Victoria's Bushfire Management Strategy

VICTORIA
State Government

We acknowledge and respect Victorian Traditional Owners as the original custodians of Victoria's land and waters, their unique ability to care for Country and deep spiritual connection to it.

We honour Elders past and present whose knowledge and wisdom have ensured the continuation of culture and traditional practices.

We are committed to genuinely partnering with Victorian Traditional Owners and Victoria's Aboriginal community to progress their aspirations.

© The State of Victoria Department of Energy, Environment and Climate Action May 2024.

Creative Commons
This work is licensed under a Creative Commons Attribution 4.0 International licence, visit the Creative Commons website (http://creativecommons.org/licenses/by/4.0/).

You are free to re-use the work under that licence, on the condition that you credit the State of Victoria as author. The licence does not apply to any images, photographs or branding, including the Victorian Coat of Arms, and the Victorian Government and Department logos.

Printed by smo
ISBN 978-1-76136-529-4 **(pdf/online/MS word)**

Disclaimer
This publication may be of assistance to you but the State of Victoria and its employees do not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequence which may arise from you relying on any information in this publication.

Accessibility

To receive this document in an alternative format, phone the Customer Service Centre on 136 186, email customer.service@delwp.vic.gov.au, or contact National Relay Service on 133 677. Available at DEECA website (www.deeca.vic.gov.au).

Contents

Minister's Foreword 3

Introduction 4

A 10-year strategy to set a clear direction 5

Looking Back: Victoria's history with major fires 7

Looking Forward 9

1. People and community safety 14

1.1. Empower people and communities to manage local bushfire risk, response and recovery 14

1.2. Build the resilience of at-risk cohorts through education and collaboration 18

1.3. Use a range of mitigation strategies to reduce fire starts and impacts 20

1.4. Deliver fuel management that addresses the challenges associated with a changing climate 21

1.5. Limit the impact of bushfires through early control 24

1.6. Support timely and effective community recovery 24

2. Critical infrastructure and economic resilience 26

2.1. Understand, plan for and minimise economic impacts across all aspects of bushfire management 27

2.2. Embed business and industry expertise into bushfire management 30

2.3. Mitigate fire ignition risks from industry and critical infrastructure 32

2.4. Invest in resilient infrastructure to minimise disruption to communities 33

3. Aboriginal self-determination in cultural fire and bushfire management 34

3.1. Develop operational pathways that enable Traditional Owners to lead planning and to undertake cultural burns across all land tenures and Country types according to their cultural obligations 37

3.2. Build Traditional Owner governance and capacity in cultural fire knowledge and practice 37

3.3. Improved management of state forest reserves and private land through the application of collaborative management to heal Country and build resilience in people and landscapes 38

3.4. Facilitate the development and strengthening of institutional frameworks that support cultural fire practice 38

3.5. Enable Traditional Owners to have a greater role in bushfire management according to their self-determined interests and objectives 39

4. Ecosystem resilience and nature conservation 40

4.1. Continuously improve data, tools, systems, and knowledge of the influence of fire regimes on ecosystem resilience and the environment 42

4.2. Integrate research and knowledge on climate change into modelling and planning for ecosystem resilience 45

4.3. Improve monitoring, evaluation, and reporting on fire management practices against ecosystem resilience metrics and targets 46

4.4. Improve the effectiveness, consistency, and transparency of environmental value assessments 47

4.5. Strengthen leadership in fire ecology and environmental sciences 47

4.6. Build community understanding of fire regimes, ecosystem resilience, and nature conservation 48

5. Informed decision-making, evidence-based approaches and tools 50

5.1. Invest in high-quality shared data, science and research 51

5.2. Prioritise resources on actions that will most effectively reduce bushfire risk and impacts 53

5.3. Build a culture of transparent evidence-based decision-making at all levels of fire management 54

5.4. Embed Traditional Owner and community insights in evidence and decision-making 55

6. Working together, accountability and shared responsibility 56

6.1. Collaborate with the community and other stakeholders 56

6.2. Establish and maintain a comprehensive bushfire management framework 57

6.3. Apply an integrated bushfire management planning framework 58

6.4. Increase transparency to support greater accountability in bushfire management 59

6.5. Share bushfire risk decision-making with communities 59

7. Enhanced capability and capacity 60

7.1. Better support interoperability and decision-making through standardisation 62

7.2. Build capability through education, coaching and mentoring programs 62

7.3. Embed physical and mental health, wellbeing, and safety 63

7.4. Increase diversity at all levels of fire management 63

7.5. Build sector capacity and capability in a changing climate 64

7.6. Secure the necessary equipment and infrastructure for bushfire management in a changing climate 66

8. Implementation, monitoring and reporting 68

Outcomes framework 68

Work ahead to further refine the bushfire risk management outcomes framework 68

Review of the Strategy 68

Implementation plan 68

Monitoring, evaluation and reporting 69

Appendix 1 – Strategy overview 70

Appendix 2 – List of acronyms 72

References 74

Image credits 78

Minister's Foreword

Victoria's Bushfire Management Strategy

Since the 2019-20 bushfires that devastated so much of Australia's east coast, Victoria has made an unprecedented investment to improve how we manage bushfire. We've delivered more than $500 million in funding to support continuous improvement, capacity building, recruitment, and technology upgrades. This funding has been on top of the work our crews carry out year-round to manage bushfire risk, including through planned burning and other risk-reduction activities.

