CLIMATE COUNCIL

Emergency Leaders for Climate Action

WHEN CITIES BURN: COULD THE LOS ANGELES FIRES HAPPEN HERE?

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Emergency Leaders for Climate Action (ELCA) is a coalition of 38 former fire and emergency service leaders from every Australian state and territory demanding stronger government action on climate pollution that is driving more frequent, damaging extreme weather disasters, better resourcing for climate adaptation, community resilience, and frontline fire and emergency services.

To find out more about Emergency Leaders for Climate Action, visit: www.emergencyleadersforclimateaction.org.au

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Cover image: Kevin Marshall sifts through his mother's fire-ravaged property in the the Palisades Fire in the Pacific Palisades neighborhood of Los Angeles, January 11, 2025 (AAP / John Locher).

The Climate Council and Emergency Leaders for Climate Action acknowledges the Traditional Owners of the lands on which we live, meet and work. We wish to pay our respects to Elders, past and present, and recognise the continuous connection of Aboriginal and Torres Strait Islander peoples to land, sea and sky. We acknowledge the ongoing leadership of First Nations people here and worldwide in protecting Country, and securing a safe and liveable climate for us all.

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Contents

Key findings

1 The shocking 2025 wildfires that ripped through Los Angeles neighbourhoods in the middle of winter were supercharged by climate pollution.

- Climate pollution from the burning of coal, oil and gas shaped the dangerous and extreme weather conditions that drove these fires: record dryness; non arrival of the typical annual wet season; and hurricane-like winds gusting up to 160 kmh.
- Climate pollution has all but erased traditional fire seasons and turned them into an all-year-round threat. The January 2025 fires hit in the middle of winter, well outside of the traditional fire season from June to November.
- LA experienced climate whiplash: a rapid switch between two very wet years that resulted in extreme fire fuel loads, followed by very dry conditions ideal for fires.
- Around the world, climate pollution is driving worsening fire conditions: 43% of the 200 most damaging fires have occurred in just the past decade.

2 Many Australian cities share dangerous characteristics that made the LA fires so destructive, and many of our worst bushfires have also exhibited unstoppable fire behaviour.

- Like California, many parts of Australia have a hot and dry climate. Research shows between 2000 and 2023 the intensity and frequency of the worst fires in southern Australia and western North America rose sharply under more extreme weather conditions.
- Australia has suffered through fires with the same characteristics as LA: extremely strong winds, drought conditions, high fuel loads and unstoppable fire behaviour. During Black Saturday 2009 in Victoria, the fire danger index exceeded 200 (with 100 the upper limit of recognised fire danger rating up until 2009).
- Fire-generated thunderstorms, or pyroconvective events, were relatively rare with 60 such events recorded in Australia in the 40 years up to 2018. During Black Summer, there were at least 45 fire-generated thunderstorms.
- Our analysis shows that the outskirts of Sydney, Melbourne, Canberra, Adelaide, Perth and Hobart share characteristics that made the LA fires so destructive.

3 Just like in LA, more people than ever are living in harm's way on the fast-growing urban fringes of Australian cities.

- In LA, hurricane-like Santa Ana winds (up to 160 km/h) created a firestorm that fed on tinder dry brush, then houses. From 1990-2020, 45% of all new homes in California were built where suburbs meet flammable terrain.
- Over the past 20 years, outer suburban populations have exploded in Australia, too: More than doubling in Melbourne and Perth, up 36% in Adelaide, 33% in Hobart and 24% in Sydney.
- More than 6.9 million Australians now live where suburbs meet the bush — the zones most exposed to deadly fires. Had the Black Summer bushfires directly impacted the edges of our cities or major regional centres - such as Sydney, Newcastle, Wollongong, the NSW Central Coast, the Dandenong ranges, the Adelaide Hills, the Perth Hills or Hobart - then property losses on the scale of LA could have occurred.
- Many of the LA homes that burnt were built before fire resilient building standards were introduced there in 2008. Up to 90% of Australian homes in high-risk fire zones were also built before modern bushfire standards existed — making ignition due to ember attack and house-to-house fire spread far more likely.

- Research shows that, globally, 10% of all fires result in 78% of all fatalities. Most of these occur in suburbs built where bush or grassland meets cities.

4 Climate pollution is turbo-charging Australian fire conditions, and it's making fires more frequent, costly, intense - and less predictable.

- Since 2020 insurance premiums have increased by 78% to 138% for homes in bushfire-prone Local Government Areas within Sydney, Melbourne and Perth.
- The cost of the 2019/20 Black Summer bushfires to our economy was estimated at $10 billion. It is a matter of when - not if - we'll experience another fire on this scale, or worse, as dangerous fire weather conditions driven by climate pollution make this a near certainty.
- From 1979 to 2019 fire seasons across Australia grew by an additional 27 days - a 20% increase over the 40-year period.
- Southern Australia is experiencing long-term declines in cool-season rainfall at the same time as spring and summer become hotter and drier: setting the stage for earlier, more intense and widespread fires like the 2003 Canberra fires and 2009 Black Saturday bushfires.
- Fire behaviour at night is becoming more extreme and robbing firefighters of a tool they've used for centuries: attacking fires and backburning during milder night conditions to bring large fires under control.
- The world's first large-scale fire-generated tornado - and the fastest rate of spread for a forest fire - was recorded in Canberra, in January 2003.

5 Climate-fuelled fires are increasingly exceeding the limits of modern firefighting. Investment in community preparation and urgent cuts to climate pollution are both critical to saving Australian lives and communities.

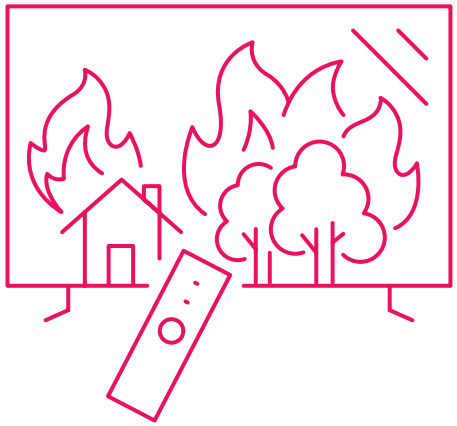
- There is no way to safely or effectively fight pyroconvective events, like those experienced in Canberra 2003, Black Saturday 2009, and the Black Summer bushfires. Aircraft must be grounded, and efforts to protect properties temporarily abandoned.
- Modelling shows that 3°C of global warming would result in catastrophic fire danger zones three times bigger than experienced on Black Saturday in 2009 (810,000 km^2) with temperatures as high as 48°C in Victoria, NSW, and South Australia.
- Fires on this scale are considered beyond the limits of any fire service to control. Los Angeles is one of the best-resourced firefighting jurisdictions in the world, but was still overwhelmed: extreme winds grounded aircraft, simultaneous fires limited assistance, and there was sudden loss of water pressure.
- Australia is facing more days of extreme fire weather and larger, more damaging fires under worsening fire weather caused by climate pollution. We must:
  - Cut climate pollution from coal, oil and gas more swiftly and deeply if we're to avoid even worse.
  - Invest heavily in disaster preparation and community resilience at all levels of government so we're as prepared as possible for the worsening fire risks we already face.
  - As a priority, increase emergency service and land management capacity at the urban fringe of our cities and major regional centres so growing populations are better protected for what's to come.

INTRODUCTION

In January 2025, images of Los Angeles — ablaze in the middle of winter — shocked the world.

This was the home of Hollywood. A modern, well-resourced city. A city that was overrun by a firestorm so intense that firefighters, aircraft and water systems were overwhelmed. In the end, 31 people were killed in the fires, more than 16,000 structures destroyed, and communities left shell-shocked. Thousands of people became homeless. And it happened in winter, well outside the traditional Southern California fire season.

This prompted an immediate, and unsettling question for many Australians: *Could this happen here?*



The uncomfortable truth is that many of the factors that led to the LA disaster are already present in Australia — and getting worse. Climate pollution from burning coal, oil and gas is supercharging heat, drying out landscapes, lengthening fire seasons and fuelling more extreme fire weather across fire-prone regions worldwide. Australia is no exception.

In fact, Australians have already experienced fires with the same hallmarks of the LA fires: drought-parched forests, strong winds, low humidity, explosive fire behaviour, and unstoppable fire fronts that firefighters - no matter how well resourced - struggled to respond to. In 2003, it happened in Canberra. In 2009, Black Saturday hit Victoria. Tasmania and the NSW Blue Mountains in 2013. Then the national megafires of 2019-20: the Black Summer bushfires, the most destructive and widespread on record. In the lead up to each of these events, we experienced many of the same conditions that led up to the LA firestorm.

What Australia has not yet experienced — but is increasingly at risk of — is what Los Angeles endured: a major fire hitting a major city. This report brings together the latest science, climate trends and fire behaviour research to provide a clear answer to the question: Could this happen here?

The chilling answer, in short is: it is not a matter of if, but when. As our climate continues to overheat because of pollution from coal, oil and gas, fire weather conditions are worsening and our cities are expanding. The warning signs are all there.

This analysis explains that millions more Australians now live on the expanding outskirts of our capital cities and major regional centres, where homes adjoin highly flammable bush and grasslands. These at-risk communities — from the Dandenong Ranges in Victoria, Perth Hills, Adelaide Hills, the Blue Mountains, Sydney suburbs, NSW Central Coast, Hobart's suburbs and Canberra's western edge — are already some of the most fire-exposed urban areas in the world. All of them have experienced fires in the past where hundreds of buildings burned. It is not beyond the bounds of possibility that an extreme wind event following drought could push fast-moving fires into suburbia, with consequences on the scale seen in LA. As climate pollution continues to drive worsening fire weather, unfortunately the odds are on that such an event will occur here.

In this report, we outline how climate change played an instrumental role in supercharging the main factors that underpinned the Californian

catastrophe, and compare those conditions across Australia's capital cities. We also explain why firefighters are increasingly facing fires they cannot stop; and what must be done to protect Australian lives, homes and communities as extreme fire weather intensifies.

We still have a choice on just how dangerous future fire conditions become. Now is the time to reduce climate pollution further and faster, to adapt our cities, and prepare our fire services and communities for a future where the unimaginable has already become possible.

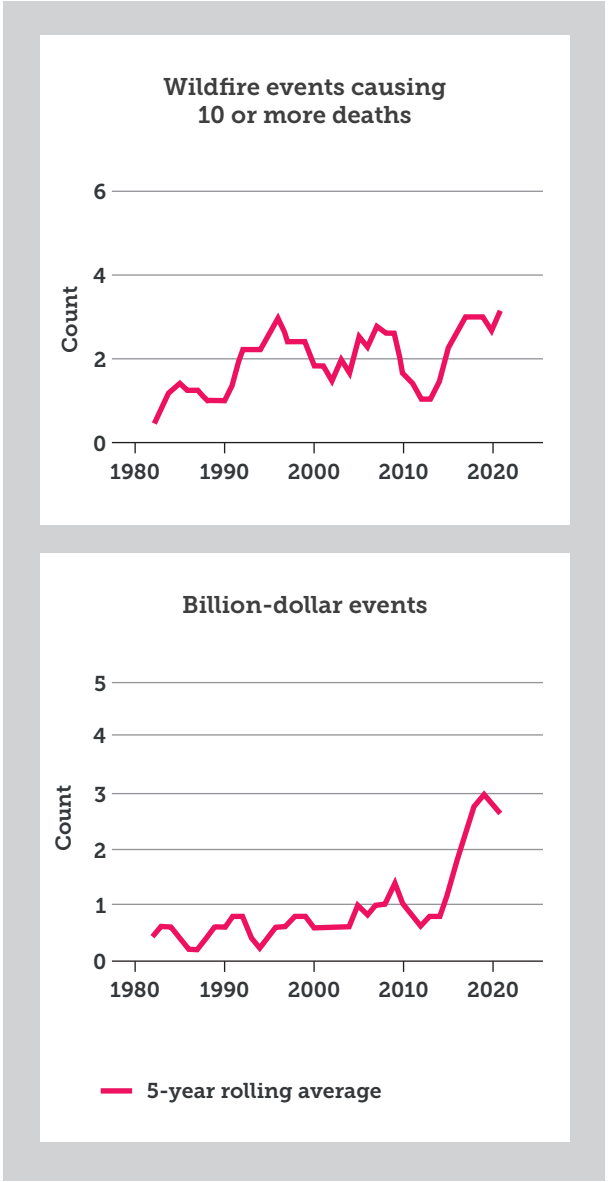
CLIMATE CHANGE IS FUELLING MORE INTENSE AND FREQUENT FIRES ACROSS THE GLOBE

Across fire-prone regions, bushfires[1] are becoming more destructive than ever—breaking records for size, intensity and community impact. Climate pollution from the burning of coal, oil and gas is supercharging heat, drought and extreme fire weather, which have grown markedly worse over the past four decades (CSIRO 2024; Cunningham et al. 2025). Alarmingly, 43% of the 200 most damaging bushfires worldwide from 1980 to 2023 have occurred in just the last decade (Cunningham et al. 2025). Extreme fires, unable to be controlled by firefighters, are becoming more common. Between 1978 and 2018, there were 60 recorded pyroconvective (fire generated) storms across Australia. During the climate change driven Black Summer bushfires in 2019 / 2020, there were an astounding 29 (later revised to 45) of these extreme events, described to the Royal Commission into National Natural Disaster Arrangements as a "flock of Black Swans" (Abrams et al, 2020; Binskin et al, 2020; Sharples in UNSW 2025).

