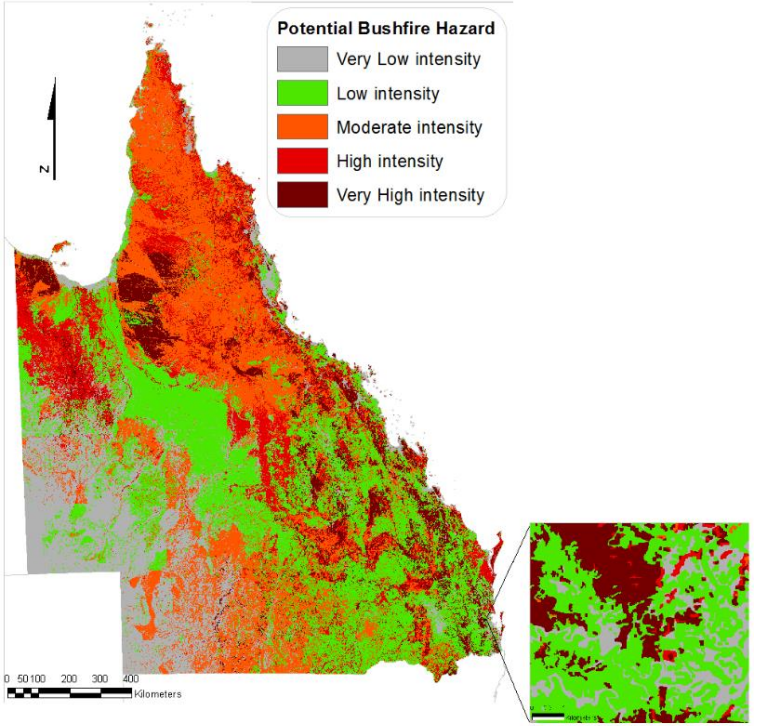
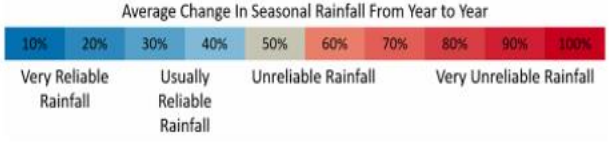
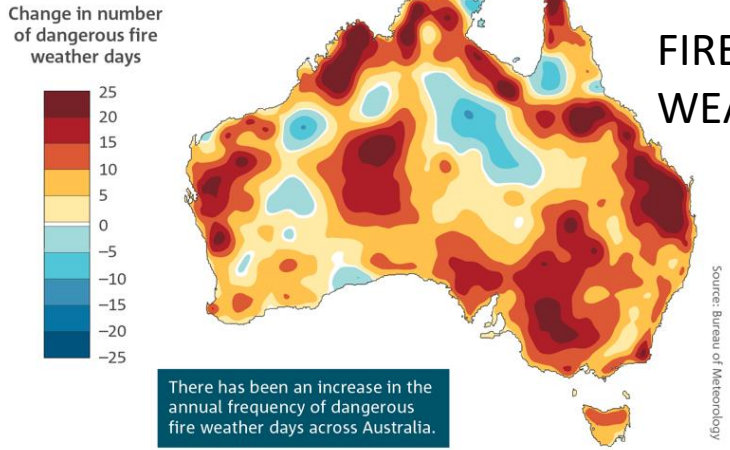


Figure 13: Potential Bushfire Hazard map for Queensland

Scenarios: What will probably happen?