Recent bushfires have once again highlighted the devastating impacts that bushfires can have on our communities, economy and natural environment. Unfortunately, climate change means these disasters are becoming more severe and frequent. Their complexity also means that now, more than ever, we need a shared approach to managing bushfire.

This strategy proudly sets a 10-year vision for us to continue to deliver more together.

Victoria's Bushfire Management Strategy is a strategy by Victorians and for Victorians. Across 7 domains, it outlines a way forward – a way for us to work together to mitigate, plan and prepare for, respond to and recover from bushfire across all land tenures, whether public or private.

The strategy has been shaped by the expertise and experiences of crews on the ground, scientists, communities, industry, non-government organisations, councils and Traditional Owners. It reflects the ways our state is changing – growing and shifting populations, working together towards Treaty, and the need to adapt to the effects of climate change, including more frequent and severe weather events, hotter and drier conditions overall, and shorter windows to manage our bushfire risk through interventions like planned burning.

And it responds to the ways our world is changing – innovative approaches, new technologies and economic shifts.

The strategy is an opportunity to share the journey. Our implementation plan and monitoring, evaluation and reporting framework will help to show the work we are doing – and help you to shape it. They'll allow us to measure and report on our progress against agreed outcomes, maximise investment and drive continuous improvement.

We cannot do this alone. Everybody has a role to play. I look forward to seeing what we can achieve together.

Steve Dimopoulos MP

Minister for Environment
May 2024

Introduction

A SHARED RESPONSIBILITY

Victorians live in one of the most bushfire-prone regions in the world. Over the past century, major bushfires have had devastating impacts on our people, communities, property, economies, critical infrastructure, essential services, cultural heritage and environment.

Fire is a natural part of the Victorian landscape. Many native plants need fire for species regeneration and habitat diversity. However, climate change is increasing the severity and frequency of bushfires.[1,2] It is a key driver of increasing levels of risk and may lead to permanent changes to Victoria's ecosystems, including loss of biodiversity.

Climate change is driving new bushfire behaviour. In the past 20 years, Victoria has experienced multiple, high-impact bushfire events. In that same time, bushfire and climate science have become increasingly sophisticated. We know more than ever before about the ways our climate is changing, and how those changes are affecting our environment and the ways fire behaves in it.

In this context, it is more important than ever that we work together to manage bushfire. Land and bushfire management must integrate private and public land, including forested areas as well as road and rail corridors, land managed by local government and private landholders. The public land estate is a critical factor in managing bushfire risk because it constitutes large tracts of land with significant bushfire fuel loads, often close to private land and properties.

Victoria's commitment to Treaty and genuine partnership with Traditional Owners is also enriching our understanding of fire and its potential to heal Country. Our partnership with Traditional Owners is fundamental to our success in bushfire management.

We have the opportunity – and the responsibility – to use this understanding to improve the way we think about, plan for, and respond to fire in our environment, our communities and our lives.

Our emergency management arrangements are underpinned by the principle of shared responsibility, which recognises that no single group can be responsible for all phases of emergency management. Shared responsibility is different from inclusion or engagement – it relates to collective obligations and accountabilities. This means everyone has a part to play in helping build Victoria's bushfire resilience.

We can reduce the catastrophic impacts of bushfires on the things we value most, but we must act now. The work we undertake together over the next 10 years will help Victoria's people, land, environment and resources be as safe and resilient as possible for when bushfires do occur.

Victoria must continue to be a world leader in bushfire management.

You can help make this happen.

What is the bushfire management sector?

The bushfire management sector comprises any department or agency with a role or function in bushfire management. The bushfire management sector is a key part of the emergency management sector as defined in the State Emergency Management Plan. Bushfire management sector agencies include Forest Fire Management Victoria (which includes the Department of Energy, Environment and Climate Action, Melbourne Water, VicForests and Parks Victoria), the Office of Bushfire Risk Management, Country Fire Authority (CFA), Emergency Management Victoria (EMV), Emergency Recovery Victoria, Fire Rescue Victoria, Department of Transport and Planning, Department of Government Services (which includes Local Government Victoria), regulators (including the Office of the Conservation Regulator), water authorities and local government.

Although different agencies in the sector play different roles and have different levels of responsibility, each part of the sector is an important contributor to its effectiveness. References to the collective sector do not mean agencies will be responsible for doing things they are not responsible for under relevant legislation or the State Emergency Management Plan.

A 10-year strategy to set a clear direction

Victoria's Bushfire Management Strategy (the Strategy) is the vision for bushfire management in Victoria that defines where we as a state want to be in 10 years' time and how we will work together to get there.

It brings together the extensive work we are already doing with what we plan to do over the next 10 years to lay the foundations for a safer and more resilient Victoria.