Some regions are especially vulnerable, particularly those with Mediterranean climates or temperate conifer forests, which face frequent, destructive fire seasons. From 2000–2023 the frequency of extreme bushfires and their radiative power—a measure of fire intensity— increased 2.2 times and 2.3 times respectively, across major fire-prone areas, including southern Australia, western North America, and southern Europe, driven by worsening fire weather (Cunningham et al. 2024).

While climate pollution is fuelling more dangerous fire weather and making fires fiercer when they ignite, the expansion of cities into fire-prone landscapes means more people are living where suburbs meet flammable bush, or grasslands on the urban/bushland interface. In recent years, increasingly destructive fires have struck these areas, with devastating losses of homes and lives. Recent research has shown that across the globe 10% of fires account for 78% of fatalities - and the vast majority of these were at the interface (Synolakis & Karagiannis 2024). In California between 2012 and 2022 the seven deadliest fires to hit the state started within 1km of the interface (Kumar et al. 2025).

While increasingly damaging fires across the globe are becoming more ferocious, the fires that hit the people of Los Angeles in January 2025 showed in devastating detail that people living in well-developed cities are not immune from increasingly frequent, intense bushfires.



Figures 1 and 2: Uptick in costly and deadly wildfires worldwide. **Source:** Cunningham et al. (2025).

1 Unless otherwise specified, this report uses the term bushfire to refer to fires occurring in forests, woodland and grass areas. In the northern hemisphere the term wildfire is used.

1.

What Happened in Los Angeles — and Why It Matters for Australia

Image 1: Santa Monica Pier under smoke from the LA fires.

Los Angeles has a Mediterranean climate of cool winters and dry hot summers similar to parts of southern Australia such as Adelaide and Perth; and is similarly fire prone (Joffre & Rambal 2001). The region's ecosystems have been shaped by fire and some vegetation even depends on it (Barnes et al., 2025). Dry brush, steep canyons, and powerful Santa Ana winds from the desert interior that blow downslope combine with the regional climate to create ideal conditions for fast-moving fires (Richardson 2025; Bowman 2025).

In recent decades, climate change has intensified the weather that drives the region's fires. Rising heat, prolonged dryness, climate whiplash from flooding rains to sudden drought are amplifying risk across Mediterranean-type regions like Southern California.

Over the past decade, very strong winds combined with intense dryness have increasingly become a major feature of interface fires that have transformed into incredibly destructive urban firestorms, such as Fort McMurray in Canada in 2016, the Northern California city of Paradise in 2018, Australia's Black Summer in 2019/2020, the Marshall Fire in Colorado in 2021, and the Lahaina Fire in Maui in 2023. In Southern California peak wind velocities are up to 20% stronger than they were a century ago (Cazzaniga & Faranda 2025). Wind velocities recorded in January 2025 were off the scale.

At the same time as weather conditions intensify, more people are living closer to flammable bush and grasslands, increasing the potential for deaths and destruction. These forces set the stage for the devastating Los Angeles fires of January 2025.

The LA fires showed the world: even wealthy, well-resourced cities are no match for climate-fuelled firestorms.

TABLE 1: SEVEN KEY FACTORS THAT FED THE DESTRUCTIVE POWER OF THE JANUARY 2025 LOS ANGELES FIRES

Long-term warming trend	Increase in dry periods, temperatures, fire weather days and less rainfall: > Southern California experienced one of its hottest summers leading up to the 2025 fires. > Southern California has been in the grip of a 20-year mega-drought. > Increased frequency of dangerous fire weather days.
Climate whiplash	Southern California swung from experiencing very wet conditions, to very hot and dry - sometimes referred to as "climate whiplash". > It experienced its fifth wettest two-years in 2022-24 since 1980, due in part to Hurricane Hillary. The deluge led to significant fuel growth. > This rapidly dried when the region had one of the driest starts to its traditional wet season on record in 2024.
Terrain and vegetation	The mountainous and hilly terrain around Los Angeles combined with the region's forests, dry brush and grasses accelerated fire spread.
Strong winds	Santa Ana winds—hot, dry katabatic[2] winds from the great basin deserts descending from the San Gabriels—funnel through canyons and cities, rapidly drying the landscape and pushing accelerating fire fronts and burning embers. > These winds now strike during autumns made hotter and drier by climate change. > The January 2025 event was an extreme example of Santa Ana and made fires uncontrollable until winds abated.
More fuel to burn	Two years of above average rainfall led to prolific vegetation growth followed by rapid drying - creating huge fuel loads ready to burn. > Greater concentrations of CO_2 in the atmosphere may also promote plant growth - creating greater fuel loads than would occur in the absence of climate pollution. > Wet conditions followed by rapid drying, winds and heat restricted the ability to conduct hazard reduction burns to reduce fuel loads over wide areas.
Longer fire seasons	Bushfire risk is no longer seasonal - authorities warn that California can now burn throughout the year. > Fire-affected regions in California and Oregon are projected to see a 40% increase in extreme fire weather in coming decades.
More people in harm's way	Residential areas in close proximity to bush and grassland can face significant fire risks. Older homes in close proximity to one another that do not meet current fire codes can lead to house to house ignitions. > Between 1990 and 2020, nearly 45% of new California homes were built where suburbs meet flammable terrain.

Source: Barnes et al. (2025); Madakumbura (2025); Williams et al. (2022); Climate Central (2023); Cazzaniga & Faranda (2025); Allen et al. (2024); Hawkins et al. (2022); CalMatters (2025).

2 Wind produced by the flow of cold dense air down a slope (USGS 2015)

THE PALISADES AND EATON FIRES

Between January 7 and 9 in 2025 the city of Los Angeles faced a catastrophic mix of high fuel loads on steep hillsides and canyons caused by years of above-average rainfall that created prolific growth and hampered hazard reduction efforts, a sudden and prolonged drought with very little rain recorded in the preceding year, then an intense Santa Ana wind event that created hurricane-strength winds of up to 160 kmh.

The two most destructive fires were the Palisades Fire, which destroyed 6,837 buildings and killed 12 people, and the Eaton Fire that destroyed 9,414 buildings and killed 19 (Reuters 2025; Babrauskas 2025; CalFire 2025a, 2025b).

The previous worst property losses near Los Angeles were during the Woolsey Fire in 2018 when 1,643 structures were destroyed, and the Old Topanga Fire in 1993 when 350 structures were destroyed (County of Los Angeles 2019; LARFSC 2025). All previous high loss fires had occurred in the California summer fire season, from June to early November (McCarthy and Richter 2025). There are no previous records of large fires or high losses due to fires after November, as historically this is when weather conditions become cool, wet, and not conducive to fire spread.

THE LA FIRES WERE AMONG THE MOST DESTRUCTIVE IN CALIFORNIAN HISTORY

Except for the 2018 Camp Fire in Northern California that obliterated the city of Paradise, the Eaton and Palisades fires were the most destructive in California's history, killing 31 people and together destroying more than 16,000 structures, damaging 2,000 more. Losses exceeded $400 billion (US$250 billion) (CalFire 2025a, 2025b; WFCA 2025; Qiu et al. 2025; Semancik 2025).

The fires' destructive power was magnified by Los Angeles' expanding interface—244,000 new homes were built near forests and grasslands between 2010 and 2020 (Qiu et al. 2025). Communities like Pacific Palisades and Altadena sat directly in the interface, where hurricane-force winds turned brush fires into urban firestorms, spreading embers and flames from house to house (Climate Council 2025; Barnes et al. 2025). The vast majority of homes in Altadena (95%) and Pacific Palisades (86%) were built last century - before modern fire resilient building codes were introduced for high risk areas (Point2homes 2025a, 2025b).

As fire penetrated the suburbs they entered areas where homes were remote from vegetation and therefore not built to these codes – particularly in Altadena which historically wasn't considered to be at high risk of fire. This made these areas even more vulnerable and easy to ignite as neighbouring homes burned. The fire spread became exponential as fires entered areas where homes were densely packed – a single burning home could ignite homes on each side and behind. The three new burning homes could then ignite nine more, and so on. Firefighters had no chance of stopping the fires until winds abated and water supplies were re-established. Water jets from large fire hoses turned to steam or were blown back at firefighters by the extreme wind.

Los Angeles didn't burn in summer — it burned in winter. Climate pollution has erased the idea of a 'fire season'.

Image 2: Smoke from the Los Angeles fires at Santa Monica Beach.

CLIMATE POLLUTION MADE THE FIRES MUCH WORSE

Climate pollution has reshaped weather conditions that led to the 2025 Los Angeles fire disaster. California's wet season now starts 27 days later than in the 1960s and is shorter overall, even as extreme rainfall events increase (Aon 2022). These erratic bursts of heavy rain fuel rapid vegetation growth that later dries into fuel for fires. The record heat and dryness of late 2024 were consistent with longer term climate trends for the region, with recent studies showing that wind speeds in Southern California may now be up to 20% stronger than a century ago (Cazzaniga & Faranda 2025).

The Los Angeles fires' timing (mid-winter) highlights how climate change has erased traditional "fire seasons." The California Department of Forestry and Fire Protection (Cal Fire) has reportedly deemed the term obsolete, as wildfire risk now persists year-round (Aon 2022). High temperatures are no longer a necessity for major property loss fires to occur – extreme fuel dryness coupled with intense wind events can result in major losses outside traditional fire seasons, as evidenced by the Marshall Fire in Colorado in December 2021 and the Los Angeles fires in January 2025. The day after 1,000 homes were destroyed in the Marshall Fire, it snowed.

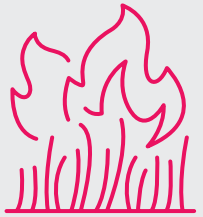
FIRES NOW SO FIERCE NO ONE CAN STOP THEM

Climate pollution is driving more frequent, more intense fires worldwide. Fire seasons are starting earlier, lasting longer, and like Los Angeles in 2025, raging deep into winter because of our changing climate. California is regarded by many as having one of the best resourced firefighting jurisdictions anywhere in the world, yet the 2025 Los Angeles fires could not be stopped until weather conditions abated (Cunningham in *The Guardian*, 2025).

Hurricane-force Santa Ana winds grounded firefighting aircraft and rendered ground suppression efforts largely ineffective (Barnes et al. 2025; Climate Council 2025). This is the new reality for communities on the urban/bushland interface, one that will worsen as our planet continues to overheat.

COULD THE LA FIRES HAPPEN HERE?

The most dangerous elements of the LA catastrophe — extreme dryness, strong and gusty winds, abundant fuel, and fires that outrun firefighting — are already happening in Australia.



Southern California's winds are now up to 20% stronger than a century ago due to climate pollution. This fuelled one of the most destructive urban interface fires ever recorded.

