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Preparing Fire Agencies for Catastrophic Climate Threats

Technical Report to ELCA

October 2026

About this Report

- This report was prepared by ConnellGriffin for the Emergency Leaders for Climate Action, as a technical economic report for their research on mega fire impacts.
- ConnellGriffin undertook economic modelling to quantify the economic impacts of mega fires to the Australian economy, and therefore, the economic value of greater emergency preparedness for future megafires.
- This report provides an independent, evidence-based view, utilising a recursive dynamic computable general equilibrium (CGE) modelling framework to estimate the value of improved preparedness. CGE modelling captures both direct and indirect impacts, including how labour, capital and resources are reallocated across industries, households, governments and trade in response to economic shocks.
- The report applies ConnellGriffin's implementation of the Victoria University Regional Model (VURM), a well-established multi-regional CGE model developed by the Centre of Policy Studies at Victoria University.
- The timeframe for the economic modelling is a 30-year forecast from 2025-26. The modelling is conservative, notably its parameters for future mega fire frequency and for included economic and social cost categories. We selected economic costs whose methodologies are more mature, to reduce the sensitivity range. A detailed methodology is provided in the Appendix.
- Development of the report drew on a series of consultations, including expert interviews, and peer review of the economic modelling.
- We wish to thank individuals who participated in these consultations in a personal and expert capacity, including Greg Mullins, Bob Conroy, Lee Johnson, A/Professor Andrew Watkins, David Jones, Emeritus Professor Ross Bradstock, and Professor John Quiggin.
- Whilst we have sought to reflect their expertise to the best extent, and to capture current and robust climate science assumptions, we note that this report remains the views and responsibility of its authors.



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01 Executive Summary



Australia is in a new era of megafire – with more frequent, more intense, longer bushfire seasons, and escalating economic costs nationally

This report updates the economic research on the impacts of major and catastrophic bushfire in Australia. It demonstrates that strengthening bushfire preparedness is an emergency management priority, and one that will support economic and community resilience in the decades ahead.

- **Bushfire risk and costs are increasingly shared across households, businesses and governments**, with insurance coverage and access declining in some bushfire-prone areas and a greater proportion of risk potentially being borne by households and the public sector.
- **The economic costs escalate sharply as major bushfire frequency and severity increases**, with major events generating impacts well beyond the direct costs of physical damage.
- **The economic cost of bushfires is estimated at an average of \$6.0 billion a year**. This represents an indicative, conservative long-run modelling estimate across different bushfire severity categories. Actual future bushfire costs may differ materially from this estimate depending on the frequency, severity and impacts of future events, as well as changes in population and asset exposure, vulnerability, preparedness and fire suppression capacity.
- Over the 30 years to 2055–56, this represents an estimated economic burden to Australia of \$181.7 billion in undiscounted terms, equivalent to \$72.6 billion in present value terms.

Calibrated Average Annual Loss				
Severity band	Cost / event (\$bn, FY2025)	Recurrence (years)	Number of events modelled ¹	Average annual costs (\$bn, FY2025)
Compound Major Bushfire event	\$27.7	30	1	\$0.9
Major Bushfire event	\$16.1	3	8	\$4.3
Other Non-Major Bushfire event	\$1.2	1	21	\$0.8
Total Average Annual Cost				\$6.0
Total Economic Costs		Undiscounted over 30 years		\$181.7
		Discounted over 30 years		\$72.6 ²

Sources: ConnellGriffin Analysis. Total may not add due to rounding.

1. Only one bushfire severity category is modelled in each year, with higher-severity events replacing lower-severity events to avoid double counting.
2. A 7 per cent real discount rate is used for all discounted figures in this analysis.

Better preparedness can reduce broader economic losses, helping to protect economic activity, employment and government tax revenue

- **Strengthening preparedness could deliver substantial economic benefits**, with the modelling estimating that improved preparedness could avoid around **\$20.9 billion to \$39.4 billion** in GDP losses over **30 years** on an undiscounted basis.
- **The economic benefits of better preparedness flow across the broader economy**, with reduced disruption (adverse shocks) to productive capacity and economic activity, helping to preserve sectoral output, household consumption and investment.
- Under two scenarios representing modest and stronger improvements in bushfire preparedness, avoided losses help protect long term GDP, employment and government revenue:
 - Job losses prevented are equivalent to 2,950 FTE jobs (modest improvements scenario) and 5,620 FTE jobs (stronger improvements scenario) per year.
 - Government tax revenue is protected, with avoided revenue losses equivalent to \$8.8 billion in the modest improvements scenario and \$16.8 billion in the stronger improvements scenario over the 30 year period on an undiscounted basis.
- Strategic investment in prevention, operational and workforce capability, emerging technologies and long-term preparedness can materially reduce the economic impacts associated with disaster, lower recovery costs and improve the resilience of communities and the broader productivity of the economy.

Economic impact under modest and stronger preparedness scenarios¹

Outcome modelled		Scenario 1 Modest Improvements	Scenario 2 Stronger Improvements	
	Australian GDP losses avoided (\$FY2025)	Undiscounted (2025/26 – 2054/55)	\$20.9bn	\$39.4bn
		Discounted at 7% (2025/26 – 2054/55)	\$8.3bn	\$15.6bn
	Employment losses avoided (FTE)	Average annual (2025/26 – 2054/55)	2,950	5,620
		In FY2040	3,100	5,860
	Government Tax Revenue Protected (\$FY2025)	Undiscounted (2025/26 – 2054/55)	\$8.8bn	\$16.8bn
		Discounted at 7% (2025/26 – 2054/55)	\$3.1bn	\$5.9bn

Sources: ConnellGriffin analysis

1. Scenario 1 – Modest improvement in preparedness: assumes measures reduce the total economic damage associated with bushfires by 10% relative to the baseline trajectory.
 Scenario 2 – Stronger preparedness package: assumes a more comprehensive package of preparedness, mitigation and response measures reduces total economic damage by 20% relative to the baseline trajectory.

02 The New Bushfire Reality



Australia has entered a new era of megafires

Australia is experiencing **more frequent and intense megafires** with **devastating consequences** for industry and infrastructure, lost homes and property, and risk to lives and environmental assets.

Rising temperatures are accelerating conditions for hotter and drier landscapes across Australia. Both prolonged drought and rapidly developing ‘flash droughts’ can increase fuel dryness and fire danger, allowing major fires to spread faster and become significantly more destructive.

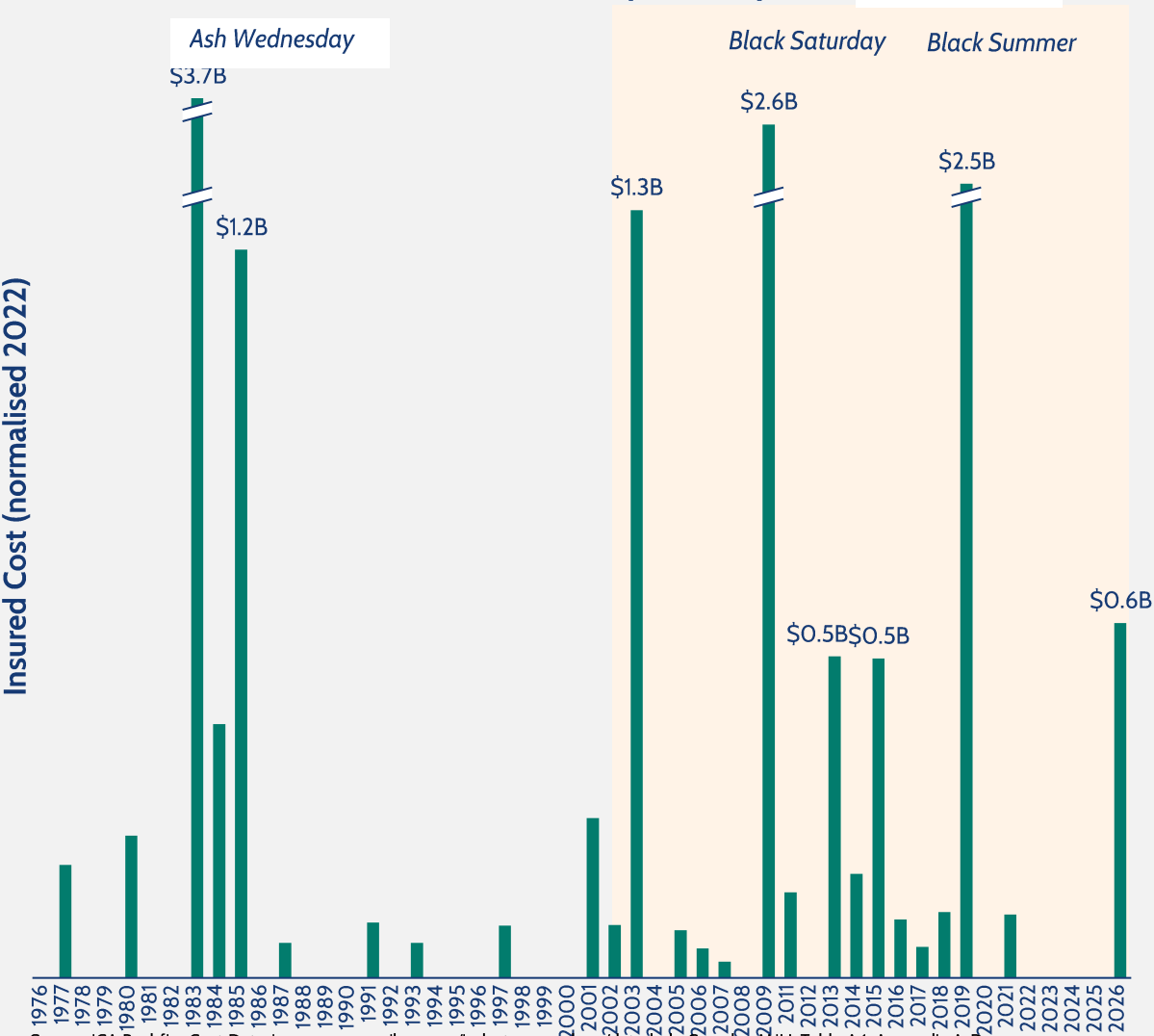
Three of the five most extreme forest-fire years in the past 50 years of record occurred since 2002, and Australia’s fire season has shown signs of expanding from summer to spring to autumn and even winter (CSIRO, 2021).

Australian insurance data, a sub-set of these costs, show a step-change in frequency of megafire events over recent decades. To provide a consistent comparison, we compare two equivalent 25-year periods, with six major megafire events occurring in the most recent 25 years, compared with two in the preceding 25 years.

When the historical Macarthur Forest Fire Danger Index (FDDI) was developed, it set a benchmark score of 100 for the 1939 Black Friday bushfires. Since then, the 1983 Ash Wednesday fires recorded a maximum FDDI of 123; the 2009 Black Saturday fires 152; and Black Summer 126 in South Australia and 121 in Victoria.

The chart shows insured losses only and does not represent the full economic cost of bushfires. Broader costs can include uninsured property and infrastructure damage, government response and recovery expenditure, business disruption, health and social impacts, agricultural losses and environmental damage. Changes in insurance coverage over time also mean insured losses should be interpreted as an indicator of the frequency of major events, rather than a complete measure of total bushfire costs.

Bushfire Insured Losses in Australia over past 50 years (2022 dollars)



Source: ICA Bushfire Cost Data; insurancecouncil.com.au/industry-members/data-hub. See also ANU, Table A.1, Appendix A. Dr Garry Cook, Andrew Dowdy, Dr Juergen Knauer, Mick Meyer, Dr Pep Canadell, Peter Briggs, 2021, “Australia’s Black Summer of fire was not normal – and we can prove it – CSIRO”
Note: Equal 25-year periods are used to compare changes in event frequency. The broader historical ICA record is retained for analysis of the geographic distribution of insured bushfire losses.