Our shared vision: Victorians work together to manage bushfire risk for safer communities and healthy ecosystems in a changing climate.

To achieve this vision, Victorians must collectively have a clear understanding of the outcomes we are working towards and the actions we will take to get there.

What is bushfire management?

Bushfire management is any activity undertaken to mitigate, plan or prepare for, respond to and recover from bushfires and grass fires. Bushfire management is included in the scope of this Strategy; management of structural fires is not.

This Strategy identifies 7 outcomes that Victoria will work toward over the next 10 years:

- **People and community safety**
  - Outcome: Communities are more resilient to the impacts of bushfires and bushfire management activities
- **Critical infrastructure and economic resilience**
  - Outcome: Business, industry and infrastructure are more resilient to the impacts of bushfires and bushfire management activities
- **Aboriginal self-determination in cultural fire and bushfire management**
  - Outcome: The sector supports and enables self-determination of Traditional Owners and Aboriginal Victorians in land and bushfire management
- **Ecosystem resilience and nature conservation**
  - Outcome: Fire regimes support healthy and resilient ecosystems and nature conservation in a changing climate
- **Informed decision-making, evidence-based approaches and tools**
  - Outcome: Victoria uses the best available science, innovation and knowledge to support evidence-based decisions
- **Working together, accountability and shared responsibility**
  - Outcome: The sector, land managers, communities and industry work together effectively and share responsibility for managing bushfire risk across public and private land
- **Enhanced capability and capacity**
  - Outcome: Victoria is supported and equipped with the skills, equipment, capability and systems to safely and effectively manage bushfire

These bushfire-specific outcomes are nested within the Victorian Government's broader Emergency Management Sector Outcomes Framework. The bushfire management outcomes articulated in the Strategy align with and support whole-of-government emergency management outcomes.

'WE' MEANS ALL VICTORIANS

In this Strategy, 'we' means all Victorians.

We all need to work together to manage the bushfire risks Victoria faces – all levels of government, emergency service organisations, Traditional Owners and Aboriginal Victorians, community members, landowners and occupiers, non-government organisations, industry and business owners, environmentalists, scientists and educators.

Working together we can reduce the impacts of bushfires on the things we value most.

Although reducing bushfire risk is the collective responsibility of all Victorians, some actions require a high level of investment, technical skill and capability, and legislative or regulatory changes. This means certain aspects of bushfire management go beyond the responsibility of individuals, communities and private organisations, and are the responsibility of the Victorian Government or local councils.

Victoria is already a world leader in managing bushfire risk, but in a changing climate we need to pursue continuous improvement if we are going to protect what we value most.

Role of the Australian and Victorian governments

In Australia, state and territory governments have primary responsibility for the protection of life, property and the environment within their jurisdictions. State and territory governments are responsible for disaster response and also lead emergency relief and recovery efforts (though they may delegate some responsibilities to councils).

In recognition of the significant cost of natural disasters, the Australian Government established the Disaster Recovery Funding Arrangements to alleviate the financial burden of disaster response and recovery on states and councils and to facilitate the early provision of assistance to disaster-affected communities.

Safer Together: Victoria's risk-based approach to bushfire management

Safer Together was launched in 2015 and revolutionised Victoria's approach to bushfire management on public and private land. *Safer Together* combines strong community partnerships and in-depth local knowledge with the latest science and technology to more effectively target our actions across public and private land. The Strategy builds on the *Safer Together* approach to support improved outcomes for bushfire risk management.

Looking Back: Victoria's history with major fires

RIGHT FIRE FOR COUNTRY

Fire has shaped Victoria's landscapes both through natural ignition (lightning strikes) and Indigenous burning practices. Regular fire intervals are essential to maintain the balance of those ecosystems that rely on fire to regenerate.

Prior to European colonisation, First Nations peoples across Australia used fire as a tool for managing Country. This cultural use of fire is a socially and ecologically complex practice, governed by kinship, eldership, spiritual connections to Country and environmental interactions with fire.

MODERN BUSHFIRES HAVE SEVERE IMPACTS

In more recent times, Victoria's relationship with fire has become increasingly complex.

The state is characterised by geographic and demographic profiles that exacerbate its vulnerability to bushfire. It is relatively small and densely populated, with a sizable population (more than 17%)[3] living in communities with high to extreme bushfire risk.

Victoria has also suffered severe consequences from bushfires, impacting on social, economic, built and natural assets and values.

Relative to other Australian states and territories, Victoria has recorded the largest number of bushfire fatalities since 1900 – more than 60% of all bushfire deaths in Australia have occurred in Victoria.[4] The Black Friday fires in 1939 caused 71 deaths; the Ash Wednesday fires in 1983 resulted in 47 deaths in Victoria; and the Black Saturday fires in 2009 caused 173 Victorian deaths (see **Figure 1**).

Smoke from bushfire causes substantial health and economic impacts. Smoke from the Black Summer bushfires is estimated to have been responsible for 417 additional deaths.[5] Healthcare costs arising from smoke-related deaths and hospitalisations are predicted to reach $110 million by 2030.[6] Smoke from planned burns also needs to be carefully managed to avoid problems such as health challenges and damage to agricultural crops such as grapes.