TABLE 2: HOW MAJOR AUSTRALIAN URBAN FIRES COMPARE TO THE 2025 LOS ANGELES FIRES

	Brisbane	Sydney	Canberra	Melbourne	Hobart	Adelaide	Perth
Worsening fire weather	☑	☑	☑	☑	☑	☑	☑
Periods of extreme dryness	☑	☑	☑	☑	☑	☑	☑
Possibility of strong wind gusts and/or pyroCb	☑	☑	☑	☑	☑	☑	☑
Steep slopes that accelerate fires	☑	☑	☑	☑	☑	☑	☑
Large tracts of bushland adjacent to homes	☑	☑	☑	☑	☑	☑	☑
History of major fires / property loss	☒	☑	☑	☑	☑	☑	☑

2.

Australia Has Already Experienced Fires With Explosive Behaviour

Image 3: Pacific Palisades fire at sunrise.

Most Australian capital cities share alarming parallels with some of the conditions that led to the devastating Los Angeles fires in January 2025.

Outer urban areas near Brisbane, Sydney, Melbourne, Canberra, Hobart, Adelaide and Perth feature hilly or mountainous terrain, with ridgetop residential development surrounded by bush and grassland. All of these cities are ringed by highly flammable vegetation that will burn under the right conditions: periods of above average rainfall can spur fuel growth (Blue Mountains 2013, Hobart 1967), sudden switches to extreme dry or long term drought can rapidly cure fuels loads (Sydney 1994, Canberra 2003, Black Saturday 2009, Blue Mountains 2013, Tasmania 2013, Woolaroo 2021) and strong winds paired with low humidity can spur extreme fire behaviour and pyroconvective events (Canberra 2003, Black Saturday 2009 and Black Summer 2019/2020).

Historically there have already been major property losses from bushfires in Hobart (1967), the Adelaide Hills and Victoria (1983), Sydney (1994), Canberra (2003), Wangary SA (2005), Black Saturday Victoria (2009), Perth Hills (2011 and 2021), with the NSW Blue Mountains and Tasmania (2013), and nationally during Black Summer (2019/2020).

These events cumulatively destroyed thousands of buildings, with more than 3,000 destroyed in Black Summer alone. It is entirely possible that one or more of our capital cities or satellite cities like Sydney, the NSW Central Coast, Newcastle, Wollongong, Blue Mountains, Gold Coast Hinterland, Dandenong Ranges, outer Melbourne suburbs, Adelaide Hills, Perth Hills, Hobart or Canberra could be faced with a catastrophe like that in Los Angeles as climate-fuelled extreme weather conditions continue to change and intensify.

Image 4: Firefighting helicopters drawing water from the local pond in Port Kennedy WA to fight a local fire.

Australia has already seen LA-style conditions, but we have so far been lucky to avoid an LA-level impact on a major city.

Image 5: A firefighter on standby.

2003 CANBERRA BUSHFIRES: A FIRE TORNADO

In the lead-up to January 2003, the ACT endured one of the worst droughts in recorded history. Rainfall was at record lows—just 40 mm compared with an average of 150 mm—and temperatures in November 2002 were 5°C above average. Vegetation and soils were extremely dry, with the Keetch–Byram Drought Index rising unusually quickly. Record daytime temperatures, combined with low atmospheric humidity and cloudiness, led to early and advanced curing of fuels across the region (MacLeod 2003; Doogan 2006).

On 18 January 2003, Canberra recorded temperatures above 37°C, low humidity, and winds gusting to 65 km/h – Extreme fire danger. Two fire fronts that had originated in the Kosciuszko and Namadgi National Parks combined into a 25 km fire front, producing a firestorm described as "unstoppable" (AIDR 2025a; MacLeod 2003).

By early afternoon, the fires were driven directly into Canberra's western suburbs. A state of emergency was declared at 2.45 pm; by 3 pm flames reached Duffy, before rapidly spreading into Rivett, Chapman, Kambah, Higgins, Hawker and Cook. Notably, the fire went from burning homes close to bushland to house to house ignitions - a major reason so many homes were destroyed (Gissing 2023).

Merging fire fronts and extreme winds made suppression of the fire by first responders impossible (AIDR 2025a; MacLeod 2003). Once merged, the 25km fire front produced the world's first recorded large-scale fire tornado, and the fastest rate of spread ever recorded worldwide for a forest fire (Doogan 2006).

The fires burned 160,000 hectares (70% of the ACT's pasture, forests and reserves), including Namadgi National Park, Tidbinbilla Nature Reserve and the Stromlo pine plantation (AIDR 2025a). In the city, 487 houses were destroyed, four people died, more than 435 were injured, and 5,000 evacuated. Initial damages were estimated to be as high as $350 million (AIDR 2025a; MacLeod 2003). The insurance losses - normalised to 2022 values were more than $1.2 billion (ICA 2025).

CASE STUDY

There was an eerie silence, before the massive roar

Major General Peter Dunn (retired), former Commissioner of the ACT Emergency Services Agency (formed after the 2003 fires) and member of Emergency Leaders for Climate Action recalls the 2003 Canberra bushfires and Australia's first recorded fire tornado.

Canberra's summer of 2003 was hot and dry and there were extreme drought conditions in many parts of the country. Apart from worrying about the impact of the drought we thought that it was a pretty typical Aussie summer. We could see some smoke rising in a couple of places in the distant Brindabella mountains and news reports had told us that the emergency services were watching and there was nothing unusual happening.

We were renovating our house in the Woden Valley and went to the light industrial suburb of Fyshwick to look at kitchen appliances and other items. After a couple of hours we stepped outside and into a wall of heat. There was an eerie silence: things just didn't feel right. We stopped shopping and headed home.

Suddenly, it became dark and the street lights came on. It was early afternoon. As we came over a hill and looked out over the Tuggeranong Valley towards the Brindabella Mountains we could make out a red glow through the dark. Then we noticed ash and small embers in the beam of our car's headlights. The eeriness turned into a feeling of serious danger. That's seared into our memories.

Arriving home we ran up onto the ridge which was on the urban interface. Embers were blowing all around in the very strong, hot wind. Something dangerous was happening. Other neighbours appeared and were equally alarmed. Some small grass fires were appearing and we all agreed to quickly change into more suitable clothing and work together to extinguish what we could. Back on the ridge we all worked feverishly racing to spot after spot with wet towels, wheelie bins full of water or garden hoses extinguishing small flare ups. We were successful and were standing around congratulating each other when it happened.

We heard a massive roar from the valley to our front. *"It must be Elvis [the famous water bombing helicopter],"* shouted one of our group. Moments later we were struck by cyclonic winds. A man was blown to the ground. A fire front tore up from the valley and we fell back to the back gardens of the houses on the ridge and desperately fought to save anything that we could. We all felt like we were trying to halt Mother Nature herself: she was very, very angry. We felt helpless against the onslaught.

Mopping up at our house the landline suddenly rang. Relatives on the Gold Coast were calling to check if we were OK. They couldn't reach us on our mobile phones. *"Are you alright? Is the house damaged?"* We replied, *"It was scary, but everything is under control. It wasn't as bad as it could have been"*. We hadn't seen the news yet: people killed and more than 400 homes destroyed, huge stock losses and infrastructure.

Embers were blowing all around in the very strong, hot wind. Something dangerous was happening.

2009 BLACK SATURDAY BUSHFIRES: HOT AND DRY TINDERBOX

The Black Saturday fires hit at the end of the Millennium Drought after the state of Victoria and most of metropolitan Melbourne had suffered through drought for the better part of a decade. The Millennium Drought was predominantly a 'cool' drought where winter rainfall over many years was far below average (BoM 2015).

In late January 2009 Victoria experienced one of its most severe heatwaves, with Melbourne exceeding 43°C for three consecutive days, the first time on record (Teague et al. 2010). This extreme heat dried out flammable vegetation across the state, setting the stage for catastrophic fire conditions.

On 7 February 2009, temperatures climbed into the mid-40s, with Melbourne reaching 46.4°C, its hottest day on record. Strong morning winds built to storm force, and a late-afternoon wind change intensified fires and sent fire fronts in new directions. The Forest Fire Danger Index reached more than 200 in some areas, well into today's Catastrophic fire danger rating of 100+, 100 until then being the maximum reported fire danger index (Teague et al. 2010).

At least 316 grass, scrub, and forest fires ignited across Victoria that day. Fires spread rapidly after ignition, with crowning in forests, powerful convection columns, and long-distance spotting driven by burning bark carried kilometres downwind. Spotting allowed fires to cross terrain and vegetation breaks, while the wind change expanded and redirected fire fronts. Aircraft support was severely limited by unsafe flying conditions (Teague et al. 2010).

The fires resulted in 173 deaths, hundreds of injuries, over 2,000 homes destroyed and losses valued at $4 billion (Teague, McLeod & Pascoe 2010). Entire towns such as Kinglake and Marysville were devastated, and fires reached the outer suburbs of Melbourne, including Upper Ferntree Gully, Narre Warren, and Bunyip State Park (Teague et al. 2010).

2019 BLACK SUMMER CUDLEE CREEK FIRES: AN UNSTOPPABLE FORCE

At 9:17 a.m. on 20 December 2019, in South Australia the Cudlee Creek fire ignited and developed into a fast-moving blaze, driven by strong winds and soaring temperatures. Despite the efforts of ground crews and aircraft, the fire surged uphill with unstoppable intensity (Keelty et al. 2020).

Towns across the Adelaide Hills came under attack within hours: Lobethal at 12.05pm, Woodside at 12.50pm, Brukunga at 2.45pm, Harrogate at 6.31pm, and Mount Torrens by 7.23pm (Keelty et al. 2020).

The extremely dangerous fire conditions threatened communities and firefighters alike: numerous fire crews experiencing burnovers as they desperately tried to protect communities. Several fire trucks were damaged and firefighters injured.

When the fire was finally declared safe on 3 January 2020, it had burned 23,253 hectares, destroyed 86 homes, 542 outbuildings, and 325 vehicles.

The devastation underscored a chilling truth. As fire scientist Kevin Tolhurst concluded in his review of the Cudlee Creek and Kangaroo Island fires, the Black Summer fires exceeded the upper limits of firefighting capability — with flames so intense that machines, aircraft, and tankers were powerless. At such extremes, crown fires dominate, houses cannot be defended, and human survival becomes unlikely (Keelty et al. 2020).

2019 BLACK SUMMER GOSPERS MOUNTAIN: SYDNEY'S NEAR MISS

The Gospers Mountain fire, ignited by lightning on 26 October 2019 in Wollemi National Park northwest of Sydney, quickly escalated into an unstoppable megafire (Filkov et al. 2020). Within its first 24 hours, wind gusts over 80kph drove the fire across 521ha with a 3km perimeter (ABC 2020). Despite three water-bombing aircraft and six remote area firefighting (RAFT) crews being deployed, extreme heat and wind forced all crews to withdraw (ABC 2020).

On 12 November, NSW issued its first-ever "catastrophic" fire warning for Greater Sydney, the Central Coast and surrounding regions (ABC 2020). By then, the Gospers Mountain fire had ballooned to 25,000ha, and under strong winds made an extraordinary 11.7km run in under three hours (ABC 2020). As it closed in on Mellong, the fire generated its own pyrocumulonimbus (pyroCb)—a fire-generated dry thunderstorm that produced lightning that ignited new spot fires, and extreme wind gusts that further intensified the blaze (ABC 2020). By day's end it had doubled to 56,000ha with a 170km perimeter.

Containment efforts were shattered again on 25–26 November when a storm delivered 19,016 lightning strikes, sparking multiple new ignitions (ABC 2020).

By early December, several major fires began to merge. On 6 December, Gospers Mountain joined with the Little L Complex and Three Mile fires; later that day it merged with the Paddock Run and Thompsons Creek fires, and soon after with the Kerry Ridge blaze—creating a near-million-hectare fire complex unprecedented in NSW (ABC 2020).

During Catastrophic conditions on 21 December, firefighters fought to stop the fire from crossing the Hawkesbury River and driving into Sydney's northern suburbs—an event that could have forced mass evacuations across Hornsby and the Hills District (ABC 2020).

Across November, December and January, the fire expanded relentlessly, defying suppression efforts and creating a months-long uncontrollable firefight. In total, Gospers Mountain burned 512,626 ha across the Lithgow, Hawkesbury, Hunter Valley, Lower Hunter, Cudgegong, Blue Mountains and Central Coast districts—an area more than twice the size of the ACT (RFS 2020)—and merged with multiple other major blazes to create a combined burn area of nearly 1,000,000 ha (RFS 2020). The fire destroyed 90 homes across the Hawkesbury, Blue Mountains, Lithgow and Singleton local government areas (AIDR 2020). It was not fully extinguished until heavy rains arrived in February 2020 (Binskin et al. 2020).