The Black Summer fires highlight the challenge of preparing for megafires in Australia with climate change

The 2019–20 Black Summer bushfires set a new benchmark for scale and distribution of catastrophic bushfire impacts.

However, a changing climate, continued development in bushfire-prone areas and increased exposure of communities and economic assets mean that it may not be an unrepeatable event for Australia. Climate experts consulted for this report pointed to similar conditions in other fire seasons, where “we got lucky” with wind, rainfall, or temperature drops mid-season.

The geographic distribution of losses shifted significantly, with severe impacts experienced across multiple jurisdictions. The deadliest consequences were not even in the areas with most extreme fire weather conditions.

There is no single, agreed technical methodology for measuring the economic cost of bushfires, with the literature on economic costs of Black Summer varying and measuring different elements of overall economic burden. These differences may include insured losses, property and infrastructure damage, government response and recovery expenditure, business disruption, supply-chain impacts, employment and income effects, environmental losses, and the monetised value of premature mortality and morbidity.

DIRECT IMPACTS

Over 3,000 homes,
2.9m adults affected

24–34M

HECTARES BURNED



>1B ANIMALS

KILLED, INCL 100,000 LIVESTOCK

33 DEATHS DIRECTLY CAUSED BY FIRES

Hundreds of deaths and thousands of hospitalisations and ED admissions due to wildfire smoke and pollution.

650M – 1.2B tonnes

Carbon dioxide released to the atmosphere

ECONOMIC ESTIMATES & IMPACTS

Total economic losses have been quantified in the literature at up to \$100b

\$4.5b

ESTIMATED TOURISM
SECTOR LOSSES

AGRICULTURAL
LOSSES

Up to \$5b

> 23,000

BUSHFIRE-RELATED
INSURANCE CLAIMS
IN NSW, QLD, SA, VIC

\$1.5b

Public infrastructure
and assets,
emergency response
and recovery

This new era of “megafire” phenomena makes fire management highly challenging, complex and resource intensive, with acute risks to life and economic infrastructure

Victorian 2026 Fires

The 2025-26 summer saw a mosaic of fires along Victoria's coast during a *La Nina* season, whereby “triple-dip” *La Ninas* from 2020 to 2026 produced high vegetation and fuel loads, before a flash drought in early summer, driven by very low rainfall in December 2025 and January 2026, caused rapid drying and intense bushfire conditions.

The fires destroyed 451 homes, and had significant impacts on farming communities, losing over 45,000 head of livestock, almost 10,000 km of fencing and over 150,000 hectares of agricultural land (Parliament of Victoria, 2026).

Fast moving grass fires highlighted the need for hazard reduction burning, delays to appropriate incident controllers and support teams, telecommunications resilience planning and the need for more “boots on the ground” to improve firefighting response..

Queensland South-Western Fires 2023

Queensland, historically more impacted by tropical cyclones and flooding, had a 2023-24 fire season that surpassed its Black Summer, driven by extreme dryness and heat during a strong El Nino, and fueled by preceding *La Nina* grasses and forest growth.

In total, Queensland's season had 7500 bushfires, 100 of which were significant, burning almost 3.29 million hectares in consecutive events from September to November 2023 in the south, October to December in the north, and November to December in The Pines and Condamine Farms.

The southwest was hardest hit. Firefighters faced extraordinary blazes that ran through woodland canopy, that easily jumped 100-metre cleared firebreaks. The fires began early in season, with extensive dry lightning sparking new, out-of-control fires overnight (ARC Centre of Excellence for Climate Extremes, 2024).

2019-20 Currowan Complex NSW¹

The Currowan complex, triggered by remote lightning strike, spread rapidly, merging five fires in Currowan, Charley's Forest, Clyde Mountain, Morton, and Tianjara from November 2019 to February 2020. The complex was one of the most devastating Black Summer fires, burning over 500,000 ha, losing 1000 homes, and resulting in three deaths. 500 personnel were deployed to the main fire on New Years' Eve.

NSW experienced 29 fire-generated thunderstorms (pyrocumulonimbus), which with overnight fire intensity hampered suppression efforts. Overwhelmed services in other geographies had to withdraw help.

Bushfire intensity was driven by a multi-year drought, and a protracted spring and summer heatwave that included 6 days of Catastrophic, 22 days of Extreme, and 72 days of Severe fire danger in NSW.

¹ Owens & O'Kane (2020), O'Sullivan (2024)

² Quote from Bob Conroy, bushfire expert consultation, 2026

“ *In catastrophic conditions, you've got a safeguarding or defensive strategy, protecting lives and mopping up afterwards.* ”

Future firefighting needs the full suite of prevention, technology and operational capabilities to manage protracted fire campaigns with rapidly changing risk environments

	Capability	Measures	Evidence of Effectiveness
PREVENTION	Resilient housing	• Retrofits and upgrades • Ember proofing • Public education • LiDAR (Light Detection and Ranging) mapping for high-risk areas • Garden management	Over half Australian homes were built before modern standards, leaving bushfire prone areas inadequately prepared. Resilient housing in high risk areas yields a cost benefit ratio of 1.4, and vegetation management 1.3 (Deloitte, 2013). Firefighters shared examples of houses built to standard that withstood fires that destroyed their neighbourhoods. All agreed the most effective measure was household education.
	Fire-smart land-use	• Zoning to limit development in high-risk areas	Urban development in the right places is a major source of avoided losses for infrastructure and property. Improved land-use planning could reduce property damage costs across all hazards by \$54–\$63 billion in present value terms over 2026–2100, using a 2.5% discount rate (productivity Commission, 2025). ¹
TECHNOLOGY	Risk assessment and warning: AFDRS	• Complete AFDRS development • Climate and bushfire research	Emergency services, governments and communities need clear and comprehensive assessments and warnings of the fire dangers they face during high risk seasons.
	Satellite and AI detection	• Analytics and AI • Satellites	For future bushfires, lightning strikes are the biggest risk factor for early action. Satellites are increasingly effective for detecting small fires, especially in remote locations. AI can be used to rapidly assess satellite data.
	Aerial detection using drones	• Unmanned aerial vehicles, drones	Many fires in Australia start in hard to access forested areas, and early detection and response has direct benefits to fire extent and control (Christensen, 2015). Unmanned aerial vehicles or remotely piloted aircraft and forward-looking infrared yield savings relative to helicopter use of 31 % on total suppression costs.
	Aerial firefighting capability and arrangements	• Sovereign capability.	Can be restricted during strong winds. However, critical to future capability, and less likely to be shareable with overlapping and protracted bushfire seasons in the future.
OPERATIONAL	Workforce	• Volunteer recruitment and retention • Professional fire service capability	Australia's fire services rely heavily on volunteers, but volunteer personnel supporting fire service organisations declined by 16% between 2015–16 and 2024–25 — around 36,000 fewer volunteers. In 2024–25, over 190,000 volunteer firefighters and support personnel remained nationally (Productivity Commission, 2026). Maintaining recruitment and retention will be increasingly important as demands on fire and emergency services grow.
	Asset upgrades and maintenance	• Equipment and refurbishment • Fit-for-purpose stations/fleet	Fire trucks in Victoria and to an extent other states and territories are ageing, and subject to sporadic funding Hard to assess existing v ideal state. Likely if older vehicles and injury/death of firefighters.

1. The RCP4.5 and RCP8.5 scenarios are retained as reported in the Productivity Commission's underlying analysis and are presented here as source-specific evidence. They are not used to calibrate bushfire recurrence in this report.

Australia has among the world's best firefighting capability, but better preparedness can materially cut bushfire losses and strengthen emergency responses under catastrophic conditions

Even under catastrophic fire conditions, better preparedness can reduce damage to homes and infrastructure, lower risks to communities and improve the effectiveness of emergency response. A firefighter interviewed likened fighting today's fires to warfare, where the impacts are similar in scale, and where logistical and capability preparation beforehand must be similar.

This report acknowledges the considerable effort by Governments, fire agencies, and public programs to respond to mega fires in Australia. During the Black Summer Fires, RFS in NSW estimated that whilst it lost 2448 Homes, and saw 1013 damaged, it saved an estimated 14,519 homes, 1,486 facilities and 14,016 outbuildings through protective measures.¹

Consultation with Experts highlighted some emerging and immediate priorities for better preparedness for mega fires – with climate change driving more frequent, extreme fire weather, longer and overlapping fire seasons, and events with multiple fronts:

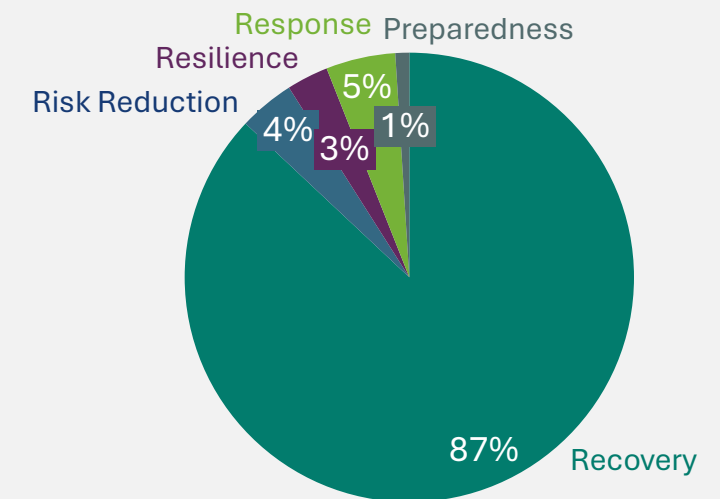
- **Education and public awareness:** Career fire fighters emphasised that a well-prepared community, with continuous education and awareness measures, knows when to stay and when to leave, and maintains their properties in ways that improve fire fighting efficacy under extreme conditions. They cited examples of well-prepared homes that were the only ones standing after a fire.
- **Volunteers and Workforce:** Recruitment and retention of volunteers and professional workforce are critical, for community education and 24/7 firefighting operations. Greater technology deployment needs a well trained workforce to support its effectiveness.
- **Technology and aircraft:** Drones, analytics and AI to rapidly detect smoke and fire, track fire spread, and respond to lightning strikes, and next generation fleet and equipment to support 24/7 operations in multiple locations.
- **Housing retrofits and standards:** Poorly protected homes are highly vulnerable and draw considerable firefighting effort. Better preparedness improves the way homes are built and maintained, and where they are built.

- **Land use and planning:** Asset protection zones and green halos around populated areas, for animal grazing, thinning vegetation, prescribed burning.
- **Investment focus on preparedness:** Recovery spending should help ensure damaged structures and infrastructure are “built back better”. Collaboration with ICA and insurers is needed to inform resilience upgrades beyond like-for-like replacement.

Public funding is heavily skewed towards recovery

Every dollar spent before a bushfire delivers better value than every dollar spent fighting the fire or rebuilding after it. However, public spending is heavily skewed towards disaster response and recovery.

In the five years from 2018-19 to 2022-23, Commonwealth funding across the disaster continuum for bushfires and other disasters totalled \$13.9 billion. Of this, 92% was on response and recovery, with only 8% of spending on risk reduction, resilience and preparedness measures.