Bushfires can lead to loss of and damage to significant cultural heritage. This impact can be particularly acute for Aboriginal Victorians given their deep spiritual connection to and cultural obligation to care for Country.

Bushfires also cause significant damage to the built environment, with the 2019-20 fires damaging or destroying 458 homes and 478 agricultural buildings.[7] A June 2021 analysis by the Department of Treasury and Finance estimated the economy-wide impacts of the 2019-20 bushfires was $2.1 billion.[8]

Natural assets and values, such as ecosystems, threatened species and water yield are also impacted by bushfires, adversely affecting resilience of fire-sensitive species and undermining nature conservation efforts.

Mitigation of bushfire risks must consider the effects on social, economic, built and natural assets and values from bushfire and planned burns.

THE EFFECTS OF CLIMATE CHANGE ARE ALREADY EVIDENT

The past 3 decades have seen dramatic changes in our environment and the way bushfire behaves in it. Not only has the total number of bushfires increased significantly, but also their intensity and the area they burn.

The major contrast between the pre- and post-2000 eras demonstrates the impacts of climate change on fire intensity, size and frequency. There have been 5 major fire seasons in the 20 years since 2000 but only a few in the century before 2000.

In 3 of the major fire seasons following the year 2000 (see **Figure 1**), the total burnt area was more than 1 million hectares. The 2019–20 Black Summer bushfires alone saw more than 1.5 million hectares of Victoria burnt. Those fires resulted in tragic loss of life, the destruction of homes, property and infrastructure, and had devastating impacts on wildlife, livelihoods and the environment. There was also a significant impact on Victorian biodiversity, including threatened species and habitats. The bushfires burnt 78% of remaining warm temperate rainforests and at least 50% of the habitat of 215 rare or endangered plant and animal species.[9]

The cost of fires in 2002–03, 2006–07 and 2009 was estimated at $2.7 billion, $2.1 billion[10] and $4 billion[11] respectively. The economic loss of the 2019-20 bushfires was estimated to be $2.1 billion in Victoria[12] alone, with a cost to the Australian food system of at least $4-5 billion.[13]

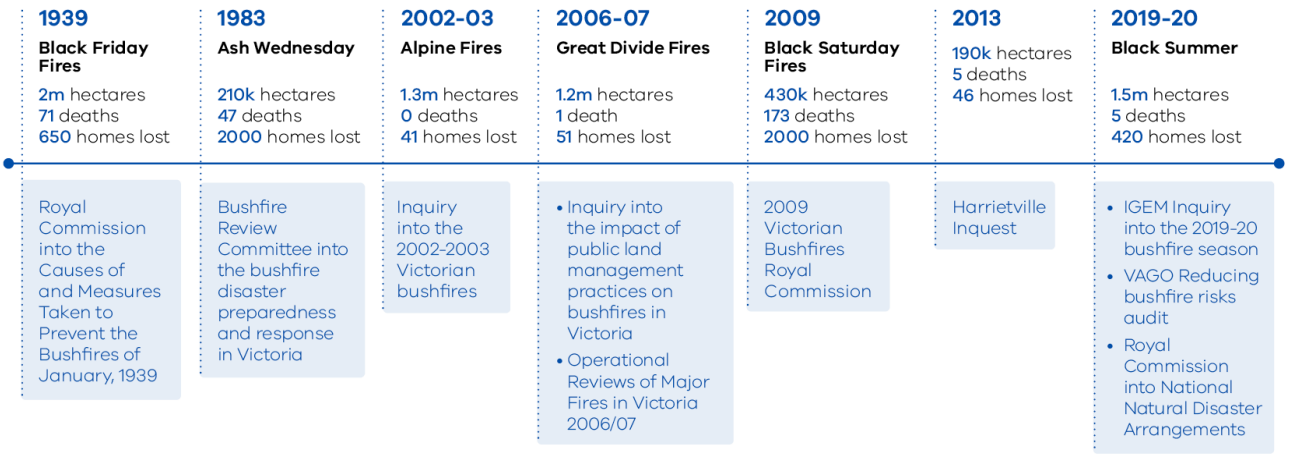


Figure 1: Impacts of major fires in Victoria

Looking Forward

The effects of climate change are already evident in the bushfire trends of recent decades. Key bushfire-related risks will only increase as our climate continues to change. Ultimately, this could lead to permanent changes to Victoria's ecosystems, including loss of biodiversity and regeneration failure across some native plant species.

To meet the growing challenge, Victoria must commit to finding more effective management approaches, technologies and behaviours, and improve the way we think about, plan for and respond to fire in our environment, our communities and our lives.

The Strategy reflects the step change necessary to manage bushfire risk in a world of more frequent and intense bushfires, potentially compounded by other extreme weather events or concurrent emergencies.

The Strategy also responds to population growth and dramatic shifts in demographics, including greater numbers than ever before moving to, working and living in regional and rural areas.