Had the Gospers Mountain megablaze entered into Sydney's northern suburbs there would have been far more homes lost to fire and potentially lives lost. That the 2019/20 fire grounds largely missed our capital cities - with the exception of the Cudlee Creek fire in Adelaide Hills - meant we "dodged a bullet" - avoiding a large-scale urban firestorm like the January 2025 Los Angeles fires.

Fires are now so intense they create their own wild thunderstorms, hurricane strength winds and lightning.

FIRES ARE NOW SO DANGEROUS THEY CREATE THEIR OWN STORMS

Pyrocumulonimbus (pyroCb) events occur when bushfires couple with the upper atmosphere, generating explosive thunderstorms that can include strong downdrafts, lightning and even black hail (Climate Council 2020).

These events are more likely to occur when atmospheric instability is high, combined with dangerous near-surface conditions (e.g. low humidity, strong winds and high temperatures) (Climate Council 2023). They happen when large fires generate intense heat and convection columns that reach into the stratosphere, forming cumulonimbus (storm) clouds, but with very little moisture and therefore generating little, if any, rain.

A pyroCb can cause already intense fires to expand and behave explosively, with storm force winds coming from different directions, lightning that causes new fires up to 100km away, and downdrafts that can damage buildings, fire trucks, and push down trees.

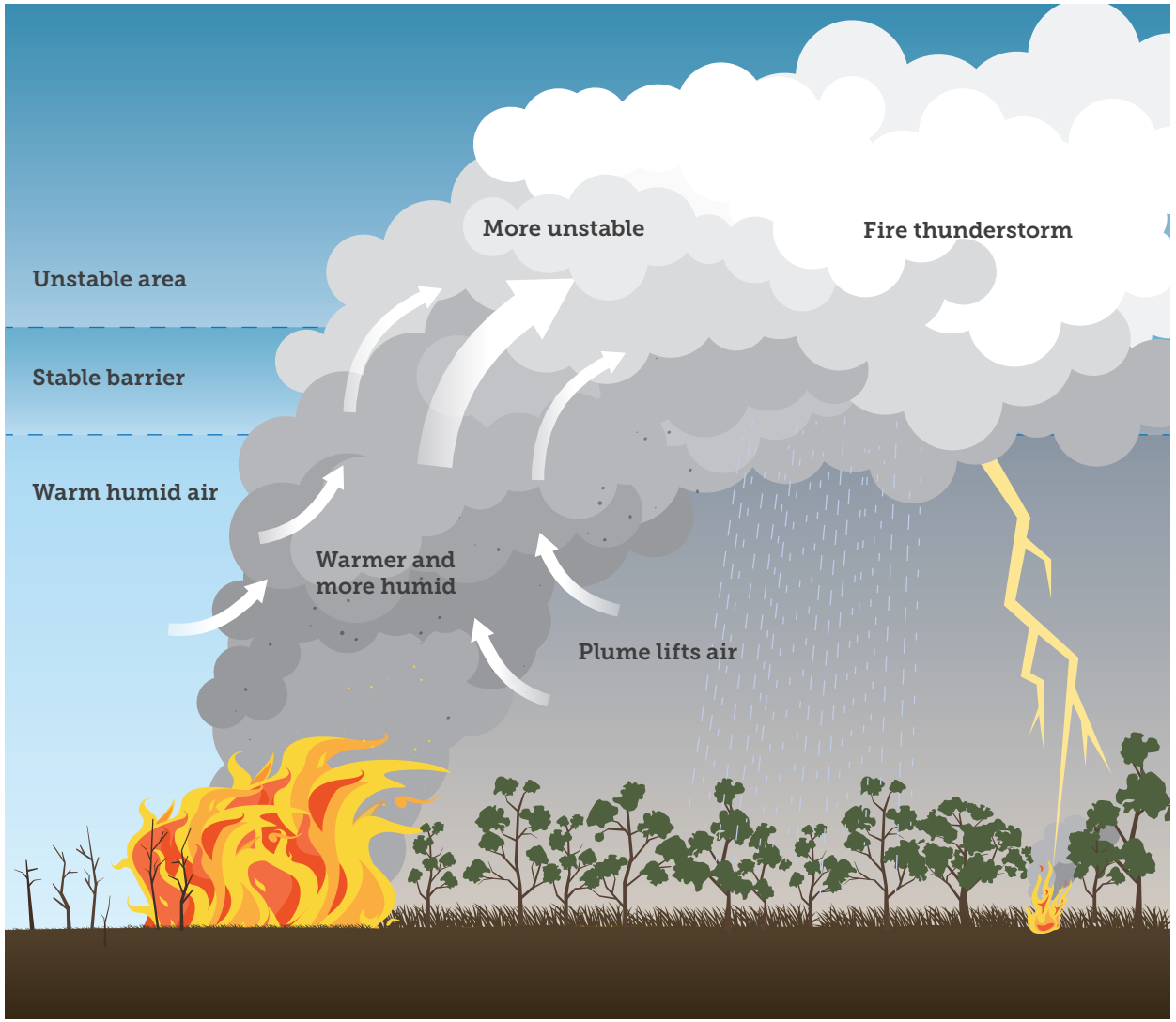


Figure 3: Pyrocumulonimbus cloud development. **Source:** Adapted from BoM 2020 (Climate Council 2023).

Originally referred to as Black Swan events due to their rarity and extreme impacts, these fire storms are becoming increasingly common as the atmosphere warms and fires become more intense. Around 60 events had been recorded nationally from 1978 to 2018, but during Black Summer at least 45 were recorded (Sharples in UNSW 2025).

From 1979 to 2016 south-eastern Australia has experienced an increase in conditions conducive to formation of fire-generated thunderstorms. Risks have increased during the spring and summer due to decreases in atmospheric stability and humidity alongside more severe fire weather conditions (Owens & O'Kane 2020). Climate change will continue to amplify these conditions and could lead to more fire-generated extreme weather over longer fire seasons (Sharples 2020).

Image 6: Smoke from LA fires at Santa Monica beach and pier.

3.

More People in Harm's Way: Australia's Expanding Urban Fringe

Image 7: Firefighter rescues a young girl from an urban fire.

Australians living close to bush and grasslands face significant fire risks, particularly those living in older housing stock.

Houses within 700m of bushland are far more likely to be destroyed in a fire, especially when built close together (Chen & McAneney 2004). For this reason, experts have long warned that climate change and expanding populations on the rural–urban fringe are amplifying bushfire danger. Reviews of the 2009 Black Saturday and 2011 Perth Hills fires highlighted the growing risks as more people settle in bushfire-prone areas near cities (Teague et al. 2010; Keelty et al. 2011).

Over two decades after Canberra's most destructive fires, the ACT State of the Environment report shows continued population growth along the city's bushfire-prone northern and western edges (Office of the Commissioner for Sustainability and the Environment, 2023).

Across Australia, city fringes are expanding fast. Over the last two and a half decades the outer suburbs of our capital cities have grown rapidly - increasing by 65.5% or 2,740,036 people (ABS 2025a, 2025b).

Across Australia, populations on the fringe of our cities have exploded over the past few years: up 65.5% with at least 6.9 million people now living in danger zones.

TABLE 3: RESIDENTIAL POPULATION OF URBAN FRINGE AREAS FOR CAPITAL CITIES (ABS 2025A, 2025B)[3]

	2001	2024	Increase
Brisbane	805,075	1,417,559	76.08%
Sydney	1,313,121	1,630,315	24.16%
Canberra	227,439	332,760	46.31%
Melbourne	952,501	2,012,697	111.31%
Hobart	146,272	194,493	32.97%
Adelaide	298,814	407,125	36.25%
Perth	439,583	927,892	111.08%
Total change:	**4,182,805**	**6,922,841**	**65.51%**

3 Capital city boundaries were defined using the Australian Bureau of Statistics (2025c) 'ABS Maps' product comparing Greater Capital City Statistical Areas and Local Government Areas. Local Government Areas on the outer boundary of each city were included where the majority of the council area was within the metropolitan boundary of each city. It should be noted that bushfire risks can extend further into metropolitan areas than what is captured here - for example - one of Sydney's fastest growing areas, Cumberland, has faced at least six major bushfires since 2000 (Cumberland Bush Fire Management Committee 2025).

Many of our outer suburbs face serious bush and grass fire threats. The Yarra Ranges and Nillumbik local government areas were impacted by the Black Saturday bushfires. In 2019, the Bunyip State Park bushfire (Cardinia Shire Council) threatened communities in Melbourne's east. Sydney's Blue Mountains, Wollondilly, Sutherland and Northern Beaches have been repeatedly impacted by damaging fires.

Some outer suburban areas have small pockets of bushland that also represent a potential fire risk to communities and require careful management by local authorities. Residents beyond immediate bushfire zones can also face disruptions to power, roads, schools, childcare, and emergency warnings (Office of the Commissioner for Sustainability and the Environment 2023).

Another factor contributing to house losses during fires on the urban fringe of our cities is the age of homes. Up to 90% of homes in bushfire-prone areas were constructed before modern, bushfire-resilient standards were introduced (Binskin et al., 2020). The Black Summer bushfires made this clear: 99% of buildings destroyed were within 500m of bushland, and 74% were built before AS 3959.2 was included in the Australian Building Code, now Australian Construction Code (Binskin et al., 2020).

The 2003 Canberra bushfires showed Australians that bushfires that start in forested areas can rapidly go from forest-to-house fires to house-to-house fires. As shown in figure 4 below, homes close to bushland face three sources of bushfire - inner and outer gardens, other buildings and vegetation such as forests (Price et al. 2025). Ignition sources include direct contact with flames, radiant heat and firebrands and embers (Price et al. 2025).

Firebrands and embers - fanned by strong gusty winds - were one of the main causes of the large loss of homes to fire in Canberra 2003, followed by house-to-house ignition (Blanchi and Leonard 2005).

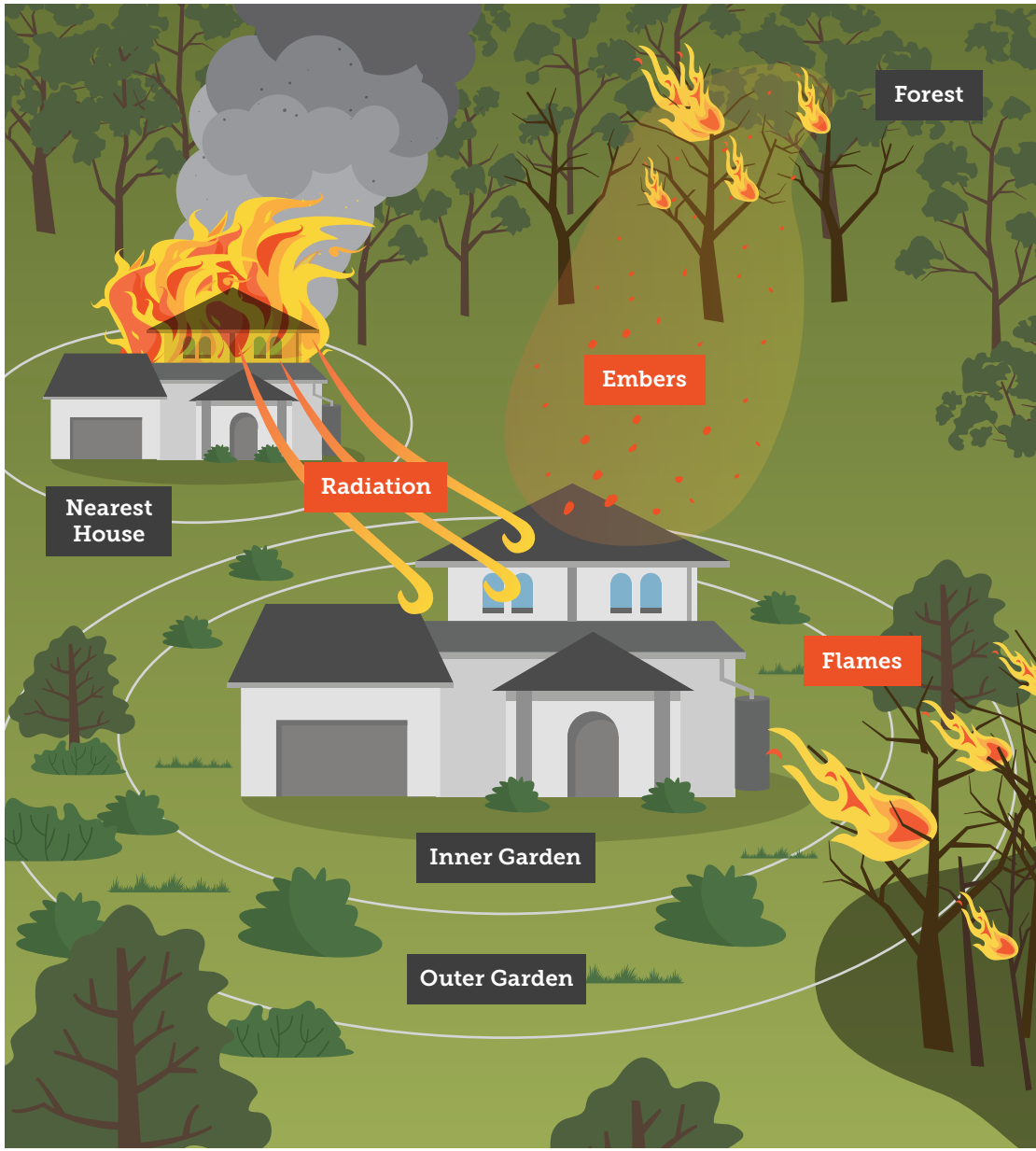


Figure 4: Sources of fire and attack mechanisms (Price et al. 2025).