Source: Andrew Colvin (2024), Independent Review of Commonwealth Disaster Funding

1. NSW Rural Fire Service (2020); Australian Institute for Disaster Resilience (2020)

03 Economic impacts



Direct bushfire costs escalate with severity, but the broader economic impacts can be several times larger

The **direct financial costs of bushfires** provide an important indication of **their increasing severity**, but capture only part of the overall economic burden. Insured losses, asset damage and government recovery expenditure do not account for the disruption to businesses and supply chains, impacts on employment and household incomes, or longer-term social and health consequences. The estimates presented in the table to the right therefore vary depending on the costs included and the methodology applied but collectively provide an indication of the scale of the broader economic impact.

These estimates should not be interpreted as directly comparable measures of total economic cost. **Broader bushfire literature indicates that the total economic and social impacts can be several times the value of direct losses, with estimated multipliers ranging from approximately 3 to 5.3 across studies.** A previous ANU study examining the economic impact of early bushfire detection estimated a multiplier of around 4. While these multipliers are not directly transferable to all bushfire events, they illustrate the potential for wider economic impacts to substantially exceed the direct financial costs. This distinction is increasingly important as insurance coverage declines in some bushfire-prone areas while development continues in exposed locations.

Quiggin (2020) estimated the broader economic and recovery costs of Black Summer at around \$100 billion. This was an event-specific estimate with a broader cost scope, capturing a wider range of direct and indirect impacts, and is therefore not directly comparable with the estimates shown here.

Indicative annual cost of bushfire in Australia				
Australian National University (ANU) Peer-reviewed study	Large-scale study	Average annual bushfire cost, using ANU's national climate-adjusted estimate	~\$2.2 billion per year	2020-2049
Insurance Council of Australia (ICA) Database	Case study (Black Summer)	Black Summer insured losses	\$2.3–\$2.4 billion per year	2026
World Wildlife Fund (WWF) / University of Sydney Study	Case study (Black Summer)	Black Summer food/agriculture losses	\$4–\$5 billion per year	2021
National Emergency Management Agency (NEMA) / Australian National Audit Office (ANAO) Analysis	Case study (Black Summer)	Australian Government Black Summer recovery fund	~\$2.2 billion per year	2021

Sources: ConnellGriffin Analysis

The economic impacts of megafires are multiples of the value of direct financial costs

Case studies show the scale of losses across homes, farms, insurers, public budgets and wider communities.

Event / jurisdiction	Scale of fire	Homes / insured losses	Agriculture / output losses	Public / community costs
Victoria 2026 Summer fires	~440,000 ha burnt; 23 LGAs impacted; >200 fires started on 9 January.	451 homes destroyed; 4,300 insurance claims worth ~\$422.9m and rising.	>45,000 livestock lost; ~10,000 km fencing; >150,000 ha agricultural land impacted.	> \$370m committed for relief and recovery; additional \$80m pre-season preparedness funding.
Black Summer 2019–20 National / east & south	>10m ha burnt in south-eastern Australia; about one-quarter was agricultural land.	38,416 insurance claims worth ~\$2.33bn.	Food system losses estimated at \$4–5bn; production losses around \$2bn; >100,000 livestock deaths.	At least \$2bn National Bushfire Recovery Fund; recovery assistance reported at \$8.2bn.
NSW Black Summer / Currowan complex	NSW: 5.5m ha burnt. Currowan complex: >500,000 ha over 11 weeks.	NSW: 2,448 homes destroyed. Currowan/Clyde Mountain: ~802 homes destroyed and 1,869 structures destroyed/damaged.		Shoalhaven example: ~\$50m AGDRP, ~\$29.2m BLER funding and >\$11m BSBR projects.
South Australia 2019–20 examples	Kangaroo Island, Cudlee Creek and other fire-affected primary production areas; 172,591 ha of private land burnt.	1,190 primary production businesses impacted; losses reflected through farm assets, livestock, viticulture and business disruption.	\$186.6m agricultural production losses; 67,928 livestock killed; 781 ha viticulture burnt, worth \$8.8m.	

Sources: AIDR Black Summer NSW 2019–20; Currowan case study note; Victorian Government Submission to 2026 Summer Fires Inquiry; WWF Australia / University of Sydney (2021), Fire on the Farm; DAE/AFPA (2014); ANU (2020).

Note: Case studies add detail behind the top-down numbers: homes, farms, infrastructure, health, tourism and government recovery payments.

Insurance coverage is declining in some bushfire-prone areas, increasing the share of risk borne by households and governments

There is growing evidence that insurance is becoming less available or affordable in areas exposed to bushfire risk. As the frequency and severity of extreme bushfires increases, **insurers face greater exposure to large, correlated losses, resulting in higher premiums, increased excesses, tighter policy conditions and, in some locations, insurers choosing not to renew or offer new policies.** For example, some properties in popular alpine tourism destinations, have reportedly been unable to obtain insurance cover due to their exposure to bushfire risk, illustrating that insurance constraints are already emerging in high-risk locations.

This is changing how bushfire risk is distributed across the economy. Where properties are uninsured or underinsured, a greater share of the financial consequences of a major bushfire is borne directly by households, businesses and governments rather than being absorbed through insurance. As a result, insured losses may increasingly understate the potential economic cost of future bushfire events.

At the same time, population growth and continued urban development are increasing the number of people, homes and economic assets located in bushfire-prone areas. Domain (2024) estimates that 5.6 million Australian homes — almost half of all properties — are exposed to bushfire risk, with a combined value of around \$4.66 trillion. Expansion of the urban footprint into the bushland and urban interface increases exposure.

Taken together, these trends suggest that historical insured losses are becoming a less reliable guide to the future economic burden of bushfires. The value of assets exposed is likely to increase in real terms as construction and rebuilding costs rise faster than general inflation, while population growth and housing demand may lead to continued development in or near bushfire-prone areas. Rising dwelling values, as shown on page 23, further increase the value of capital at risk. As a result, the potential economic cost of future bushfires may continue to grow even as insurance markets become more constrained.

1. Quote from Insurance News (2020)

“...some properties in popular Alpine tourism destinations, have reportedly been unable to obtain insurance cover due to their exposure to bushfire risk...”

”

The climate science points to most pronounced impacts in south-eastern Australia, our biggest state economies

- Historically, Victoria and Tasmania have been more exposed to Australian Bushfire Season, with 50% of historical insured losses occurring in Victoria.
- The historical distribution of bushfire losses, illustrated by ICA data in the table to the right, provides an indication of the geographic pattern of past losses across Australia, but should be interpreted with caution, given limitations of insured losses as a proxy for total economic impacts and the changing availability and coverage of insurance in high-risk areas.
- As well, a warming climate means the reach of megafires is extending, from the traditional hot-spots of Victoria and Tasmania to NSW and QLD
- The Black Summer fires declared for NSW, QLD, SA & VIC, in 2019 highlighted acute growing bushfire risk in NSW with 81% insured losses.
- ICA reported in 2020 that 38,181 claims had been lodged, totalling an estimated insurance loss of \$2.3 billion.

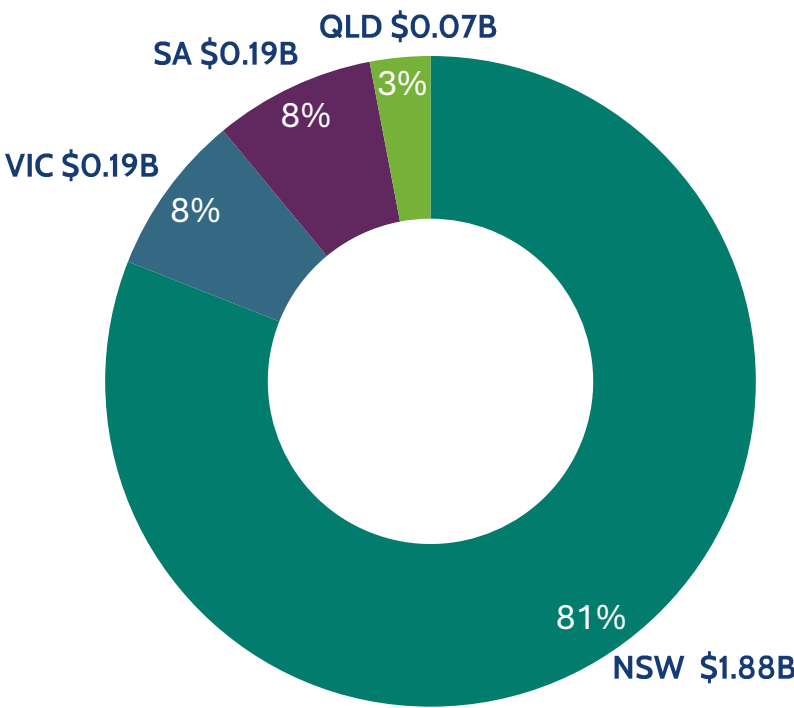
Historical versus Black Summer Bushfire Losses, by State

Historical Split by State

ICA normalised bushfire losses (\$2022bn)		
Jurisdiction	Normalised loss	Share of total
VIC	\$9.7	50%
TAS	\$4.3	22%
NSW	\$1.8	9%
SA	\$1.7	9%
ACT	\$1.3	7%
WA	\$0.5	3%
QLD	\$0.0	0%
NT	—	—
Total	\$19.2	100%

Source: Insurance Council of Australia (2026).
Note: shares reflect insured normalised catastrophe losses only, not total economic costs. The Colvin Review estimates are annual total economic costs for 2049–50 under P95 and P99 tail-risk scenarios. They are not directly comparable with the historical ICA figures, which represent cumulative normalised insured losses across recorded bushfire events. Colvin's estimates also incorporate uninsured and social costs, future growth in population and asset exposure, and projected changes in bushfire hazard.

Black Summer Split by State



Source: Insurance Council of Australia (2020). Editors note in Insurance Council of Australia press release, *Insurance Bill for Season of Natural Disasters Climbs over \$5.19 billion*, 28 May 2020

Economic costs rise sharply as bushfire severity escalates from severe to catastrophic

The Colvin Review illustrates how both the scale and geographic distribution of modelled bushfire economic costs can change substantially as event severity increases. The tables show each jurisdiction's share of the national modelled bushfire cost under P95 and P99 scenarios, based on the underlying jurisdiction-level dollar estimates.

This modelling reinforces the broader evidence that the economic consequences of bushfires can extend well beyond direct financial losses, with costs increasing disproportionately as event severity rises.

Forecast 2049–50 share of economic cost of bushfires ¹				Forecast 2049–50 share of economic cost of bushfires ²			
P95 scenarios: severe but not worst-case				P99 scenarios: catastrophic events			
National modelled bushfire cost: \$20.3bn / \$28.5bn / \$29.9bn				National modelled bushfire cost: \$109.7bn / \$169.5bn / \$199.0bn			
Jurisdiction	Excl. climate	Moderate emissions	High emissions	Jurisdiction	Excl. climate	Moderate emissions	High emissions
NSW	19.6%	17.9%	17.9%	NSW	7.9%	6.5%	5.7%
VIC	61.9%	65.6%	66.2%	VIC	43.5%	41.4%	36.3%
QLD	0.0%	0.0%	0.0%	QLD	4.1%	3.7%	3.1%
SA	13.1%	11.5%	11.3%	SA	9.5%	7.5%	6.6%
WA	5.3%	5.0%	4.5%	WA	1.6%	1.3%	1.1%
TAS	0.0%	0.1%	0.1%	TAS	24.4%	30.2%	38.0%
NT	0.0%	0.0%	0.0%	NT	0.0%	0.0%	0.0%
ACT	0.0%	0.0%	0.0%	ACT	9.0%	9.4%	9.2%
National	100.0%	100.0%	100.0%	National	100.0%	100.0%	100.0%

Source: Deloitte (2023), Commonwealth Disaster Funding, Tables 25–32 of the Colvin Review appendices. Figures are predicted 2049–50 total economic costs of bushfires by jurisdiction, in real 2023–24 dollars. Percentages shown are ConnellGriffin calculations of each jurisdiction's share of the national modelled bushfire cost under each scenario.