The Strategy complements and supports the delivery of the *Strategic Roadmap for Emergency Management in Victoria 2022-28*, which sets the strategic directions and priorities for the emergency management sector – including bushfire.

One further, fundamental driver of change is the Victorian Government's commitment to enabling Aboriginal self-determination and its formal agreements with Traditional Owners to work in partnership on the path to Treaty.

CLIMATE CHANGE IS DRIVING INCREASING RISK OF BUSHFIRE

Climate change is increasing the frequency, severity and duration of dangerous bushfire weather conditions in Victoria. The fire season starts earlier in spring, is more intense and destructive, and continues longer into autumn.[14] Larger areas may be burnt in a single fire season and fires will occur in places that have not burnt historically. This could negatively impact the natural environment and result in damaging consequences for Victorian communities. Regional centres such as Bendigo, Ballarat and Shepparton could experience more than double the number of high fire danger days by 2050 compared to the period 1968 to 2005.[15]

A 2021 CSIRO study found that the area of Australian forest burnt by fire had an annual average increase of 350% between 1988-2001 and 2002-2018. When including the 2019-20 fires, this number increases to 800%. This increase has been linked to the effects of climate change.[16]

Across Victoria, fire seasons increasingly start earlier and there were an increased number of days with high fire danger rating between 2002 and 2017, compared to 1972 and 2001).[17] This pattern is expected to continue as the impacts of climate change increase.

CLIMATE CHANGE IMPACTS MAKE BUSHFIRE MANAGEMENT MORE CHALLENGING

Climate change challenges our ability to manage fire because it is likely to:

- lead to longer fire seasons, which puts pressure on firefighting resources (such as personnel and aircraft), increases firefighter fatigue, reduces the lifespan of firefighting assets, and reduces capacity to share resources nationally and internationally
- reduce the window of time available for safe and effective planned burning, requiring a shift in when these bushfire management activities take place, and reducing flexibility to schedule burns around community or stakeholder needs
- result in changes to vegetation types, which will affect the fuel load and fire risk in different areas, and present further challenges for planned burning
- increase the occurrence of thunderstorms, which may lead to an increase in the number of bushfires started by lightning strikes[18]
- increase the risk of pyroconvection (where heat and moisture generated by bushfires creates clouds and thunderstorms)[19]
- increase bushfire risks, changing the places people can safely live and visit, and requiring different approaches to urban development

- increase the amount of carbon released from bushfires into the atmosphere and reduce ecosystems' ability to absorb carbon from the atmosphere, likely exacerbating the impacts of climate change
- increase cumulative recovery costs over time for individuals, the community and government
- exacerbate emergency events that occur or need to be managed simultaneously, placing strain on all those involved in coping with and responding to emergencies
- Exacerbate cumulative effects of consecutive events, such as drought, bushfires and floods, prolonging recovery efforts and reducing ability to prepare for future emergency events.

The timing and extent of these and other climate change impacts on bushfire in Victoria is likely to vary across the state. In some cases, regional projections of the impacts of climate change are more severe than global, national or even state-level projections.[20]

Figure 2 below shows that between 1981 and 2020, the time between bushfires occurring in the same place has decreased, with parts of Hume region in north-east Victoria experiencing the most significant decrease.