WORSENING FIRES ARE COSTING AUSTRALIANS

Historical fires that have hit our cities have had significant social and economic costs. Significant fire events hitting Sydney, Canberra, Melbourne, Hobart, Adelaide and Perth have led to insurance losses of approximately $10.6 billion - normalised to 2022 values (ICA 2025).[4, 5]

While insurance losses are one of the most direct measures of a bushfire's impact on households - homeowners exposed to climate-fuelled disasters such as bushfires are also seeing astronomical insurance premium increases. Homeowners living in bushfire exposed local government areas in Sydney, Melbourne and Perth have seen above average insurance premium increases in recent years.

While these figures provide some insight into the costs of bushfires hitting our cities - the true costs are likely to be much higher. The full social and economic costs of the Black Saturday bushfires were estimated to be as high as $7 billion (Deloitte Australia 2016). The cost of the 2019/20 Black Summer bushfires to the Australian economy was estimated to be $10 billion (Commonwealth of Australia 2024).

TABLE 4: RISING INSURANCE PREMIUMS FOR PEOPLE LIVING IN BUSHFIRE-PRONE AREAS[6]

Local government area	Increase since 2020
Sydney	
Northern Beaches	99%
Ku-ring-gai	88%
Hornsby	78%
Sutherland Shire	87%
Melbourne	
Yarra Ranges	138%
Nillumbik	123%
Perth	
Mundaring	103%
Kalamunda	94%
Serpentine - Jarrahdale	94%

Source: Finity Consulting in SMH (2025a), SMH (2025b) and WA Today (2025).

4 Normalised losses are adjusted for inflation, population exposure and building stock. Taking this approach means that historical losses for disasters are more easily compared to more recent events.

5 The Insurance Council of Australia notes that historical bushfire information is reliant on historical records and has a degree of uncertainty based on what was recorded at the time. The losses included here are for fires that were declared to be catastrophic. One fire event (Blue Mountains 1968) was an undeclared event, however insurance loss information has been included. Overall, it needs to be noted that this does not capture all insurance losses for fires on the peripheries of Australian capital cities - only those with a high number or value of insurance claims.

6 No data was available for the Blue Mountains. Hawkesbury residents have seen the greatest increases in insurance premiums compared to other Sydney local government areas, largely due to flood risk.

4.

The Perfect Storm: Climate Pollution Has Made Dangerous Fire Conditions More Likely

Image 8: Tasmanian bushfire (below Stacks Bluff).

LONGER, MORE DANGEROUS FIRE SEASONS

'Fire season' describes the period that historically has been more likely to produce weather conditions conducive to the outbreak and spread of significant bushfires. For example, in NSW the Rural Fires Act states that the statutory Bushfire Danger Period runs from 1 October to 31 March. In Australia and across global fire-prone regions fire seasons have become significantly longer, more dangerous and less predictable (Mullins 2021). From 1979 to 2019 fire seasons across Australia grew by an additional 27 days - a 20% increase over the 40 year period (CSIRO 2022). The historical boundaries of spring - summer fire seasons have eroded as climate change drives hotter temperatures, prolonged droughts, record low humidity, and more frequent heat extremes.

Australian fire weather has worsened markedly in recent decades, with more days each year reaching extreme or catastrophic thresholds and far fewer opportunities for safe hazard-reduction burning (Binskin et al. 2020). Over the last 40 years the frequency of extreme fire weather days across Australia increased by 56% (CSIRO 2022). The result is a landscape that remains fire-ready for much longer, with elevated risk extending deeper into winter, spring and autumn.

This lengthening of the seasons is not unique to Australia. In California, the historic June–October fire season has effectively collapsed, with authorities now treating fire risk as year-round (Aon 2022; MacCarthy and Richter 2025). Both hemispheres are experiencing similar trends, and as fire seasons expand and increasingly overlap, international resource-sharing becomes more difficult—reducing the capacity to surge support during major events. Countries that formerly weren't considered to be at risk of fires now regularly experience bushfires. For example, in 2022 dozens of homes burned on the outskirts of London as bush and grass fires raged in 40 degree heat (BBC 2024).

Longer seasons also mean more frequent "out-of-season" fires, such as Colorado's Marshall Fire in late December 2021 or unprecedented early-season catastrophic fire danger in NSW on 6 September 2019, and a major fire in south western Sydney in April 2019 (NOAA 2024; Mullins, 2021). These events illustrate how extreme dryness, heat and wind can now combine well outside traditional summer periods. Compounding this, night-time fire behaviour has intensified, reducing the likelihood of what was once a predictable overnight window of cooler temperatures for suppression allowing fires to continue spreading rapidly and to threaten homes during darkness when most firefighting aircraft are unable to operate.

Together, these factors are creating more sustained, exhausting fire seasons for emergency services, communities and infrastructure. As climate extremes intensify, Australia must plan for fire seasons that are longer, more volatile and increasingly outside historical patterns.

DESTRUCTIVE URBAN FIRES HAVE BEEN MADE WORSE BY DRYING CONDITIONS CAUSED BY CLIMATE POLLUTION

Some of the most devastating fires to hit our southern cities have been worsened by climate-induced extended dryness and drought. This was also a significant factor in fires that have hit Los Angeles over the past two decades.

Both the 2003 Canberra and 2009 Black Saturday bushfires occurred during a decade-long dry spell. The Millennium Drought was predominantly a 'cool' drought where winter rainfall over many years was far below average (BoM 2015). This is significant because cool season rainfall is less likely to evaporate and therefore soaks into soils, in turn helping to keep vegetation hydrated and green. The 2019/2020 Black Summer bushfires arrived in the final year of the Tinder Box drought - an event made hotter and drier by climate change (Devanand et al.2024).

Vapour pressure deficit is an insidious and unstoppable process as the planet warms. A warmer atmosphere can hold more moisture, and this means that moisture is drawn out of living and dead vegetation 24/7, making it drier and more combustible, in turn increasing the intensity of fires when they ignite (Phillips, 2023). As average

The old firefighting rules no longer apply: fires sometimes don't ease at night, and climate pollution is drying out fuels faster than firefighters can manage them.

temperatures across the globe increase during day and night, there is more transfer of moisture from vegetation to the atmosphere. Record high vapour pressure deficits in 2019, up until then Australia's hottest year on record, leading to significant drying of fuel loads - set the stage for the destructive fires that followed (Devanand et al. 2024). The intensely dry landscape also made heatwaves up to 2.5°C hotter during 2019 (Devanand et al. 2024).

Droughts are now occurring against a back-drop of long-term declines in cool season rainfall in Southern Australia driven by climate pollution (CSIRO 2024). Worse is in store in the future. Just like their northern hemisphere counterpart, Australia's southern capitals are likely to see more declines in rainfall and extended dry periods in future - creating longer windows for fires to strike and take hold and hampering prescribed burning that is essential to manage fuel loads. Climate whiplash will also lead to more rainfall extremes in between longer fire seasons, which will further restrict hazard reduction burning and lead to prolific regrowth after fires, as has happened following Black Summer.

STRONG WINDS: THE KEY INGREDIENT FOR THE MOST DESTRUCTIVE FIRES

The most destructive fires occur during periods of extreme or catastrophic fire weather, usually when it is also very hot. However due to the drying trend described above, only strong wind and high fuel loads are necessary now to create conditions that endanger communities living on the urban interface of our cities. High temperatures, once a necessity to generate serious fires that can damage properties are no longer required for fires to become uncontrollable.

Across Australia's most destructive bushfires, strong winds were the main factor that drove rapid, explosive fire spread. The spread of two of the Black Summer bushfires discussed in this report - Cudlee Creek in South Australia and the Gospers Mountain mega-blaze were spurred by strong winds. The Canberra bushfires entered their most destructive state on January 18 2003 when strong winds gusting at 65km/h helped four fire fronts to merge and travel toward the city's western suburbs (MacLeod 2003; AIDR 2025a). Hobart's 1967 bushfires that destroyed 1,293 homes and killed 64 people were propelled by winds up to an estimated 100km/h (AIDR 2025b). Recent fires that destroyed homes near Hobart in December 2025 were driven by winds gusting to 100 km/h (ABC 2025).

Peak wind gusts during the 2011 Roleystone-Kelmscott (Perth Hills) were estimated to have been between 70 and 80km/h at the fire site on the day of ignition (February 6), with average wind speeds between 25km/h and 40km/h. Analysis of the easterly winds affecting Perth Hills bushfires shows that extremely dry easterly wind events have increased since the late 1970s. These events increase both the intensity and rate of spread of bushfires - making them far harder for fire fighters to control (Keelty 2011).

In the first week of December 2025, Dolphin Sands on Tasmania's east coast was hit by fast moving fires that destroyed 19 homes (ABC 2025b). Preceding conditions didn't meet the threshold for extreme weather that the Bureau of Meteorology uses when issuing fire weather warnings to the public. The key factor driving the fires was strong wind. While fuel loads were dry, there had been rain and temperatures were not high (ABC Radio Canberra 2025). Reflecting on the impact of the wind driven fire and lack of warning households had to prepare, David Bowman, Professor of Pyrogeography and Fire Science at the University of Tasmania explained:

> *"...we have a very unstable climate now... we just have to accept the fact that with a very unstable climate, a fire situation, you can go from zero to 100 in hours. And you've got to think about what that means, because that means that you might be having to activate a bushfire plan very quickly, not in days, in hours"*
>
> *(ABC Radio Canberra 2025).*

NO RESPITE FOR FIRE CREWS AT NIGHT

Night-time conditions have traditionally been critical to bushfire suppression. Cooler temperatures, higher humidity and calmer winds after sunset typically slow fire behaviour and allow firefighters to regroup, plan and conduct backburning (AFAC 2021). This reprieve occurs as reduced solar heating cools the surface, stabilises the atmosphere and forms a planetary boundary layer that traps cooler air, moisture and smoke near the ground (NOAA 2025; Cunningham, Bowman & Williamson 2023).

However, these overnight advantages are rapidly disappearing. Hotter nights, drier air and deep drought now drive intense overnight fire activity, removing one of firefighters' most important tools. Multi-day fires that burn hard through the night stretch personnel, limit safe opportunities for backburns, and heighten risks to communities. Night-time fires are especially dangerous because more people are at home and may be unprepared to evacuate quickly (Peace & McCaw et al. 2024).