Note: Percentages represent each jurisdiction's share of the national modelled bushfire economic cost under the relevant P95 or P99 scenario. These shares are influenced by differences in population and asset exposure and should not be interpreted as a direct measure of bushfire probability or underlying risk. Per-capita measures would provide a complementary perspective on relative exposure.

1. P95 scenarios show severe bushfire cost outcomes, but not the most extreme cases. Most modelled outcomes would be lower than this level.

2. P99 scenarios show more catastrophic bushfire cost outcomes. These represent very rare but higher-cost events, which may be more relevant for testing catastrophic climate risk.

The average annual cost of bushfires is estimated to be around \$6 billion

The \$6.0 billion per annum estimate represents an indicative long-run average cost of bushfires across the three severity categories. It is a modelling estimate based on historical cost evidence and indicative event-frequency assumptions informed by consultation with fire experts, rather than a formal catastrophe-loss estimate.

The modelling assumes one Black Summer-scale major event over a 30-year period, Major damaging fires approximately every four years to FY2040 and every three years thereafter, and other damaging fires occurring annually.

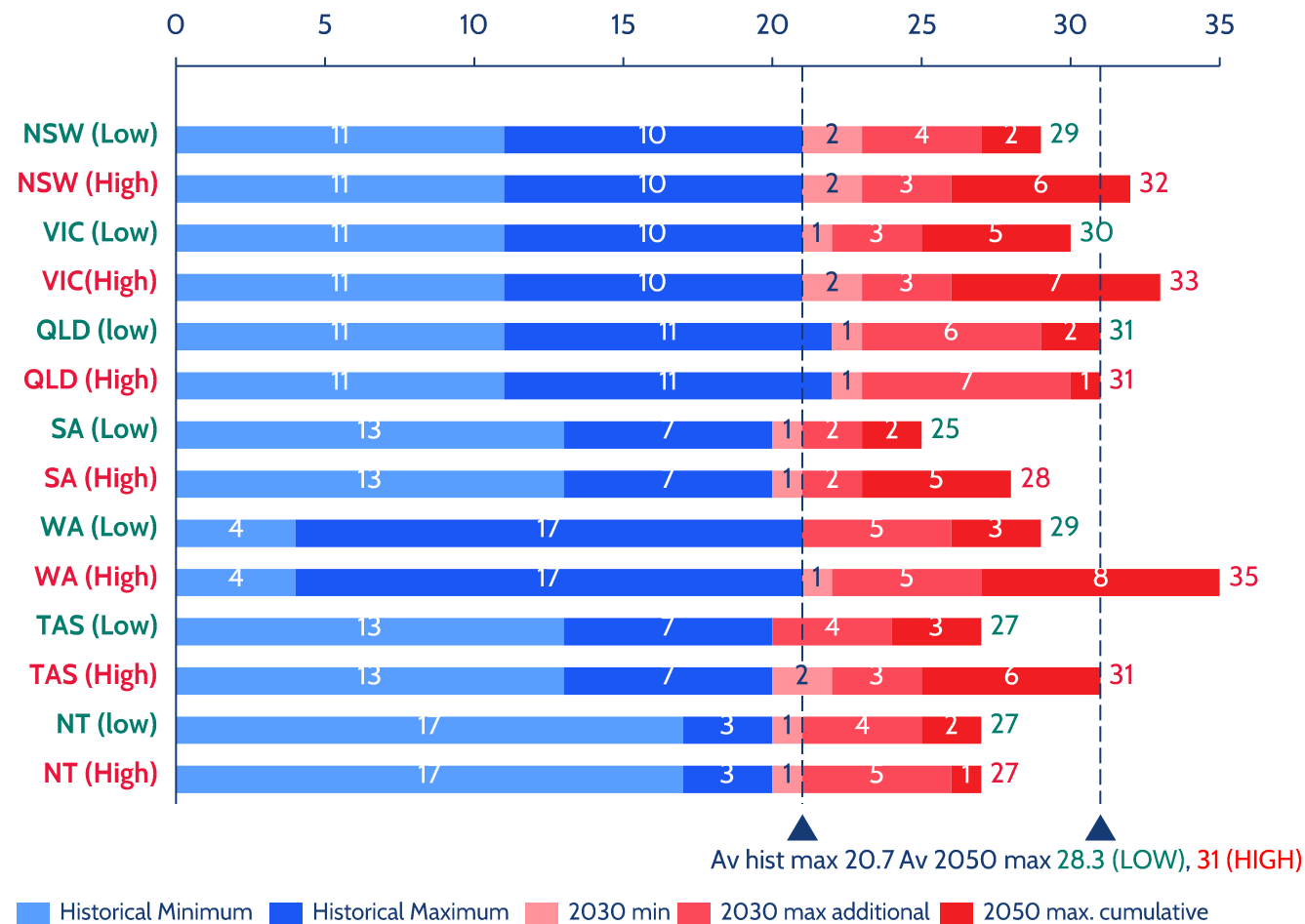
The estimate should be interpreted as a long-run average rather than an expected cost in any individual year. Actual future bushfire costs may be materially higher or lower depending on the frequency, severity and impacts of events, as well as changes in exposure, vulnerability, preparedness and fire suppression capacity. Cost multipliers are applied consistently across the modelling but remain indicative approximations and may vary across different fire events.

The adopted compound major benchmark excludes environmental and ecological costs associated with Black Summer. More broadly, the estimated average annual cost excludes intangible and other non-market costs that are difficult to quantify consistently given the broad range of impacts identified in the literature and the subjectivity inherent in valuation approaches, which often rely on willingness-to-pay estimates. More detail on the approach is provided in the Appendix.



Extreme Fire Days frequency will grow by 37% to 50% annually by 2050, with WA and East Coast states experiencing pronounced increases under two emission scenarios

Additional Forecast (95th percentile) Extreme Fire Days by State (low vs high scenarios)



Source: Andrew Colvin (2024) , Independent Review of Commonwealth Disaster Funding Appendices.
Note: The 2030 and 2050 projections are each measured relative to the 1995–2014 historical baseline. The 2050 segment shown in the chart represents the additional increase from the 2030 upper bound to the 2050 upper bound, rather than a separate projection reported by the Colvin Review.

Key Points

- South-eastern Australia will likely experience substantial increases in fire weather and bushfire activity.
- Geographic concentration in NSW and Victoria is economically significant, holding Australia’s largest populations, economies and concentrations of housing, businesses and critical infrastructure. The potential for higher capital losses, insurance and recovery costs means that more bushfire events could have outsized economic impacts.
- The number of Extreme Fire Days is a proxy used for future bushfire frequency and was used in the Colvin review to measure future long run increases in bushfire frequency and intensity.
- Historically, the average historical maximum number of extreme fire days in Australia was 20.7 days a year.
- Climate scientists note that future megafire frequency is difficult to estimate, with climate change tipping points from climate change.
- The Colvin Review presents future fire-weather projections under SSP1-2.6, associated with around 1.5°C of global warming by 2100, and SSP3-7.0, associated with around 3–4°C. For this analysis, the SSP3-7.0 projections are used as a cross-check on the increase in severe fire-weather conditions underpinning the recurrence assumptions, rather than being applied directly to determine event frequency.
 - Under a low emissions scenario, Australia would see an average of 28.3 extreme fire days a year, with NSW, VIC, QLD and WA over the average.
 - Under a high emissions scenario, the average would grow to 31 extreme fire days annually, with Western Australia, New South Wales, Victoria, Queensland and Tasmania all experiencing 31 days or more of extreme by 2050.

Emerging science indicates that bushfire seasons will be longer, making preventative measures harder, and increasing the likely extent of major fires

Climate research indicates that bushfire seasons are likely to become longer and conditions conducive to extreme fire behaviour more frequent. This reduces the window available for the implementation of preventative measures such as hazard reduction burning, vegetation management and other fuel-reduction activities, while increasing the period over which communities, infrastructure and emergency services remain exposed to elevated risk. A longer season also increases the likelihood that multiple bushfire events occur within the same period, placing greater pressure on firefighting resources and emergency response capacity.

The potential economic consequences are amplified by population growth and development in bushfire-prone areas. As the urban population expands, more households and businesses are located within or adjacent to the bushland and urban interface. In addition, the value of assets exposed to bushfire risk continues to increase, including the value of housing stock, commercial assets and broader infrastructure such as roads, electricity networks, telecommunications and water infrastructure.



Population and urban development are growing, increasing potential impacts of bushfire in NSW, VIC and QLD

Population growth and development intensity increase the number of people, homes, businesses and public assets exposed to dangerous/catastrophic bushfire conditions

Why population and development matter for bushfire impacts

Populous states are continuing to grow

State	Population 2025	Annual growth	% growth	Projected 2030	Projected 2040
NSW	8.64m	+104.6k	1.2%	~8.9–9.4m	~9.7–10.5m
VIC	7.12m	+117.3k	1.7%	~7.5–7.9m	~8.2–9.4m
QLD	5.71m	+92.2k	1.6%	~5.9–6.2m	~6.3–7.2m
Rest of AUS	6.33m	+98.4k	1.6%	~6.5–6.9m	~7.0–8.0m

Together, NSW, VIC and QLD account for ~77% of Australia’s population and ~76% of annual population growth.

Implications for bushfire impacts

More assets in the path of fire
Growth increases exposure of dwellings, businesses, roads, utilities and community facilities.

Higher recovery and disruption costs
More people and assets at risk can increase capital losses, output disruption and public recovery spending.

Growth is concentrated in the three largest capitals
In FY25, Sydney, Melbourne and Brisbane added about 238,000 people in the latest year, increasing the concentration of homes, businesses and infrastructure in large urban areas and their surrounding fringes.

Modelling implication: with more people and assets in harm’s way, the avoided costs from preparedness can grow over time, particularly in fast-growing states.

Sources: ABS National, State and Territory Population (Dec 2025); ABS Regional Population 2024–25; ABS Population Projections 2022–2071. Projected 2030 and 2040 figures are indicative interpolations based on ABS long-run state population projection ranges; Rest of Australia is calculated as the residual from national totals.

Property values are also rising, increasing the value of assets exposed to bushfire in NSW, VIC and QLD

As dwelling prices and residential asset values rise, the capital at risk from dangerous and catastrophic bushfire conditions also rises.

Why property values matter for bushfire impacts

Mean dwelling prices and recent growth

State	Mean dwelling price (Mar-2016, \$m)	Mean dwelling price (Mar-2026, \$m)	Average annual growth (Mar-2016 to Mar-2026)
NSW	\$0.78	\$1.325m	5.5%
VIC	\$0.63	\$0.947m	4.2%
QLD	\$0.47	\$1.124m	9.0%
Australia	\$0.61	\$1.111m	6.2%

Among the three largest states, NSW has the highest mean dwelling price, while Queensland has recorded the strongest recent price growth.

What rising property values mean for bushfire impacts

Higher capital losses

If homes and other built assets are damaged, higher property values increase the replacement cost and the scale of direct losses.

Higher insurance and recovery costs

More valuable homes can increase insured losses, uninsured losses and the cost of rebuilding after major fires.

A larger asset base is now exposed

Australia's residential dwelling stock reached \$12.8 trillion in March 2026. This means more value is exposed when fire affects populated areas.