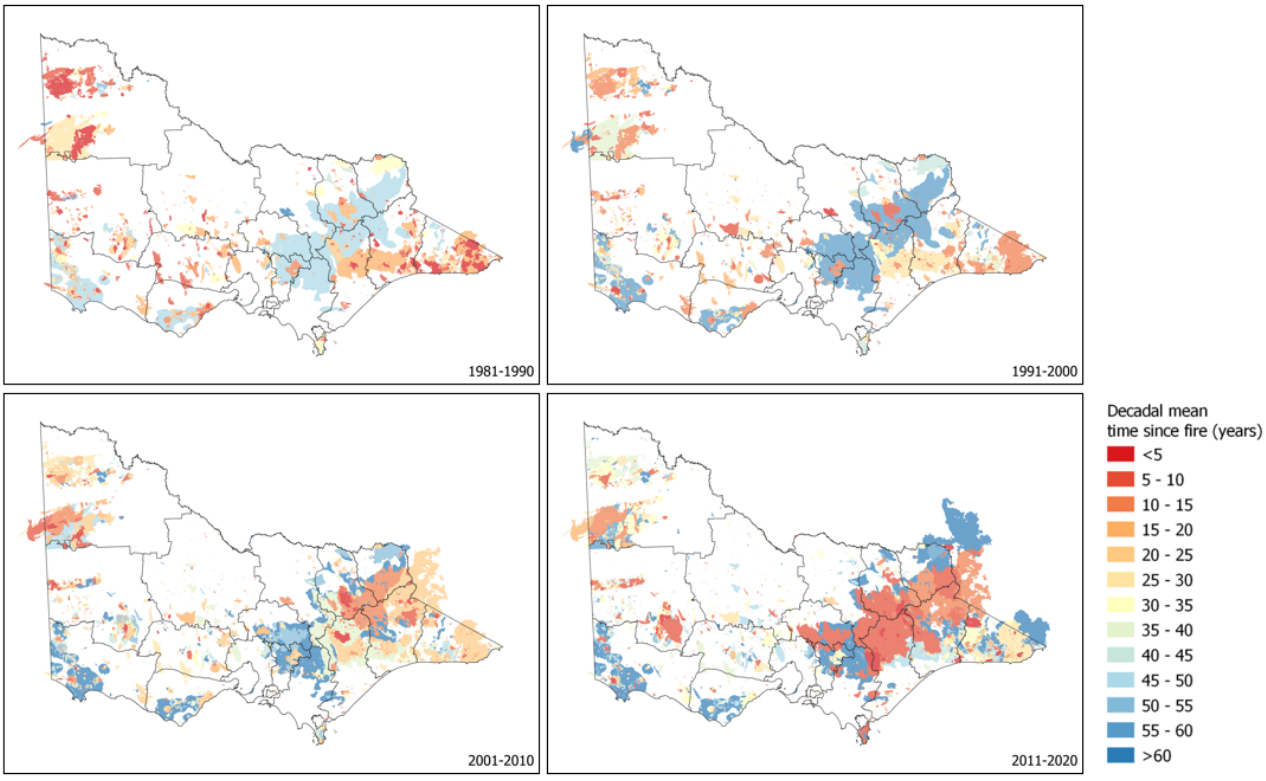


Figure 2: Years since the last forest fire (decadal mean). Data derived from the DEECA compiled fire history spatial layer.

POPULATION GROWTH AND CHANGING COMMUNITIES REQUIRE ADJUSTMENTS TO BUSHFIRE MANAGEMENT APPROACHES

Victoria's population is growing, with the most significant growth occurring in peri-urban and regional centres. Since 2006, key growth areas include Melbourne's north-western suburbs and adjacent peri-urban areas, as well as regional centres such as Geelong, Ballarat and Bendigo.

By 2056, the Victorian population is projected to grow to 11.2 million, with the strongest growth continuing to occur in outer-urban local government areas.[21] Regional growth is expected to account for 27% of Victoria's population growth to 2056. The regionalisation trend was accelerated by the COVID-19 pandemic, which prompted marked demographic shifts as more Victorians moved to and worked from regional areas.

These shifting demographics have implications for Victoria's bushfire management. With larger regional populations, bushfire risk to life, property, infrastructure and essential services increases.

As Victoria's communities continue to change, our bushfire management practices need to change with them.

Bushfires do not respect administrative boundaries, so we must ensure our land and fire management is integrated and smoothly coordinated across all public and private land. This is particularly important for communities in border regions, which need to navigate systems and processes from both sides of the state boundary.

New communities may differ substantially from the historical profile of a regional community, including different demographics, lifestyles, values and behaviours. These communities need new connections and ways of interacting with bushfire agencies. They need tailored information about bushfire risks and new ways to participate in managing those risks and preparing for fires.

In our communities, various groups may have unique dimensions of risk and resilience when it comes to the impacts of bushfires, and it is essential to provide targeted support that acknowledges both challenges and strengths.

- **Community members likely to experience vulnerability** such as the very young, elderly, regional and rural Aboriginal communities, and people with disabilities may have specific health needs and depend on external support services for transport and care. However, they often have protective factors, including strong social networks, financial stability and engagement in local organisations, which can enhance their ability to adapt and respond effectively during emergencies
- **Low-income households** facing bushfire damage may experience financial hardship and may be underinsured or uninsured. Despite these challenges, they too possess strengths such as resilience, resourcefulness and the ability to access community support networks, which can aid in their recovery
- **Newcomers to an area**, while unfamiliar with local hazards and emergency procedures, can quickly become valuable assets to their communities by bringing fresh perspectives, skills, and a willingness to collaborate, even in times of crisis
- **People who have experienced a previous fire event** may require support to manage trauma, but their resilience and experience can also make them valuable mentors and sources of guidance for others facing similar challenges
- **People with culturally or linguistically diverse backgrounds** may face communication barriers, but their unique perspectives and experiences can enrich community preparedness efforts by fostering inclusivity and cross-cultural understanding
- **Seasonal and mobile populations** though not always able to undertake full fire preparation on their property, can contribute by raising awareness of local hazards and promoting emergency procedures within their transient communities.

By recognising and building upon the strengths and resources present within these groups, we can create more resilient and interconnected communities that are better prepared to face bushfires and other emergencies.

ABORIGINAL SELF-DETERMINATION WILL CHANGE THE WAY WE MANAGE FIRE IN VICTORIA

Cultural fire management is an integral part of Traditional Owners' cultural connections and obligations to Country. For more than 60,000 years, First Nations peoples managed Country with cultural land management practices including high-frequency, low-intensity burns. These land management practices helped shape the Victorian landscape. One of the many injustices of colonisation was preventing Traditional Owners from fulfilling their cultural obligation to care for Country, including through cultural fire management.