This increase in extreme heat and persistent heatwaves has impacts on both surface and atmospheric weather conditions that sustain significant fire behaviour overnight as well as during the day (Figure 5). They support fire spread overnight, by inhibiting "formation of overnight near-surface inversions", resulting in poor humidity recovery (Peace et al 2020). This in turn results in fuels remaining drier (Peace et al. 2020; Brown & McEvoy 2020).

(excerpt from Keelty et al. 2020)

From the Blue Mountains to the Adelaide Hills to the Dandenongs, to Hobart and the Perth Hills, a single extreme wind event at the wrong time, when it is critically dry, could push fire directly into suburbs on the fringes of our cities.

OUR CITIES ARE BEING HIT WITH MORE EXTREME FIRE WEATHER CONDITIONS - INCLUDING FIRES THAT GENERATE THEIR OWN WEATHER SYSTEMS AND EXTREME WINDS

The combination of extremely low relative humidity, low fuel moisture and hurricane force winds helped to create largely unparalleled fire intensity and spread in Los Angeles in January 2025, despite it being winter. As previously explained, the intensification of fire weather conditions and fuel dryness driven by climate change has driven a massive increase in the once rare phenomenon of pyro-convective storms - where fires burn so intensely they generate their own weather systems (see page 17). These events have featured in significant fires that have threatened or directly impacted interface communities:

- The 2003 Canberra bushfires had four main complexes of pyro-cumulonimbus activity lasting three hours, one of which generated a destructive fire tornado (Fromm et al. 2006).
- The 2009 Black Saturday bushfires included three confirmed pyroCb events - two occurring in the Kilmore-Murrindindi complex fires (Dowdy, Fromm & McCarthy 2017; McRae 2025).
- The March 2019 Bunyip State Park fires on Melbourne's eastern outskirts (McRae 2025).
- The Gospers Mountain megafire that threatened Sydney and destroyed 90 homes generated a pyroCb on 12 November 2019 (AIDR 2025d).
- An unprecedented twenty nine recorded pyroCb events occurred at fires across Australia throughout the 2019 / 2020 Black Summer (Abram et al. 2021).

These fire storms can be destructive and deadly: A pyro-convective event over the Kilmore East fire in Victoria in February 2009 likely contributed to the deaths of 119 people and destruction of 1,232 homes. Spot fires were recorded 22 kilometres downwind with embers driven by cyclonic winds (Teague et al., 2010).

While the Santa Ana winds that impact on Los Angeles periodically are katabatic (downslope) winds and are fairly unique, winds even stronger than those experienced in January 2025 can be generated by pyroconvective events here in Australia.

FIREFIGHTERS ARE FIGHTING WITH ONE HAND TIED BEHIND THEIR BACKS

California is densely populated with many Fire Departments and a huge firefighting resource base, including large numbers of firefighting aircraft. The tyranny of vast distances restricts the ability of Australian firefighting agencies to rapidly assist each other, and the increasing overlap of fire seasons, once sequential in nature, has impacted the ability of states and territories to provide mutual aid during major fires (Mullins, 2021). However, our fire management personnel and resources are acknowledged internationally as amongst the world's best, with Australians regularly called upon to assist in the USA and Canada. Despite this deep expertise, the scale and intensity of the fires many communities are experiencing are increasingly, on occasion, reaching intensities that are beyond the limits of current fire suppression arrangements, resources and technologies.

Strong gusty winds can prevent or limit aerial fire suppression and extreme to catastrophic fire weather conditions fuel fires so intense that fire crews on the ground are often rendered ineffective. Strong winds prevented aerial fire suppression at times during the Blue Mountains (2013), Gospers Mountain (2019) and Hobart (2025) fires. As described above, our firefighting agencies are facing fire generated storms more often - capable of spreading embers far and wide to start new fire flanks and generating lightning that can start new fires up to 100km away (Dowdy, Fromm & McCarthy 2017).

There is no current firefighting technology or capability that enables firefighters to control fires of this magnitude and intensity, and the focus by necessity becomes saving lives. Los Angeles firefighters were faced with just this situation in January 2025.

In his review of the Cudlee Creek and Kangaroo Island fires, fire scientist Associate Professor Kevin Tolhurst concluded that fire behaviour during Black Summer exceeded the upper limits of firefighting, with machines, aircraft and tankers powerless to stop it. At such intensities, crown fires dominate, houses cannot be defended, and human survival is unlikely (Keelty et al. 2020). This is the stark reality communities on the urban–bush interface will increasingly face as climate pollution drives more extreme bushfires.

Fires are now so intense they build their own thunderstorms and tornado-strength winds.

Image 9: Los Angeles Fire Department firefighter.

5.

City by City: How Exposed Are Australia's Capitals?

Image 10: Bushfire smoke clouds sky over Sydney Harbour.

SYDNEY, NEW SOUTH WALES

SNAPSHOT

- Bushfires historically strike from north, west and south - the northwest has large tracts of intact forest and the southwest a mosaic of dry forest and grassy woodland.
- The Blue Mountains, Penrith, Hawkesbury, Northern Beaches and Sutherland local government areas on Sydney's boundary are regularly impacted by fire and historically have suffered significant property losses.
- 1,630,315 people now live in outer urban LGAs (24% growth since 2001).
- Homes in new suburbs on Sydney's fringe are densely packed and conducive to house-to-house fire spread. Homes in the northwest and southwest, face twice the likelihood of interface fires compared to other subregions (Price and Bradstock 2013).

LA FIRE FACTORS

- Worsening fire weather
- Forested areas over mountainous and hilly terrain
- Strong winds that can drive fire spread and intensity
- Periods of extreme dryness
- Large tracts of bushland adjacent to homes

HISTORICAL IMPACTS

- Major fires and fire seasons: 1957, 1968, 1993–94, 2013, Black Summer 2019/20.
- 1,689 structures destroyed, 84 lives lost (Fensham et al. 2024).

INSURANCE LOSSES

- $1 bn - 1968, 1983, 1997, 2001, 2002, 2013 (ICA 2025)

WHY AN LA-LIKE EVENT IS POSSIBLE

A Black Summer–scale fire entering Penrith, Hornsby, the Northern Beaches, The Hills, Sutherland, the Illawarra or the Blue Mountains interfaces could result in thousands of homes lost, like what occurred in LA.

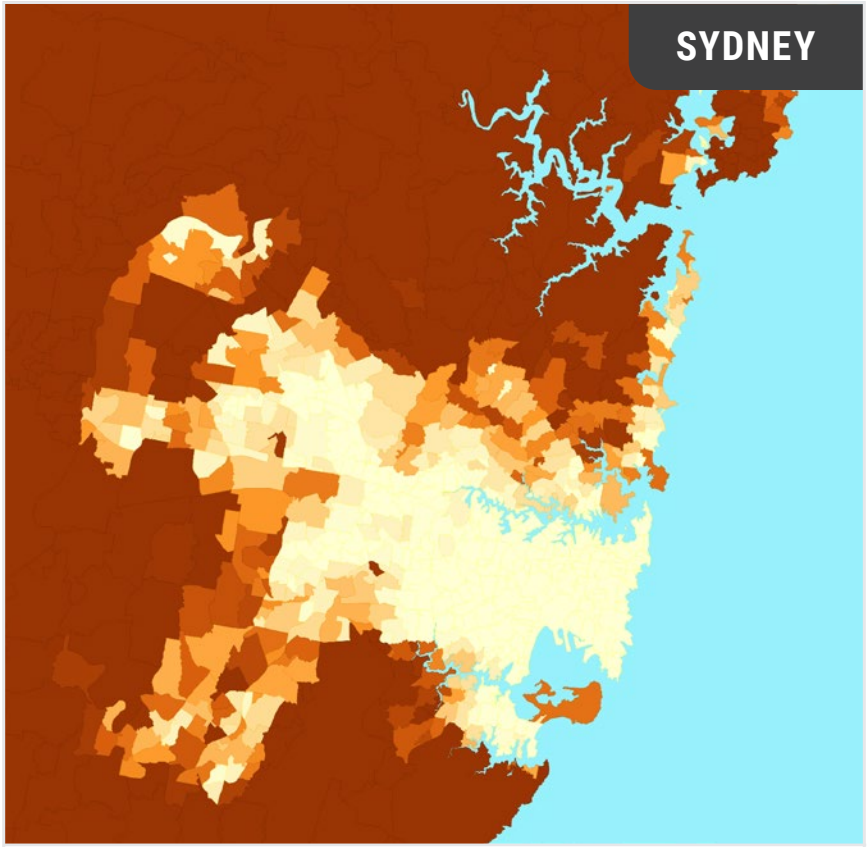


Figure 5: Sydney's bushfire-prone areas. Dark brown signifies suburbs where a high percentage of land is marked for bushfire planning.
Source: 360info (2023).

You can learn more about the bushfire risks your property may face using the NSW RFS bushfire prone land online mapping tool.

MELBOURNE, VICTORIA

SNAPSHOT

- The most destructive fires have typically occurred in the north east and east where there are large tracts of wet forests and dry eucalypt forests.
- The greatest threats lie in the northeast and east, particularly the Dandenong Ranges, Warburton Valley and Warrandyte, where dense forests meet residential areas (FFMV & CFA 2025; Fensham et al. 2024).
- Communities in the northwest and west face less - though still significant - fire risks from patches of dry forest and extensive grassland (FFMV & CFA 2025).
- 2,012,697 people now live in outer urban LGAs (111% growth since 2001).

LA FIRE FACTORS

- Worsening fire weather
- Long term drying trend, episodic drought
- Forested areas over mountainous and hilly terrain
- Strong winds that can drive fire spread and intensity
- Large tracts of bushland adjacent to homes

HISTORICAL IMPACTS

- Major fires and fire seasons: 1926, 1939, 1962, 1982-83 including Ash Wednesday, Black Saturday 2009.
- 5,844 structures lost to major fires, 404 lives lost (Fensham et al. 2024).

INSURANCE LOSSES

- $2.69 bn - 1997, 2009, 2019 (ICA 2025)[7]

WHY AN LA-LIKE EVENT IS POSSIBLE

Los Angeles' devastating fires required a combination of above-average rain encouraging fuel growth, followed by record-breaking dry and intense hurricane-like winds. Fuel loads on Melbourne's eastern edge are not as dependent on preceding rainfall. Due to their high ecological value and high moisture content, wet and damp forests in the east around the Warburton Valley aren't suitable for fuel management (FFMV & CFA 2025). As a result, during extended dry periods there are potentially high fuel loads in these areas ready to burn.

Figure 6: Melbourne's bushfire-prone areas. Dark brown signifies suburbs where a high percentage of land is marked for bushfire planning
Source: 360info (2023).

You can learn more about the bushfire risks your property may face using the Victorian Government's VicPlan - Bushfire Prone Areas function.

7 The 1983 Ash Wednesday bushfires also hit parts of suburban Melbourne - however most of the losses (~80% homes destroyed) were in regional areas, so the insurance losses have not been included here. In contrast, the majority of the losses and damage from the 2009 Black Saturday bushfires occurred close to or within the metropolitan boundary.

BRISBANE, QUEENSLAND

SNAPSHOT

- Significant fires in 1929, 1938, 1951, 1994 and 2000.
- 46 structures and one life lost (Fensham et al. 2024).
- 30,000 homes in suburban Brisbane received fire hazard reduction notices in 2023–24.
- 1,417,559 people now live in outer urban LGAs (76% growth since 2001).
- During the 2019/20 Black Summer bushfires parts of Moreton Bay and Redland were fire impacted.

LA FIRE FACTORS

- Worsening fire weather
- Periods of extreme dryness
- Possibility of strong wind gusts and/or pyroCb
- Steep slopes that accelerate fires
- Large tracts of bushland adjacent to homes

HISTORICAL IMPACTS

- At least five destructive fires in the past century.
- Dangerous fire weather is increasing for southeast Queensland.
- Property losses to fire increasing across Queensland.

INSURANCE LOSSES

- n/a[8]

WHY AN LA-LIKE EVENT IS POSSIBLE

Brisbane and southeast Queensland have so far escaped bushfire events on a scale of those hitting the southern states. However, fire risks are growing with more people living in interface areas and climate change fuelling increases in dangerous fire weather conditions.