Modelling implication: As property values rise, the avoided capital losses from preparedness can become larger over time, especially in high-value states and peri-urban areas.

Sources: ABS Total Value of Dwellings, March Quarter 2026; Deloitte Access Economics (2021).

Food and agriculture production values are also rising, increasing the value at risk from bushfire

As the value of agricultural output, crops, livestock and food supply chains rises, the economic consequences of bushfires can also become larger.

Why food and agriculture values matter for bushfire impacts

Selected indicators of rising food and agriculture value

Indicator	FY2016	FY2021	FY2026	Average annual growth (FY2016 to FY2026)
Total farm production (\$m)	\$57,102	\$72,023	\$103,819	5.6%
Crops (\$m)	\$27,791	\$40,485	\$55,344	6.5%
Livestock (\$m)	\$29,311	\$31,538	\$48,474	4.7%

Agricultural production values have increased, meaning bushfires affecting farming regions can result in larger losses to crops, livestock and farm assets.

What rising food and agriculture value means for bushfire impacts

Higher direct farm losses

If fires affect farm areas, higher-value crops, livestock, machinery, fencing, sheds and perennial plantings can increase the value of direct losses.

Higher output and income losses

Bushfires can disrupt harvests, destroy feed and pasture, reduce livestock output and interrupt farm business income.

Wider food-system impacts

Losses can extend beyond the farm gate to processing, freight, exports and food supply chains. WWF estimated Black Summer food-system losses at around \$4–5 billion.

Modelling implication: As agriculture product value grows, the avoided losses from preparedness can also grow, especially in high-value farming regions and where bushfire disruptions affect broader food supply chains.

Sources: ABARES Snapshot of Australian Agriculture 2026; ABARES Agricultural Commodities Report Sept 2025; ABS Australian Agriculture: Horticulture, 2024–25; ABS Australian Agriculture: Broadacre Crops, 2024–25; WWF Australia & University of Sydney, Fire on the Farm (2021).

Improved bushfire preparedness could avoid \$20.9 billion to \$39.4 billion in economic losses over 30 years

In the absence of further improvements in preparedness and resilience, the economic costs of bushfires to the Australian economy are expected to increase substantially over the next 30 years, reflecting the projected increase in the frequency and severity of damaging fire events.

Our modelling indicates that improved preparedness could avoid around \$20.9 billion to \$39.4 billion in GDP losses over 30 years on an undiscounted basis, depending on the effectiveness of future preparedness and resilience measures.

The range reflects two illustrative preparedness scenarios:

- **Scenario 1** – Modest improvement in preparedness: assumes measures reduce the total economic damage associated with bushfires by 10% relative to the baseline trajectory.
- **Scenario 2** – Stronger preparedness package: assumes a more comprehensive package of preparedness, mitigation and response measures reduces total economic damage by 20% relative to the baseline trajectory.

These scenarios are intended to represent plausible levels of avoided damage rather than forecasts of the performance of a specific intervention or program. They provide a transparent way of testing how improvements in Australia's capacity to prepare for, respond to and recover from bushfires could alter the long-term economic burden.

The damage-reduction assumptions have been sense-checked against Australian evidence on the effectiveness of bushfire preparedness, mitigation and early intervention, including avoided-loss studies, ANU research¹ on early bushfire detection, disaster resilience literature, and case studies and expert/ELCA advice. This evidence demonstrates that measures such as early detection, fuel management, community preparedness, asset protection and improved emergency response can materially reduce bushfire losses and generate significant economic benefits. The assumptions are therefore considered plausible and conservative, representing a partial reduction in the economic consequences of future bushfires rather than an expectation that preparedness can eliminate losses entirely.

The analysis does not separately model the additional economic activity associated with post-disaster rebuilding or recovery investment. The results therefore focus on the economic losses arising from bushfire-related damage and disruption, and on the extent to which these losses can be reduced through improved preparedness. This means the modelling should be interpreted as an estimate of avoided economic losses, rather than a full assessment of all post-disaster economic activity.

1. Biddle, N., Bryant, C., Gray, M. & Marasinghe, D. (2020). Measuring the economic impact of early bushfire detection. ANU Centre for Social Research & Methods.

The benefits of preparedness extend well beyond avoided direct bushfire damage, with reduced disruption and losses flowing through to higher economic activity, employment and government revenues

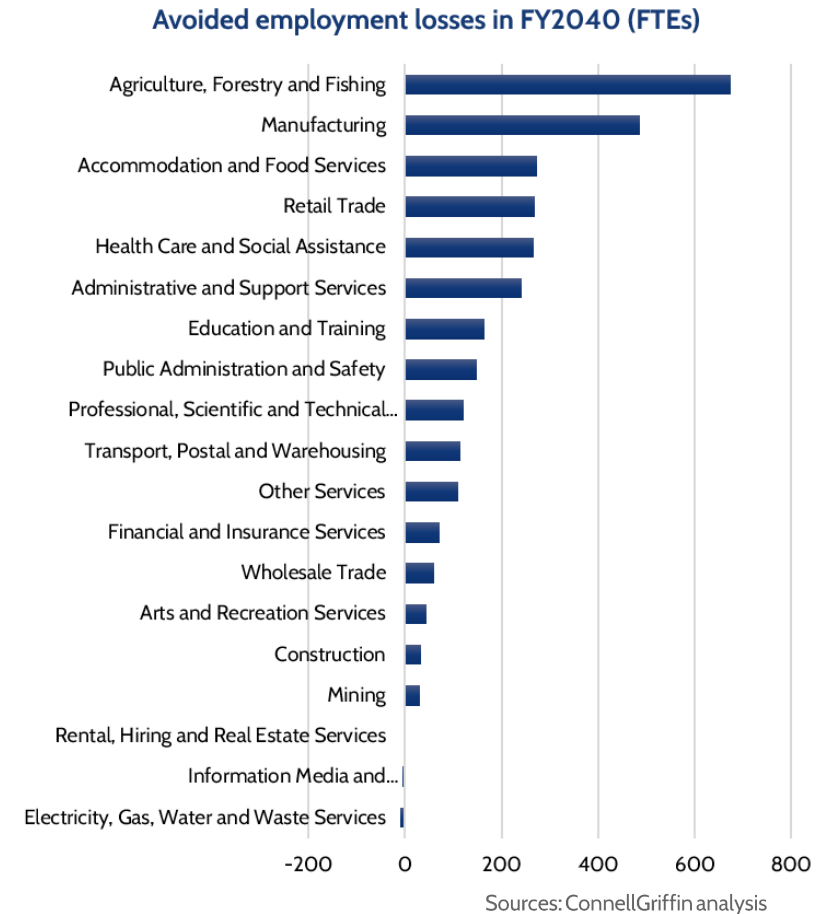
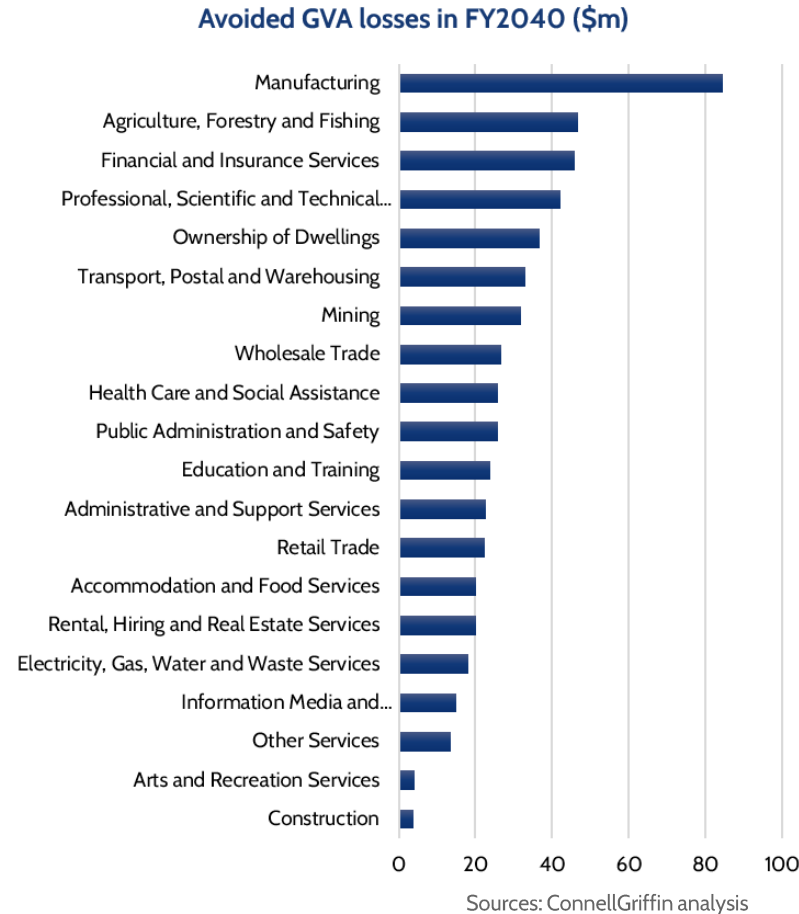
- Preparedness reduces the scale of bushfire-related disruption. Avoided damage and fewer disruptions reduce adverse shocks to productive capacity and economic activity, helping to preserve sectoral output, household consumption and investment, and limiting losses in GDP, employment and government revenue.
- By reducing bushfire-related damage and disruption, improved preparedness is estimated to avoid GDP losses of approximately \$20.9 billion under Scenario 1 and \$39.4 billion under Scenario 2 over 2025/26–2054/55, on an undiscounted basis.
- Preparedness also helps protect employment that would otherwise be affected by bushfire disruption, with avoided employment losses equivalent to approximately 2,950 FTE jobs per year under Scenario 1 and 5,620 FTE jobs per year under Scenario 2 over the 30-year period.
- Reduced disruption to economic activity also helps preserve government revenues, with approximately \$8.8 billion in tax revenue protected under Scenario 1 and \$16.8 billion under Scenario 2 on an undiscounted basis.
- Across the key economic indicators, the value of losses avoided under Scenario 2 is around 1.9 times that under Scenario 1, reflecting the greater reduction in bushfire impacts assumed under this scenario.