The Strategy aims to support the self-determination of Traditional Owners and Aboriginal Victorians in land and bushfire management in recognition of their rights and cultural obligations to care for Country across all types of land. This intent is guided by the objectives of the Victorian Traditional Owner Cultural Fire Strategy.[22] Bushfire and land management agencies will seek to strengthen partnerships with Traditional Owners and Aboriginal Victorians to enable Traditional Owner-led cultural fire management and to elevate the role of Traditional Owners in decision-making in broader bushfire management.

Victoria's Treaty process is occurring in parallel to the development of this Strategy. Accordingly, the Strategy does not limit or restrict any future recognition of First Peoples' rights. Outcomes from the Treaty process will be reflected as the Strategy is reviewed and updated.

What is cultural fire management?

Cultural fire management describes burning practices developed by First Nations peoples to enhance the health of the land and its people. Cultural fire management can include burning or prevention of burning on Country for the health of particular plants and animals. It may involve patch burning to create different fire intervals across the landscape and can result in fuel and hazard reduction. Fire may be used to gain better access to Country, to clean up important pathways, maintain cultural responsibilities and as part of cultural heritage management. It is a ceremony to welcome people to Country or it could also be as simple as a campfire around which people gather to share, learn and celebrate.

1. People and community safety

Community understanding and involvement is a fundamental aspect of bushfire resilience.

The most effective way to protect Victorian communities from bushfire is to support communities to build their resilience. Communities that understand and are prepared for the risk of bushfire are more resilient.[23] Community-centred approaches, in which communities are involved and consulted on local risk-management approaches are proven to reduce the impact of fire damage on communities.

These approaches are informed by behavioural and social sciences, fuel management strategies and methods and programs designed to positively influence behaviour change and build social capital, within communities and across the sector.

These approaches place community knowledge, expertise and experiences alongside the sector's. They require communities, agencies and stakeholders to foster relationships based on trust and to develop shared learning environments that build a common understanding of evolving fire risk alongside local community values and needs. This in turn develops our capacity to share responsibility for making decisions about local risks and continuously adapt the way we work together to establish new norms over time.

Outcome: Communities are more resilient to the impacts of bushfires and bushfire management activities.

To achieve this outcome, Victoria must:

1.1. Empower people and communities to manage local bushfire risk, response and recovery

The bushfire management sector builds on community partnerships to better understand community needs and improve community knowledge about – and capacity to manage – bushfire risk in the places they live, visit and work. The sector will concentrate on developing structures, tools and processes to promote collaboration in the management of bushfires including between the sector, landowners and land managers, and communities. Collaborative mechanisms are designed to help enhance people's ability to identify, navigate and address bushfire risk, including when and how to seek help. Some examples of this include the use of risk assessment tools to inform community engagement across public and private land based on bushfire risk, and the Australian Fire Danger Rating System (AFDRS) (see box right).

Exploring ways to further embed community involvement in bushfire management through collaborative and innovative approaches that draw upon the best, up-to-date evidence and the community's expertise and understanding of local risks is a priority for the sector.

What are Bushfire Risk Engagement Areas?

Bushfire Risk Engagement Areas (BREAs) are used by the sector to prioritise areas to work with communities on fuel management options. They refer to parts of the landscape, on either public or private land, where managing bushfire fuels could be most effective in reducing bushfire risk. BREAs are used to guide agencies and communities as they work together to determine the best actions in their local area.

What are fire danger ratings and the Australian Fire Danger Rating System?

Fire danger ratings describe the potential level of danger should a bushfire start. They are important because they provide people with the information they need to empower them to take action to protect themselves and others from bushfires.

The Australian Fire Danger Rating System is an example of national collaboration with emergency services agencies and the Australian Government, which improves the way fire danger is forecast in Australia. The system is the same in all Australian states and territories. It aims to improve public safety and reduce the impacts of bushfires, better supporting Australians to meet the challenges posed by future bushfires.

The sector will use evidence-based engagement methods and behaviour-change practices to create a shared understanding of risk and remove barriers for people to manage and act on their own risk.

It is important we also continue to deepen knowledge of what influences human behaviour, social dynamics and decision-making. The sector will use that knowledge to engage more effectively with communities affected by bushfire. Practice-based learning and strategies to strengthen agency collaboration, leadership and community-centred engagement are already being developed and will be embedded into all bushfire management activities. This will help to ensure that the sector can respond to the changing expectations and needs of communities in the context of wider social, environmental and economic impacts such as climate change.

Communities will increasingly be encouraged and empowered to participate in decision-making about bushfire management in their area. Facilitated conversations about living with bushfire will be integrated into bushfire risk reduction activities, including in schools. Fire agencies will lead work to develop goals and actions to strengthen resilience to bushfire in partnership with other stakeholders at the local level, to reflect that each landscape and community is different. This will be underpinned by the continuing delivery of community capability and capacity-building programs, recognising the importance of community-led approaches and local leadership, from risk reduction through to recovery.

We will also continue to work together with the community to

- improve early warning information and advice in multiple languages, where relevant, so that it is accurate, up-to-date and communicated in a timely manner to those at risk of bushfire emergencies (including visitors)
- prepare for the risk of isolation and loss of essential services
- develop and maintain clear plans for evacuation and relocation processes, with particular consideration for factors that may impact high-risk groups. For areas where bushfire risk remains high, this includes planning and investment in shelter-in-place and places of last resort.