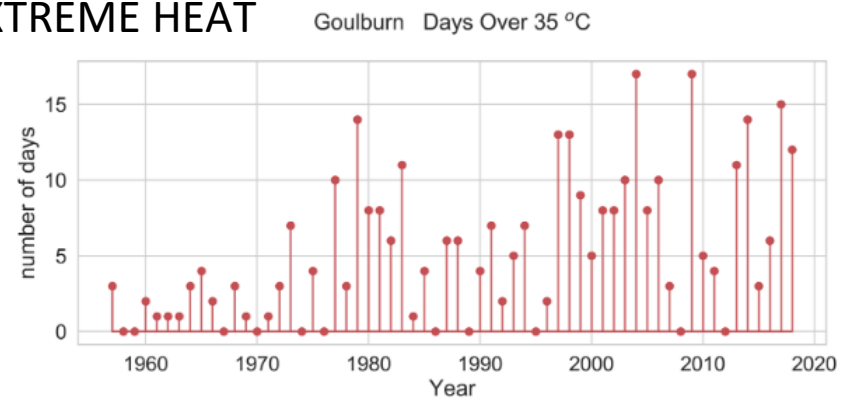
RAINFALL RELIABILITY





FIRE WEATHER

EXTREME HEAT

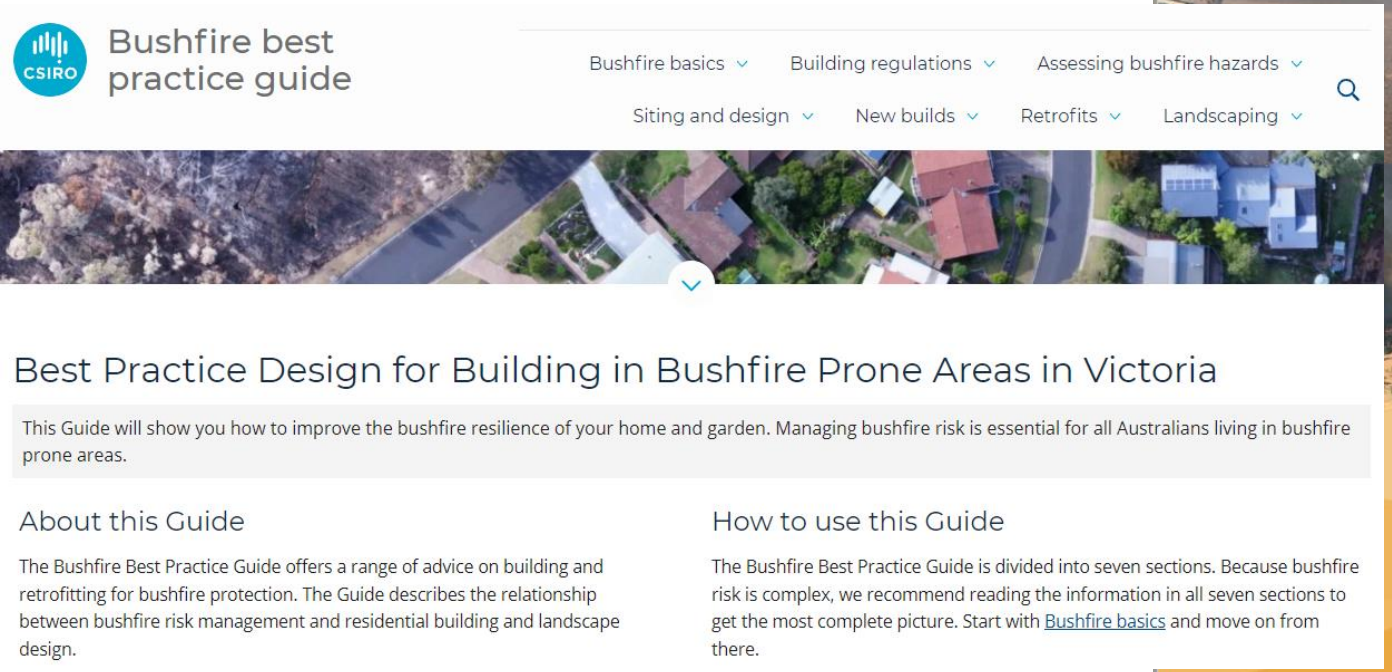


www.bom.gov.au/climate/climate-guides/

Australian Climate Service

- Major Australian Government program
- Starting with support for NRRA and EMA
- Guided by recommendations of the Bushfire Royal Commission
- Partnership between the Bureau of Meteorology, Geoscience Australia, CSIRO and Australian Bureau of Statistics