Outcome modelled		Scenario 1	Scenario 2	
	Australian GDP losses avoided (\$FY2025)	Undiscounted (2025/26 – 2054/55)	\$20.9bn	\$39.4bn
		Discounted at 7% (2025/26 – 2054/55)	\$8.3bn	\$15.6bn
	Employment losses avoided (FTE)	Average annual (2025/26 – 2054/55)	2,950	5,620
		In FY2040	3,100	5,860
	Government Tax Revenue Protected (\$FY2025)	Undiscounted (2025/26 – 2054/55)	\$8.8bn	\$16.8bn
		Discounted at 7% (2025/26 – 2054/55)	\$3.1bn	\$5.9bn

Sources: ConnellGriffin analysis

Scenario 1 reduces bushfire-related economic losses across most industries, with the largest GVA and employment impacts in agriculture, manufacturing and tourism-related sectors

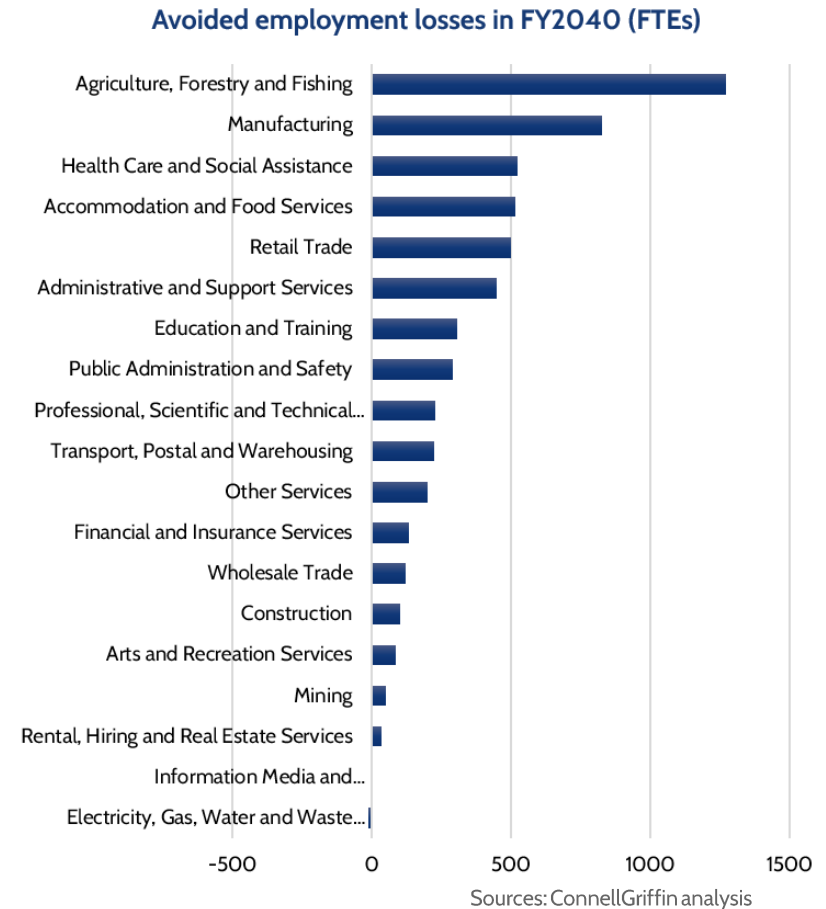
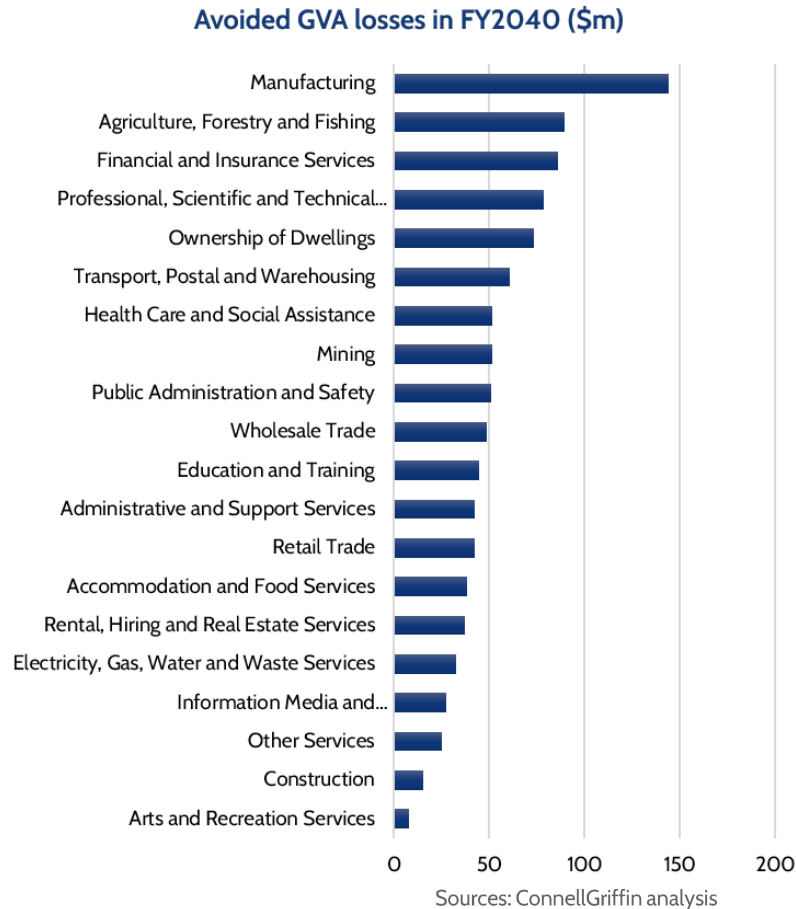
- By FY2040, reduced bushfire impacts under Scenario 1 help preserve economic activity across most industries, with avoided GVA¹ and employment losses extending beyond the sectors directly exposed to bushfires.
- The largest avoided employment losses occur in agriculture, forestry and fishing and manufacturing, with employment also protected in accommodation and food services, retail trade and health care and social assistance.
- The results demonstrate that the economic value of improved bushfire preparedness extends through the broader economy, as reduced disruption helps maintain activity across supply chains and related service industries.
- Employment impacts are positive across most industries, while a small number of sectors record very small negative or near-zero effects.



1. The GVA contributed is equal to the value of the output (the value of services in this case), less the value of inputs (the cost of labour and other costs e.g. maintenance costs, etc.) required to deliver the services.

Scenario 2 avoids larger bushfire-related economic losses across most industries, with the strongest GVA and employment impacts in agriculture and manufacturing

- By FY2040, the greater reduction in bushfire impacts under Scenario 2 helps preserve more economic activity than Scenario 1, with larger avoided GVA and employment losses across most industries.
- The largest avoided GVA losses occur in manufacturing and agriculture, forestry and fishing, with substantial benefits also extending to financial services, professional services, ownership of dwellings and transport-related sectors.
- The largest avoided employment losses occur in agriculture, forestry and fishing and manufacturing, with employment also protected in health care, accommodation and food services, retail trade and administrative services.
- The broader spread of impacts reflects how reduced bushfire disruption helps preserve activity across supply chains, household demand and service industries, extending the benefits of preparedness beyond the sectors directly affected by bushfires.



Assuming two Black Summer-scale events over 30 years increases the estimated economic value of preparedness by around 6%

This analysis includes a sensitivity test that applies the same event-cost benchmarks, damage-reduction assumptions and preparedness scenarios as the core analysis, but assumes two Black Summer-scale events over the 30-year modelling period instead of one.

What changes from the core analysis

- The core analysis assumes one Black Summer-scale event over the 30-year modelling period.
- The sensitivity analysis assumes two Black Summer-scale events over the same period.
- All other key modelling assumptions remain unchanged, including the representative event-cost benchmarks and the 10% and 20% damage-reduction assumptions applied under the two scenarios.

Sensitivity analysis results – higher Black Summer-scale event frequency

Outcome	Scenario 1 Core Analysis	Scenario 1 Sensitivity Test	Scenario 2 Core Analysis	Scenario 2 Sensitivity Test
GDP losses avoided (Undiscounted, \$FY2025)	\$20.9bn	\$22.1bn (+5.7%)	\$39.4bn	\$41.6bn (+5.6%)
Average annual employment losses avoided (FTE)	2,950	3,120 (+5.8%)	5,620	5,935 (+5.6%)
Tax revenue protected (Undiscounted, \$FY2025)	\$8.8bn	\$9.3bn (+5.7%)	\$16.8bn	\$17.7bn (+5.4%)

Sources: ConnellGriffin analysis. Note: sensitivity assumes two Black-Summer-scale major events over 30 years instead of one in the core analysis.

Key findings from the sensitivity analysis

- Assuming two Black Summer-scale events over 30 years increases the estimated value of preparedness across all key economic indicators.
- Avoided GDP losses increase to \$22.1 billion under Scenario 1 and \$41.6 billion under Scenario 2, compared with \$20.9 billion and \$39.4 billion in the core analysis.
- Average annual employment losses avoided increase to around 3,120 and 5,935 FTEs, and tax revenue protected rises to \$9.3 billion and \$17.7 billion under Scenarios 1 and 2 respectively.
- The increase relative to the core analysis is moderate because the sensitivity changes only the frequency of Black Summer-scale events, other damaging-fire assumptions remain unchanged, and events are netted to avoid double counting.

Stronger preparedness avoids greater economic losses, but further analysis is needed to identify the most cost-effective measures

Moving from Scenario 1 to Scenario 2 materially increases the economic activity, employment and government revenue protected from bushfire disruption.

- Scenario 2 results in substantially greater avoided economic losses, increasing cumulative GDP losses avoided from \$20.9 billion to \$39.4 billion and government tax revenue protected from \$8.8 billion to \$16.8 billion over the modelling period.
- Average annual employment losses avoided increase from around 2,950 FTEs under Scenario 1 to 5,620 FTEs under Scenario 2.
- The industry pattern is broadly similar across the scenarios, but the magnitude of avoided losses is larger under Scenario 2, illustrating the additional losses that could be avoided through stronger preparedness.

Comparison of modelled avoided losses under Scenario 1 and Scenario 2

Outcome	Scenario 1 Core Analysis	Scenario 2 Core Analysis	Additional avoided losses under Scenario 2
Assumed reduction in bushfire damages	10%	20%	+10 ppt
GDP losses avoided (Undiscounted, \$FY2025)	\$20.9bn	\$39.4bn	+\$18.5bn
Average annual employment losses avoided (FTE)	2,950	5,620	+~2,670
Tax revenue protected (Undiscounted, \$FY2025)	\$8.8bn	\$16.8bn	+\$8.0bn

Sources: ConnellGriffin analysis.

Modelling limitations

- The scenarios are illustrative preparedness outcomes rather than estimates of the effectiveness of individual interventions.
- The analysis does not estimate the additional expenditure required to achieve each scenario, meaning the results cannot be interpreted as a cost-benefit analysis or used to calculate a return on investment.
- Individual measures such as workforce capability, aircraft, technology, fuel management, community preparedness or resilient infrastructure are not modelled separately, and their costs and effectiveness will vary.

Recommendations / next steps

- Government agencies could undertake further cost-benefit and cost-effectiveness analysis of priority preparedness measures.
- This should compare the cost of individual measures or packages of measures with the bushfire losses they are expected to avoid, helping identify where additional funding delivers the greatest reduction in losses per dollar spent.
- This would help governments determine the appropriate level and mix of preparedness investment, alongside response and recovery funding.