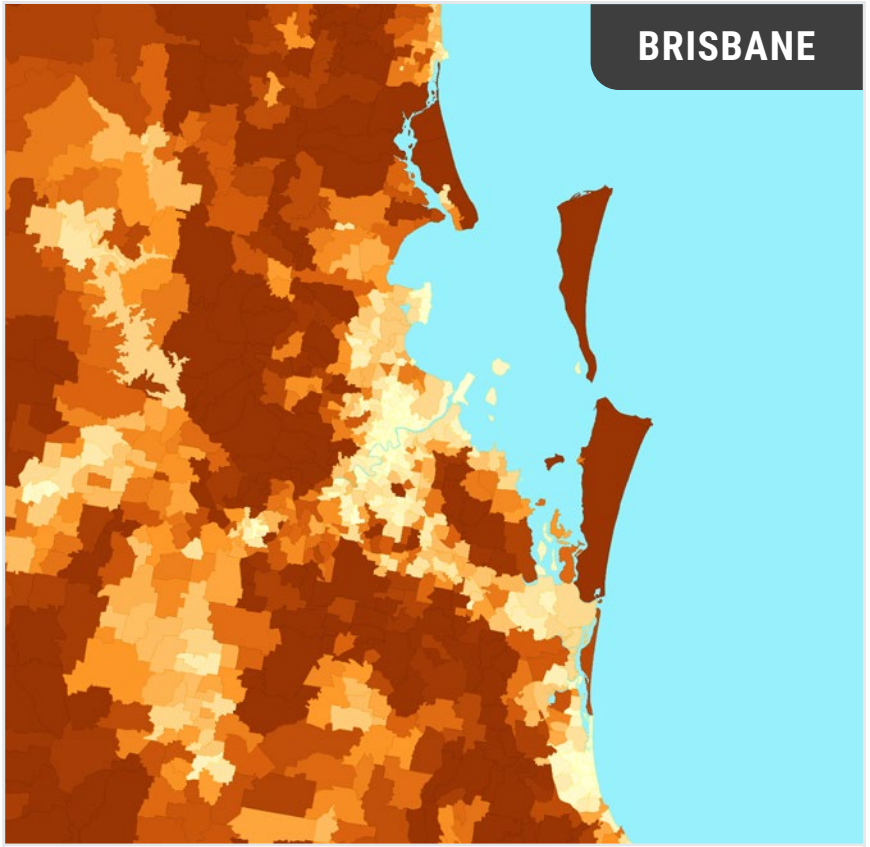


Figure 7: Brisbane's bushfire-prone areas. Dark brown signifies suburbs where a high percentage of land is marked for bushfire planning.
Source: 360info (2023).

You can learn more about the bushfire risks your property may face using the Queensland Fire Department's postcode checker.

8 At the time of writing, no specific significant or catastrophic fire events impacting Greater Brisbane had been declared by the Insurance Council of Australia. Declarations made for the 2019/20 Black Summer may include property damage or loss for homes in or around Greater Brisbane.

CANBERRA, AUSTRALIAN CAPITAL TERRITORY

SNAPSHOT

- Australia's "bush capital" is highly exposed to bushfires and is one of the closest parallels to LA.
- The city is encircled by Namadgi National Park, Tidbinbilla Reserve, the Lower Cotter Catchment, and Canberra Nature Park - suburbs and homes back directly onto forest and grassland.
- 332,760 people now live in outer suburban areas (46% growth since 2001).

LA FIRE FACTORS

- Worsening fire weather
- Long term drying trend, episodic drought
- Possibility of strong wind gusts and/or pyroCb
- Steep slopes that accelerate fires
- Large tracts of bushland adjacent to homes

HISTORICAL IMPACTS

- 2003 Canberra Fires: 487 homes lost, 4 deaths, 160,000 ha burned.
- First recorded fire tornado in the southern hemisphere.

INSURANCE LOSSES

- $1.272 - 2003 (ICA 2025)

WHY AN LA-LIKE EVENT IS POSSIBLE

Canberra already experienced a large-scale catastrophe in 2003 — when fewer people were living there (and therefore exposed) than are living there today.

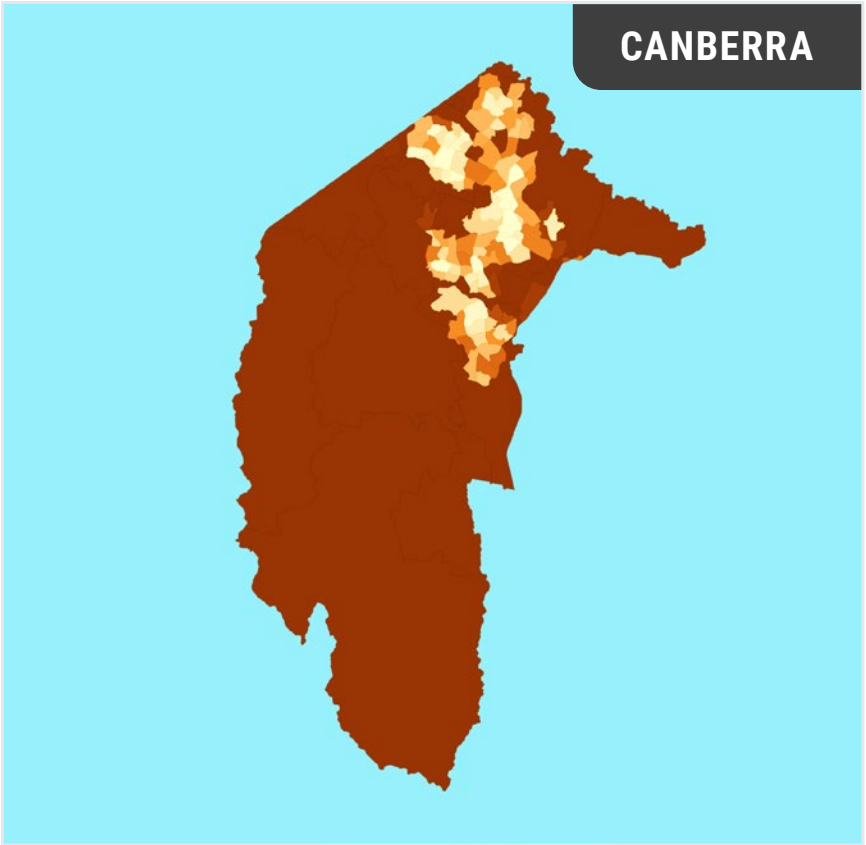


Figure 8: Canberra's bushfire-prone areas. Dark brown signifies suburbs where a high percentage of land is marked for bushfire planning.
Source: 360info (2023).

You can learn more about the bushfire risks your property may face using the ACT Government's Bushfire Fire Mapping tool.

ADELAIDE, SOUTH AUSTRALIA

SNAPSHOT

- Adelaide has a Mediterranean fire climate, with hot, dry summers and mild, wet winters (Australian Government & Government of South Australia 2025).
- Declines in winter rainfall alongside rising temperatures and periods of dry are lengthening fire seasons and driving more extreme fire weather (Government of South Australia 2021).
- Significant fire danger in the Adelaide Hills — steep terrain, fuels, heat and wind.
- 407,125 people now live in outer LGAs (up 36% since 2001).

LA FIRE FACTORS

- Worsening fire weather
- Long term drying trend, episodic drought
- Possibility of strong wind gusts and/or pyroCb
- Steep slopes that accelerate fires
- Large tracts of bushland adjacent to homes

HISTORICAL IMPACTS

- Ash Wednesday I: 51 homes lost.
- Ash Wednesday II 1983: 383 homes and 28 lives lost[9].
- Sampson Flat 2015: 27 homes lost.
- Cudlee Creek 2019: 86 homes destroyed.

INSURANCE LOSSES

- $1.32 bn - 1980, 1983, 2015 (ICA 2025)

WHY AN LA-LIKE EVENT IS POSSIBLE

The Greater Adelaide region has a similar climate to Los Angeles alongside increasing fire risk: increasing temperatures, dangerous fire weather and a long term decline in rainfall in areas with people living in close proximity to bushland.

Figure 9: Adelaide's bushfire-prone areas. Dark brown signifies suburbs where a high percentage of land is marked for bushfire planning.
Source: 360info (2023).

South Australia's bushfire prone land guidance is currently being updated. You can learn more about the bushfire risks your property may face using the interim Bushfire Overlay map.

9 Figures for the whole state - it is estimated that 60% of the houses destroyed or damaged were in the Mt Lofty Ranges.

PERTH, WESTERN AUSTRALIA

SNAPSHOT

- Situated in a global climate drying hotspot - winter rainfall has declined by at least 16% since 1970, with an even faster rate of decline since the turn of the century (CSIRO 2024;).
- The combined heat and drought hitting Perth and surrounding regions is contributing to the die back of trees - including in Jarrah forests - leading to heavier fuel loads when branches bark and leaves fall to the forest floor (Ruthroff et al. 2016).
- Significant fire danger in the Perth Hills — steep terrain, fuels, heat and wind.
- 927,892 people now live in outer LGAs (up 111% since 2001).

LA FIRE FACTORS

- Worsening fire weather
- Long term drying trend, episodic drought
- Possibility of strong wind gusts and/or pyroCb
- Steep slopes that accelerate fires
- Large tracts of bushland adjacent to homes

HISTORICAL IMPACTS

- 2023 Wanneroo/Mariginiup fire: 18 homes lost.
- 2021 Wooroloo / Perth Hills Bushfire: 86 homes lost.
- 2014 Parkerville and Perth Hills Bushfire: 57 homes lost.
- 2011 Perth Hills Bushfires: 71 homes lost.
- 2008 Perth Hills - Parkerville and Stoneville: 5 homes lost.

INSURANCE LOSSES

- $287.9 million - 2011, 2014, 2021 (ICA 2025)

WHY AN LA-LIKE EVENT IS POSSIBLE

Greater Perth and south west Western Australia has a Mediterranean climate like Los Angeles and is facing a steeper decline in rainfall than any other capital city in Australia. When this is combined with periods of record-breaking heat, strong winds, fuel availability and communities in close proximity to bushlands and coastal scrub fire risk escalates significantly.

Figure 10: Perth's bushfire-prone areas. Dark brown signifies suburbs where a high percentage of land is marked for bushfire planning.
Source: 360info (2023).

You can learn more about the bushfire risks your property may face using the Government of Western Australia's Map of Bushfire Prone Areas.

HOBART, TASMANIA

SNAPSHOT

- One of Australia's most fire-exposed capitals: steep terrain, extreme winds, heavy fuels.
- The city is hemmed in by wet and dry forests on Kunanyi/Mt Wellington, with suburbs extending into these fuels. While wet forests ignite mainly under extreme conditions, dry forests burn readily and often (Lucas et al. 2022; Fensham et al. 2024).
- Rainfall has declined since the 1970s while landscape fire activity has increased across the state (Bowman et al. 2022).
- Historically, the most destructive fires have swept in from the west, placing neighbourhoods such as Fern Tree, South Hobart, West Hobart, Lenah Valley, Mount Nelson, and Sandy Bay at highest risk (Lucas et al. 2022; Fensham et al. 2024).
- 194,493 people now live in outer LGAs (up 33% since 2001).

LA FIRE FACTORS

- Worsening fire weather
- Long term drying trend, episodic drought
- Possibility of strong wind gusts and/or pyroCb
- Steep slopes that accelerate fires
- Large tracts of bushland adjacent to homes

HISTORICAL IMPACTS

- Black Tuesday 1967: 1,293 homes lost; 64 deaths.
- 2013 Forcett-Dunalley: pyroCb firestorm and 93 homes destroyed.

INSURANCE LOSSES

- $4.1 bn - 1967 (ICA 2025)

WHY AN LA-LIKE EVENT IS POSSIBLE

Despite having fewer days of dangerous fire weather, Hobart has more fuel to burn than Melbourne. The Forest Fire Danger Index ratings recorded during the 1967 fire were far lower than for fires hitting other capital cities - signifying how destructive fires in Hobart can be under the right conditions due to terrain and fuel. The 2025 Los Angeles fires and earlier 2021 Marshall Fire in Colorado occurred in winter, driven by extreme dryness and extreme winds, a situation that's foreseeable for Hobart given its physical propensity for rapid fire spread into suburban areas and the strength of winds.