Toward best practices



Toward best practices

- Understanding risk
- Design
- Siting
- Construction
- Materials
- Landscaping

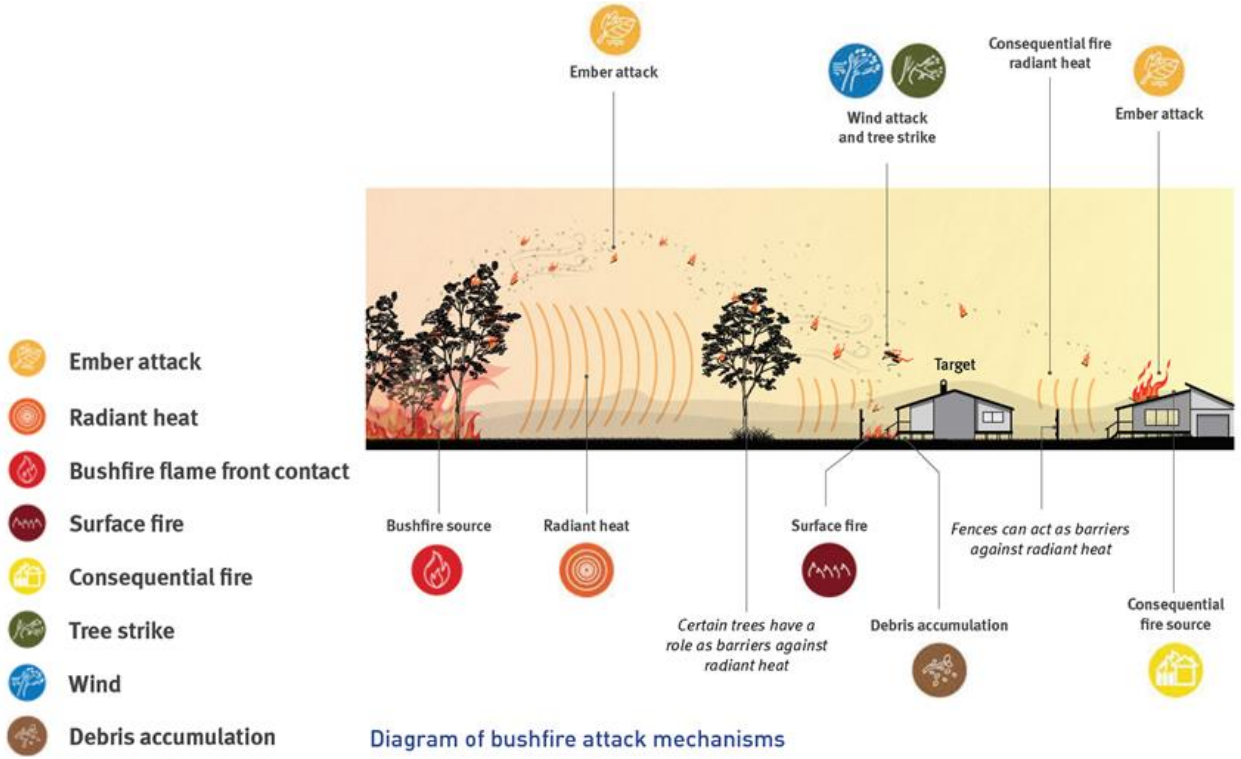


Diagram of bushfire attack mechanisms

Toward best practices

- Understanding risk
- Design
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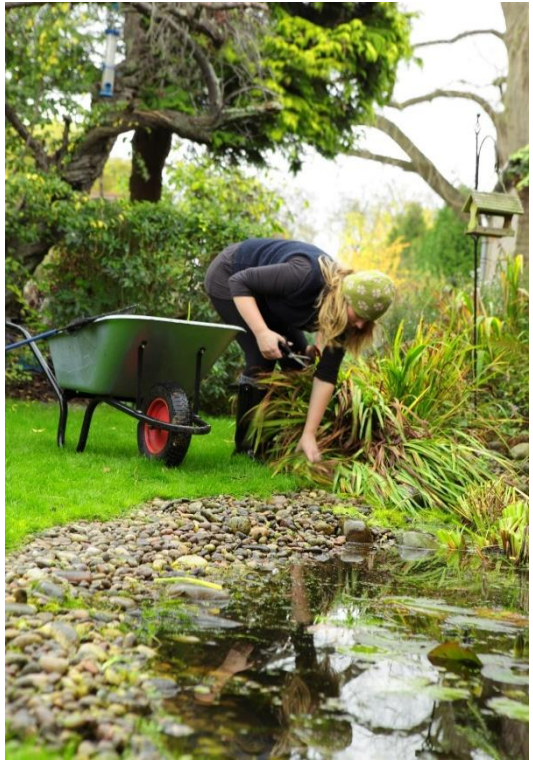


Climbing “Mount Resilience”