04 Appendix



Approach to assessing economic impacts

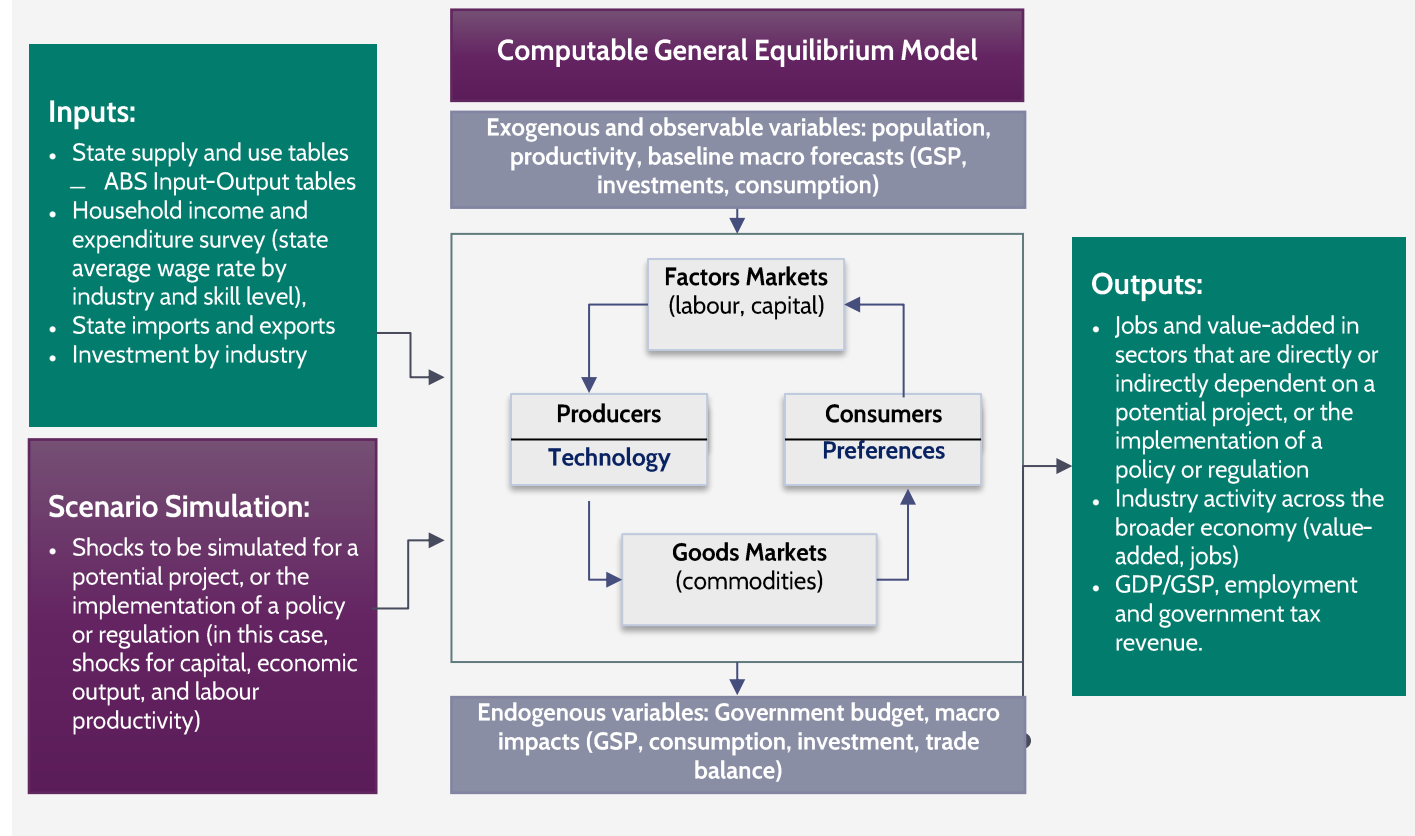
This assessment uses CGE modelling to estimate how improved bushfire preparedness affects the broader economy, capturing both the direct avoided damages and the wider flow-on effects across industries, households, governments and trade.

This assessment uses a recursive dynamic Computable General Equilibrium (CGE) modelling framework to estimate the value of improved preparedness. CGE modelling captures both direct and indirect impacts, including how labour, capital and other resources are reallocated across industries, households, governments and trade in response to an economic shock.

The analysis applies ConnellGriffin's implementation of the Victoria University Regional Model (VURM), a well-established multi-regional CGE model developed by the Centre of Policy Studies at Victoria University. VURM captures economic interactions across Australia's eight jurisdictions, enabling assessment of both the direct impacts of bushfires and their broader effects across industries and the national economy.

We utilised a top-down framework and scenario modelling to estimate the benefits of better bushfire preparedness. This is explained further in the following pages.

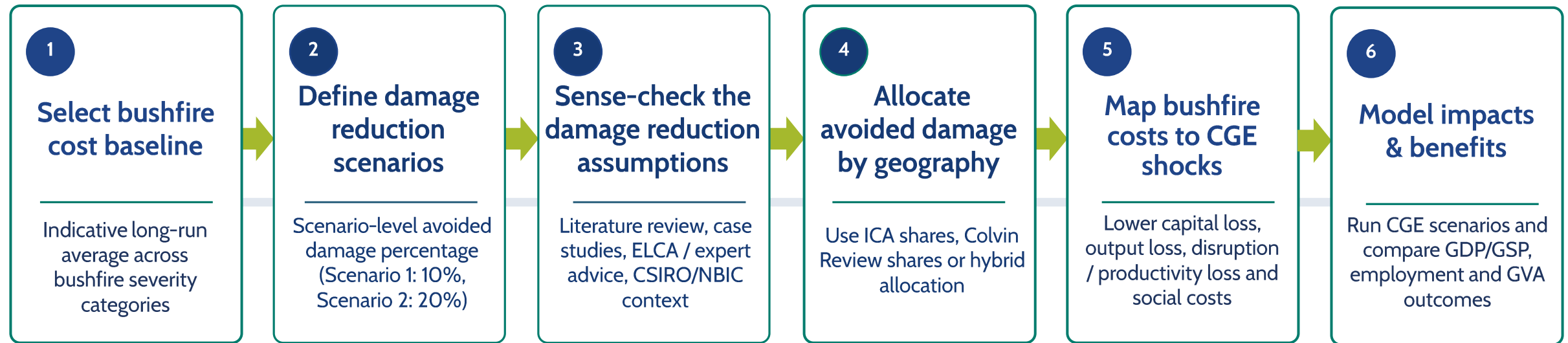
Flow chart of ConnellGriffin's CGE modelling approach



Top-down framework for modelling bushfire preparedness benefits

Scenario-level reductions in total bushfire damage costs are used as the basis for the CGE model shocks. Individual preparedness interventions are not modelled separately; rather, the intervention evidence is used to support the assumed reduction in damages, inform the composition of the shocks, and provide the supporting narrative for each scenario.

Framework logic: baseline cost → preparedness reduction → avoided damage → Model (CGE) shocks



The avoided damage % reductions should not be interpreted as the proven effectiveness of individual interventions. They are scenario assumptions used to test the economy-wide benefits if better preparedness reduces total bushfire damages by a given amount.

1 Forecast Bushfire Cost estimates

A severity-based approach was adopted to distinguish Black-Summer-scale major events from more frequent major bushfires and other damaging bushfires, allowing different cost and frequency assumptions to be applied to each category.

Methodology

- 1

Classify bushfire events into severity bands
Three mutually exclusive bands: Black-Summer-like Compound Major damaging fires, Major damaging fires, and Other Non-Major damaging fires.
- 2

Set cost benchmark for each band
Compound Major fire cost is based on Black Summer total cost. Major and Other Non-Major damaging fire costs are calibrated from ICA historical normalised catastrophe data.
- 3

Convert insured losses where appropriate
For Major fires, ICA insured losses are converted to broader economic costs using the ANU insured-to-total multiplier of 4.1, then escalated to FY2025 dollars.
- 4

Set recurrence assumptions
Our economic modelling assumes one Black-Summer-scale event over 30 years, Major fires every 4 years, and Other Non-Major damaging fires annually.
- 5

Calculate net expected average annual loss estimate
Events are netted to avoid double-counting across severity bands

Assumptions

Inputs	Data / Assumptions	Source
Compound Major event cost	\$27.7 billion FY2025; total cost	Peter Christoff (2023) ¹
Major cost	Average ICA major-fire loss × ANU 4.1 multiplier, inflated to FY2025	ICA (2026); Biddle, et.al. (2020) ²
Other Non-Major cost	ICA non-major average × ANU 4.1 multiplier, inflated to FY2025	ICA (2026); Biddle, et.al. (2020) ²
Frequency context	Megafire trends and fire-weather projections support scenario context	Dowdy and King (2025) ³

The method estimates an indicative long-run average annual bushfire loss based on assumed event frequencies and representative costs.

1. Sources: Peter Christoff (2023), The Fires Next Time – Understanding Australia’s Black Summer. <https://www.mup.com.au/books/the-fires-next-time/9780522879421>.
2. Sources: ICA Historical Catastrophe List (2026). <https://insurancouncil.com.au/industry-members/data-hub/>. Biddle, N., Bryant, C., Gray, M. & Marasinghe, D. (2020), Measuring the economic impact of early bushfire detection
3. Dowdy A and King A (2025) Novel climate analysis methods applied to the Australian ESCI projections data. Front. Clim. 6:1492228. doi: 10.3389/fclim.2024.1492228

Average annual cost estimate of future bushfire and data sources

Based on historical evidence and consultation with fire experts, the economic modelling adopts indicative frequency assumptions of one Black-Summer-scale Compound Major event over 30 years, Major damaging fires approximately every 4 years until FY2040 and every 3 years afterward, and Other Non-Major damaging fires annually.

Calibrated Average Annual Loss					
Severity band	Cost / event (\$bn, FY2025)	Recurrence (years)	Number of events modelled ²	Average annual costs (\$bn, FY2025)	Data / method source
Compound Major Bushfire event	\$27.7 ¹	30	1	\$0.9	Peter Christoff (2023), Ch.6 Black Summer total societal cost, escalated to FY2025
Major Bushfire event	\$16.1	4 (until FY2040), 3 afterward	8	\$4.3	ICA major-fire average; ANU (2020) 4.1 multiplier; FY2025 escalation
Other Non-Major Bushfire event	\$1.2	1	21	\$0.8	ICA non-major fire average; ANU (2020) 4.1 multiplier; FY2025 escalation
Total				\$6.0	

Sources: ConnellGriffin Analysis. Total may not add due to rounding.

The \$6.0 billion per annum estimate represents an indicative long-run average across the three bushfire severity categories. It combines historical cost evidence with frequency assumptions informed by consultation with fire experts. Actual costs in any given year may be materially higher or lower depending on the frequency, severity and impacts of bushfire events.

1. The estimated average annual cost here does not take into account the intangible costs, such as ecological costs.
2. Only one bushfire severity category is modelled in each year, with higher-severity events replacing lower-severity events to avoid double counting.

FWI projections support higher bushfire-frequency assumptions over the modelling horizon

Colvin Fire Weather Index (FWI) data point to a material increase in extreme-fire-day frequency across Australia, providing an evidence-based cross-check for the move from historical recurrence assumptions to a higher-frequency bushfire baseline.

Frequency cross-check

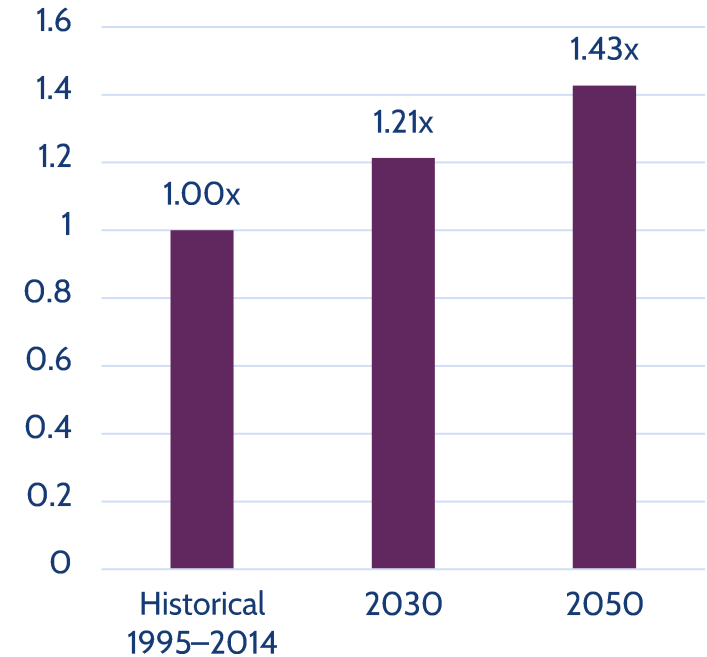
- The national extreme-fire-day frequency index increases from 1.00 historically to 1.21 by 2030 and 1.43 by 2050. These multipliers are derived using the midpoint of the historical and projected ranges of extreme fire days reported by the Colvin Review under the SSP3-7.0 scenario across seven jurisdictions. The midpoint therefore relates to the range of projected fire-day frequency, not to a midpoint temperature or warming scenario.
- The FWI projections are used as a cross-check on the recurrence assumptions rather than being translated directly into event frequency. The assumed recurrence of Major events every 4 years until FY2040 and every 3 years afterward is broadly consistent with this projected increase in extreme-fire-day frequency.
- The data indicate that Black-Summer-scale events are becoming more likely, but do not provide a precise recurrence interval. The 1-in-30-year assumption is therefore an indicative modelling assumption.