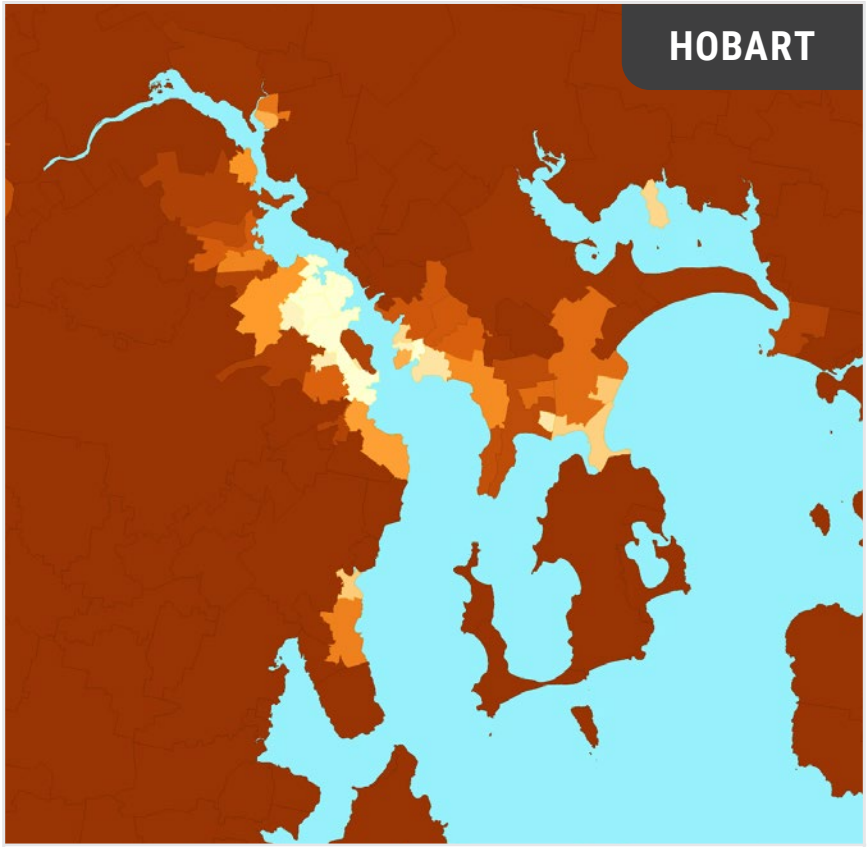


Figure 11: Hobart's bushfire-prone areas. Dark brown signifies suburbs where a high percentage of land is marked for bushfire planning.
Source: 360info (2023).

You can learn more about the bushfire risks your property may face using the Tas Alert Risk Ready tool.

6.

What Australians Must Do Now

Image 11: Firefighter hoses down fire in Knox City in Melbourne's east.

There is nothing natural about the climate-fuelled fires hitting communities worldwide, or the increasing destruction left in their wake. The continued burning of fossil fuels in Australia and around the world is loading the dice for more extreme weather conducive to the spread of devastating fires.

At the same time, more and more people are living in places where already high fire risks are increasing as new communities are established on the fringes of major towns and cities, often adjacent to areas that are primed to burn.

Fires described in this report have already cost Australians billions, with losses totalling more than $10.6 billion when normalised to 2022 values (ICA 2025). However, most worrying are the truly catastrophic events responsible for the most deaths and destruction of homes - Hobart 1967, Ash Wednesday 1983, Canberra 2003, Black Saturday 2009, and the most destructive of all, Black Summer 2019/2020.

Over the coming decades, further climate pollution will stack the odds in favour of more dangerous fire weather and conditions conducive to fire. Our southern capital cities are all facing a future characterised by an increase in short, intense bursts of rainfall, declines in long term rainfall and increases in dry periods, high temperatures and extreme heat - creating more opportunities for bush and grass fires to take hold and spread rapidly once ignited.

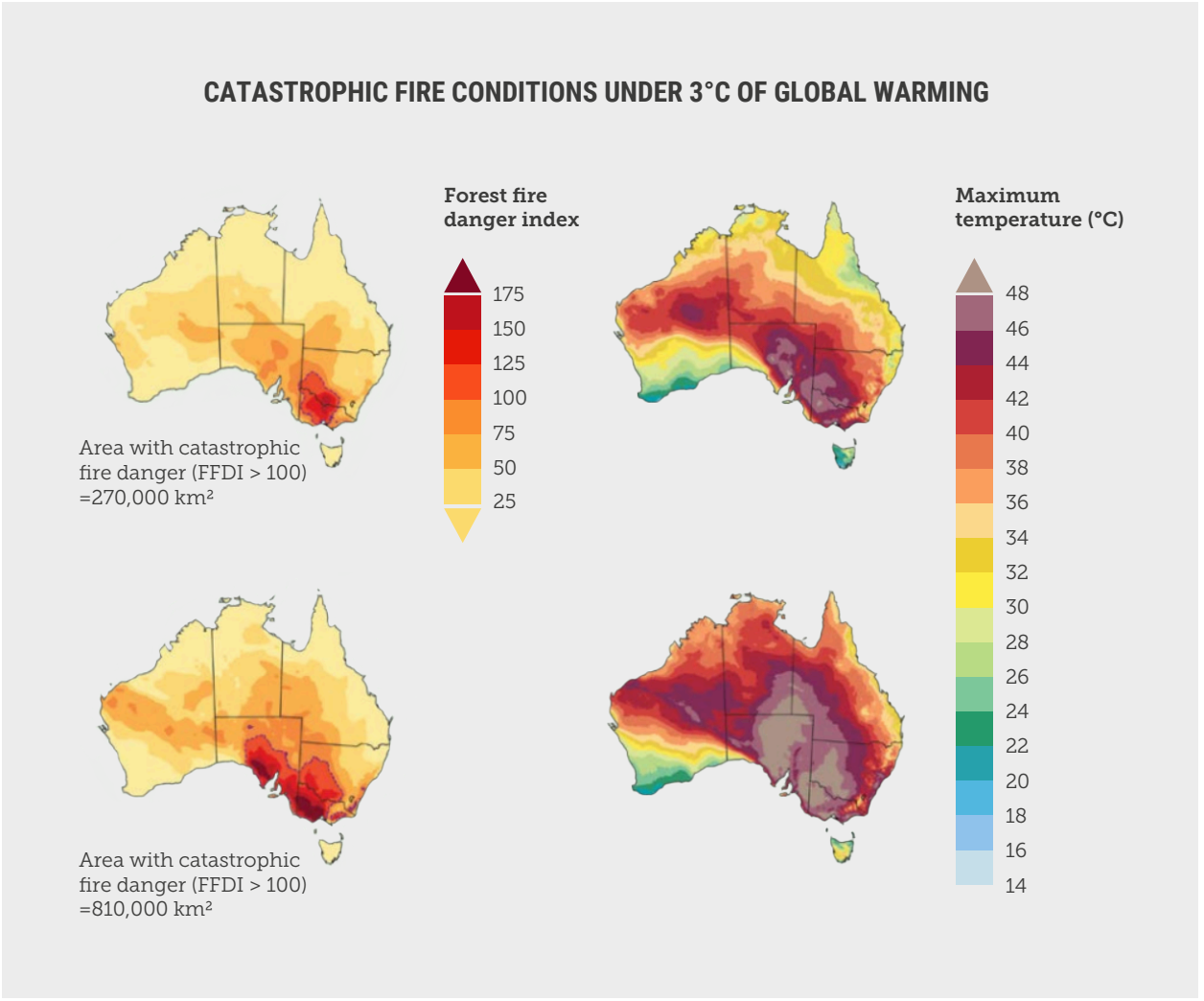


Figure 12: Catastrophic fire conditions under 3°C of global warming.

We can't say we haven't been warned. The National Climate Risk Assessment has shown what a catastrophic fire like Black Saturday would look like at 3°C of global warming with temperatures reaching 48°C across western Victoria, western NSW, and South Australia, and catastrophic fire danger zones having three times the reach of the 2009 fires.

This isn't inevitable - every choice we make now will determine the scale of the fire risks we face in future. There are three, key areas of focus:

1. Cutting climate pollution more deeply, and swiftly here in Australia, and across the world to limit escalating fire risks into the future.
2. Investing heavily in disaster preparation and community resilience at all levels of government - so our cities and regional centres, and our people are as prepared as possible for the level of heightened fire risk they already face.
3. As a priority, building emergency service and land management capacity at the bush/grassfire interface of our cities and major regional centres. With more people living in the urban fringe, there are greater demands on our fire services as well as more people at risk.

Cutting climate pollution here in Australia and across the globe to limit further temperature increases to below 2°C can help to limit the growing intensity and potential destructiveness of future fires. The Australian Government recently set a 2035 climate pollution target of a 62-70% reduction on 2005 levels. This trajectory is consistent with a level of global warming above 2°C. The Australian Government must aim to meet and exceed the upper end of this range.

However, it is also clear that communities on the peripheries of our capital cities, and the emergency services that protect them face growing fire risks now, and need to be equipped to prepare for and respond to them. This requires **Australian federal,**

Image 12: The Eaton fire from Koreatown in Los Angeles.

state and territory governments to invest heavily in disaster preparation and community resilience, including hazard reduction, local disaster planning, education, retrofitting homes to bushfire standards, and evacuation centres, while ensuring that emergency services are properly resourced.

While many more Australian homes are built to have greater resilience to bushfires, a lot of homes in bushfire-prone areas were built before current building standards were introduced. These houses remain at the greatest risk of destruction when bush and grass fires strike, and then become a source of ignition of surrounding houses.

The initial investment the Australian Government made in The Resilient Building Council's Bushfire Resilience Rating app is a welcome start. The app is a great tool that can help homeowners identify improvements to their homes to better protect them from fire. Some insurers have also offered discounts for people who complete the actions identified by the app - offering some cost of living relief for people in bushfire-exposed areas (RBC 2024).

At the same time our firefighters and emergency services are protecting growing numbers of people living in areas where climate risks continue to escalate. **Bush and grass fire mitigation in interface areas** is more resource intensive than for bushland - but with more people to protect on our urban peripheries it **must be a priority**. This should include looking at options to build emergency service and land management agency capacity in these areas - whether through paid seasonal deployments, creation of more non-operational volunteer roles or the repurposing of retiring native logging and forestry capacity and machinery to assist with the creation of biodiversity and amenity rich fuel breaks to protect residential areas.

We still control the future fire risk curve — but only if we slash climate pollution dramatically this decade.

CONCLUSION

Royal Commissions, Government Inquiries, Coronial Investigations and Reviews of devastating bushfires that have hit our communities have described fire behaviour that was ultimately uncontrollable.

Since the 1990s the fingerprints of climate change have been all over these escalating events – Sydney 1994, Canberra 2003, Black Saturday 2009 and Black Summer 2019/20.

Even worse extreme fire events in future are unfortunately inevitable as the planet continues to warm at dangerous rates because of climate pollution from the burning of coal, oil and gas. While this has locked in more frequent and destructive bushfires in the decades ahead, the collective steps we take now to cut climate pollution as far and fast as we can will limit the severity of the impacts we experience in the future. We need to deal with the root cause – placing reliance on already stretched fire services to combat climate-driven fires is a bit like continually mopping the floor as a bath overflows instead of turning off the tap.

As well as dealing with climate pollution and ensuring our emergency services and land management agencies are well prepared, equipped and funded to prepare for, prevent and respond to emergencies, we must do all we can to prepare communities for increasing fire and other disaster risks. It is well known that disaster risk reduction and community preparation initiatives can generate significant savings and returns on each dollar invested. Retrofitting homes to meet current standards, community education, community self-help programs, and a focus on prescribed burning to reduce fuel loads coupled with increased support for Indigenous-ed cultural burning can all help to reduce risks to life and property.

The Inquiry into the 2003 Canberra bushfires noted that no suburban homes had been lost to fire since 1952 - potentially leading to community complacency about the fire risks they faced. While many are far more aware of their bushfire risks due to the growing, climate-fuelled escalation in fires they have witnessed, others remain unaware. For this reason it is worth concluding with a warning from the Inquiry into the 2003 Canberra bushfires:

"... one of the lessons of the fires is the realisation that very serious and potentially destructive fires that may threaten the city could happen again in the future."

— MacLeod, 2003

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