Getting to Mt. Resilience

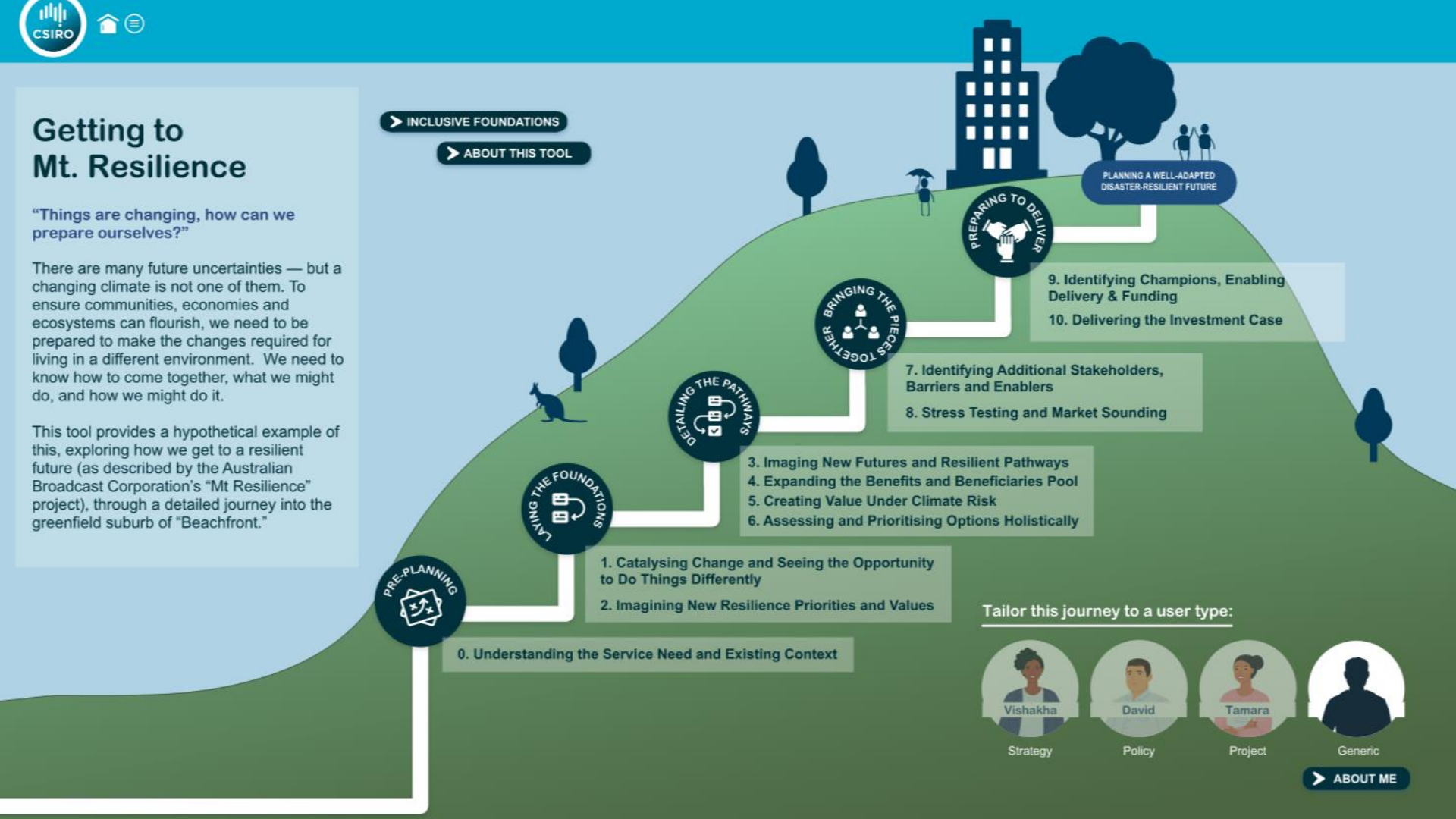
"Things are changing, how can we prepare ourselves?"

There are many future uncertainties — but a changing climate is not one of them. To ensure communities, economies and ecosystems can flourish, we need to be prepared to make the changes required for living in a different environment. We need to know how to come together, what we might do, and how we might do it.

This tool provides a hypothetical example of this, exploring how we get to a resilient future (as described by the Australian Broadcast Corporation's "Mt Resilience" project), through a detailed journey into the greenfield suburb of "Beachfront."

INCLUSIVE FOUNDATIONS

ABOUT THIS TOOL



Tailor this journey to a user type:

Strategy | Policy | Project | Generic

ABOUT ME

Bega Valley: recovery for long-term resilience

- Regional context
- Post catastrophic fire disaster and trauma
- Multiple flood disasters
- Ongoing COVID impacts
- Recognition of need to do things differently

A final thing…


FIRE RISK

Thank you

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More information:
www.csiro.au/en/research/natural-disasters

Burnover at Mogo:
vimeo.com/536225296

Best Practice Guides for Buildings:
research.csiro.au/bushfire/

www.qra.qld.gov.au/resilient-homes/bushfire-building-guidance-queensland-homes

Regional Weather & Climate Guides:
www.bom.gov.au/climate/climate-guides/

Enabling Resilience Investment:
www.mtresilience.com

www.enablingresilienceinvestment.com

Hazard Reduction Burning:
vimeo.com/619621941