Jurisdiction-level FWI multipliers

Jurisdiction	2030	2050
NSW	1.22x	1.50x
VIC	1.22x	1.56x
QLD	1.27x	1.33x
SA	1.12x	1.33x
WA	1.28x	1.60x
TAS	1.21x	1.45x
NT	1.19x	1.27x
Australia	1.21x	1.43x

Index = 1.00 historically
Source: Andrew Colvin (2024), Independent Review of Commonwealth Disaster Funding. <https://www.nema.gov.au/about-us/governance-and-reporting/reviews/independent-review-of-commonwealth-disaster-funding>

National extreme-fire-day frequency index



FWI supports escalating the frequency of damaging fire conditions through the 30-year period. It strengthens the rationale for more frequent Major events after FY2040.

1 Cost calibration: from insured losses to broader bushfire cost

The representative cost per event is calibrated separately for each bushfire severity category to reflect the substantial differences in economic impacts between Compound Major, Major and Other Non-Major damaging fires.

ICA insured loss → ANU 4.08 multiplier → FY2025 escalation			
Severity category	Starting evidence	Calibration method	Cost used (\$bn FY2025)
Compound Major Bushfire event	Black Summer direct + indirect cost excluding environmental impacts: \$23.1bn	Escalated to FY2025 dollars	\$27.7
Major Bushfire event	ICA average major-fire normalised insured loss: \$1.5bn (2022 A\$)	× ANU 4.1; escalate to FY2025; × 2.3 ratio	\$16.1
Other Non-Major Bushfire event	ICA average non-major normalised insured loss: \$0.1bn (2022 A\$)	× ANU 4.1; escalate to FY2025; × 2.3 ratio	\$1.2

Sources:

ICA Historical Catastrophe List (2026). <https://insurancecouncil.com.au/industry-members/data-hub/>.

Biddle, N., Bryant, C., Gray, M. & Marasinghe, D. (2020), Measuring the economic impact of early bushfire detection.

Peter Christoff (2023), The Fires Next Time – Understanding Australia's Black Summer. <https://www.mup.com.au/books/the-fires-next-time/9780522879421>.

Note: the 2.3 ratio is derived from the Black Summer benchmark: direct + indirect cost excluding environmental impacts (\$23.1bn) divided by direct cost (\$10.2bn).

The cost calibration in this analysis draws on historical bushfire cost data and published evidence, with the resulting assumptions reviewed against expert consultation to ensure they are reasonable for the modelling context. This allows each severity category to be assigned a distinct cost benchmark rather than applying a single average cost across all bushfire events.

1 Key modelling assumptions and limitations

The calibration is designed to be transparent and auditable, with each assumption linked to either historical loss data, published research or expert-informed judgement.

Key assumptions

- The forecast annual cost of bushfire was built as a long-run modelling baseline, with bushfire events grouped into mutually exclusive severity categories.
- Representative event costs are based on historical evidence rather than a single average bushfire cost. Black Summer provides the compound major benchmark, while ICA historical loss data are used to calibrate the lower-severity categories.
- Historical insured losses are converted to a broader economic-cost basis using the adopted ANU multiplier, with all costs expressed in FY2025 dollars.
- Event frequencies are informed by historical experience, climate-risk evidence, expert consultation and internal review.
- Severity categories are netted to avoid double counting, so a Compound Major event replaces a Major event in that year rather than being counted in addition to it.
- The resulting \$6.04 billion annual loss represents a long-run average, rather than an expectation that the same level of bushfire damage will occur each year.

Key limitations and interpretation

- The average annual loss is an indicative modelling estimate based on assumed event frequencies and should not be interpreted as a formal catastrophe-loss estimate. Actual future bushfire costs may be higher or lower depending on the frequency, severity and impacts of future events.
- The historical ICA dataset is focused on insured and economically significant events, meaning smaller or poorly insured bushfires may be less comprehensively represented.
- Environmental and ecological losses are excluded from the adopted Black Summer cost benchmark because these impacts are largely non-market in nature and cannot be readily translated into the CGE model shocks used in this analysis. This keeps the cost benchmark focused on economic impacts that can be mapped consistently to changes in capital, output, productivity and household activity.
- Future losses will also depend on factors outside the modelled frequency assumptions, including population and asset exposure, vulnerability, land use, preparedness, suppression capacity and the location of future fires.

Bushfire damage reduction scenario assumptions

Steps 2 and 3 turn the evidence base into transparent damage-reduction assumptions for Scenario 1 and Scenario 2.

Preparedness package → % reduction in bushfire damages → CGE shocks

2 Define damage reduction scenarios

The following two scenarios are designed to test the potential economy-wide benefits of improved bushfire preparedness.

What we modelled

- **Scenario 1: modest improvement in preparedness (10% reduction in total damage costs)** — represents a realistic but moderate uplift in preparedness, such as better coordination, earlier detection, targeted fuel management and some improvement in response capability.
- **Scenario 2: stronger preparedness package (20% reduction in total damage costs)** — represents a broader and more effective preparedness package, where multiple measures work together to materially reduce bushfire damage across communities, assets and the economy.

3 Sense-check the damage-reduction assumptions

The damage-reduction assumptions are sense-checked against available evidence and expert judgement to assess whether the proposed reductions are credible and achievable under real-world bushfire conditions.

Sense-check the damage-reduction assumptions

- **Evidence from relevant preparedness and avoided-loss studies** — review evidence on measures such as earlier detection, fuel management and home hardening to understand the scale of avoided damage that may be achievable.
- **Case studies and ELCA / expert advice on whether the reductions are plausible in real events** — test whether the 10% and 20% reductions are plausible under real bushfire conditions.

Important interpretation: The percentage reductions are scenario assumptions, not proven intervention-specific impacts. They reflect plausible scenario-level reductions in total bushfire damage based on the broader evidence base and expert input. They used to test the potential economy-wide benefits if improved preparedness reduces total bushfire damages by different amounts.

3 Bushfire damage reduction scenario case studies

The following case studies provide practical benchmarks for scenario-level avoided-damage assumptions.

1. Biddle, N., Bryant, C., Gray, M. & Marasinghe, D. (2020)	2. Thompson et al. fuel treatment evidence (2013)	3. UC Berkeley wildfire mitigation evidence (2026)
Early detection and response What it shows - Earlier detection / faster response reduces the probability of large damaging fires. - Under high climate-change growth, a 30-minute improvement reduces average annual large-fire cost from ~\$2.16bn to ~\$2bn — around 7 to 8%. - A 60-minute improvement reduces costs to ~\$1.79bn — around 17%. Supports Scenario 1 at ~10%, and helps justify Scenario 2 when combined with broader preparedness measures	Fuel treatment and suppression costs What it shows - DAE/AFPA cites Thompson et al. (2013), which found fuel treatments reduced wildfire size and suppression costs in treated areas and across the broader landscape. - DAE (2014) reports suppression costs could fall by 30% within treated areas and by at least 10–12% across a landscape due to less severe future fires. Supports the plausibility of a 10% landscape-level assumption and a stronger 20% package where targeted fuel treatment is combined with other preparedness measures.	Home hardening + defensible space What it shows - Post-disaster research shows homes survive wildfires when hardened materials, defensible space and vegetation management work together. - Homes with key hardening features and defensible space survived at nearly 50%, compared with about 20% for homes with no mitigation. - Removing vegetation within 5 feet of homes could reduce structure losses by 17%. Supports Scenario 1 as a modest avoided-damage assumption, and supports Scenario 2 where multiple measures are implemented together

Sources: Biddle, N., Bryant, C., Gray, M. & Marasinghe, D. (2020), , Measuring the economic impact of early bushfire detection. California Department of Insurance (2026), summarising UC Berkeley post-disaster wildfire research. DAE/AFPA (2014), Scoping Study on a Cost Benefit Analysis of Bushfire Mitigation, citing Thompson et al. (2013).

5 Methodology for translating national bushfire costs into CGE shocks

The national bushfire cost baseline is allocated across five cost categories representing the main economic channels through which bushfires cause damage. The resulting shares are then applied to each preparedness scenario to translate avoided damages into the corresponding CGE model shocks.

Baseline cost split

Cost category	Central share	National baseline amount (\$m)	Scenario 1 avoided amount at 10% (\$m)	Scenario 2 avoided amount at 20% (\$m)
1. Residential and other non-productive asset damage	17%	\$1,027	\$103	\$205
2. Productive private and public capital damage	20%	\$1,208	\$121	\$242
3. Sector output and demand losses ¹	25%	\$1,510	\$151	\$302
4. Labour and total-factor-productivity losses ²	6%	\$362	\$36	\$72
5. Social, health, mortality and other costs	32%	\$1,933	\$193	\$387
Total	100%	\$6,039	\$604	\$1,208

Sources: ConnellGriffin Analysis, Deloitte Access Economics (2021); Biddle, N., Bryant, C., Gray, M. & Marasinghe, D. (2020), Deloitte Access Economics (2017); Wittwer et al. / CoPS VU-TERM (2020); RBA (2020).

The allocation combines evidence from national bushfire cost estimates, major event case studies and Australian CGE modelling to identify the main channels of economic impact. Where the evidence does not provide a direct national split, the final shares reflect central modelling assumptions informed by the available evidence and designed to avoid double counting across categories.

1. Sector output and demand losses include disruption to agricultural, manufacturing and other industry output, as well as reduced demand for goods and services following bushfires.

2. Labour and total-factor-productivity losses include reduced hours worked, temporary workforce disruption and lower labour and business productivity.

5

How the baseline bushfire cost was allocated across the five CGE cost categories

The baseline cost split combines national bushfire cost evidence with major-event studies and CGE modelling evidence. Where the literature does not provide a direct national split, we apply transparent modelling assumptions.

Cost category	Central share	Basis for allocation
1. Residential and other non-productive asset	17%	Deloitte (2021) reports that 33.3% of bushfire costs relate to asset damage. As no national split between residential and productive assets is provided, we allocate approximately half to residential and other non-productive assets.
2. Productive private and public capital	20%	The remaining half of Deloitte’s asset-damage share is allocated to private productive capital, with an additional allowance for public productive assets captured within Deloitte’s broader financial-cost category.
3. Sector output and demand losses	25%	Based primarily on Deloitte’s 28.6% other financial costs category, adjusted to avoid double counting public productive assets. ANU (2020), RBA (2020) and CoPS (2020) evidence supports agriculture, business interruption, tourism and other market-output channels.
4. Labour and total-factor-productivity losses	6%	CoPS (2020) bushfire modelling separately identifies labour-productivity and industry-productivity effects. A lower national share is adopted to reflect variation across events and minimise overlap with temporary output losses.
5. Social, health, mortality and other costs	32%	Treated as the residual share required to capture social, health, mortality and other impacts after the production-related categories are allocated. The 2021 Deloitte’s national estimate of social costs provides the main benchmark.

Sources: ConnellGriffin Analysis, Deloitte Access Economics (2021); Biddle, N., Bryant, C., Gray, M. & Marasinghe, D. (2020), Deloitte Access Economics (2017); Wittwer et al. / CoPS VU-TERM (2020); RBA (2020).

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