In addition, individuals and communities will be encouraged to include comprehensive pet disaster preparedness in their emergency plans. By helping pet-owners care for their pets during emergencies, we aim to alleviate the burden on emergency and veterinary services, contributing to a more coordinated and efficient disaster response effort.

CASE STUDY

Upper Beaconsfield, Guys Hill and Dewhurst StoryMap project – a community values-based bushfire risk mitigation project

In 2020-21, the Upper Beaconsfield Association, Southern Ranges Environment Alliance, Cardinia Shire, Monash and Melbourne universities, the Country Fire Authority (CFA) and Forest Fire Management Victoria (FFMVic) delivered a local StoryMap project that was funded by Safer Together.

The project was initiated through a community survey to understand what residents valued most about living in the area, and what they themselves wanted to protect from the risk of bushfire. The survey results fed into the development of an interactive online tool that builds community understanding of bushfire management, clarifies who is responsible for what, and empowers residents to make their own evidence-based choices and manage their own land.

The project and its interactive online StoryMap platform[24] are helping community members understand more about their local area, its history, bushfire risk and biodiversity values. The project supports community members to make decisions about actions that can be taken to protect what they value most from the risk of bushfire, and to see the effects of various actions on biodiversity and bushfire risk. The project demonstrates shared responsibility between the community, local government, and land and fire agencies to understand and reduce bushfire risk on public and private land.

1.2. Build the resilience of at-risk cohorts through education and collaboration

The impacts of natural disasters, including bushfire, are magnified for some communities and groups, including multicultural Victorians, newly arrived migrants, women, survivors of family violence, people with disability, people with health conditions, people with lived experience of previous bushfire or other emergency events, younger Victorians and older Victorians.

The sector and community service organisations will work together so that communities can actively include at-risk groups and those communities that are situated in high bushfire risk areas and at urban–rural interfaces in bushfire management activities.

Enhancing community awareness and education on climate change and its effects will build community resilience and support communities to manage their own bushfire risk. Sharing information on the potential health impacts of bushfire will help communities plan for and respond to the impacts of both bushfires and planned burning based on their individual circumstances.

This includes building resilience in isolated communities that are most at risk of bushfire impacts. Isolated towns may include communities that have single road access and populations that have limited access to services and relief. The sector's ability to rapidly identify and suppress fires depends on clear access to these areas. Building resilience in isolated towns may include planning for how communities cope if they get cut off and how the sector may provide relief in those instances.

Lack of insurance or under-insurance poses a significant risk to affected individuals and businesses. Low-income earners are particularly vulnerable. A collaborative response to bushfire management will support at-risk communities to have the opportunity to act as needed to mitigate, plan, prepare for, respond to and recover from bushfire emergencies.

CASE STUDY

Community-based bushfire management

Community-based bushfire management (CBBM) is a facilitated program that uses a place-based community approach to reducing the risk of bushfire in Victoria. CBBM ensures that decisions and actions are based on community values and priorities. CBBM brings bushfire stakeholders together in respectful, honest conversations to advance risk reduction. CBBM began in 2016 and continues as part of the Safer Together Community First program.

To date, 21 communities have participated in CBBM. These communities are connecting with agencies to create centralised hubs, share learnings and successes (including stories of resilience), and discuss issues relevant to the community such as strategic fuel breaks or the locations of 'safer places' (locations within townships that are considered 'safer' to shelter during bushfires).

For example, residents of Briagolong – a small town about 240 kilometres east of Melbourne – have been coming together regularly with bushfire agency representatives since 2018 to discuss bushfire risk in the area and design a community-based approach to fuel management. They have established a working group that allows members to share their experiences and learn about bushfire behaviour, risk assessment and existing fuel management plans. Together, they are modelling bushfire threat and mapping community assets across built, social, natural and economic environments.

The Briagolong initiative has successfully built community resilience, connected community members, agency personnel and councils, and demonstrated how community values can be incorporated into localised bushfire management.

CBBM encourages communities to take the lead in bushfire risk reduction in their local area. All bushfire stakeholders are invited to discuss local values, experiences and strengths and to find ways to reduce risk at a community level.

1.3. Use a range of mitigation strategies to reduce fire starts and impacts

The sector will use a broad range of interventions and activities to manage bushfire risk. These include land-use planning and building controls, engagement, and community capacity building, ignition prevention, compliance and enforcement of illegal campfires, including unattended campfire programs.

Improving the data and models that underpin Victoria's risk-based decision-making processes will improve understanding of the effects of climate change on bushfire risk (see **Chapter 5**). This will support decision-making in land-use settlement planning, including progressively updating planning, building and infrastructure standards to respond to the current and projected impacts of climate change based on the most current advice from relevant natural resource and emergency management authorities.

This information will build the capability and capacity of councils to implement the State Bushfire Planning Policy. Clause 13.02 (BUSHFIRE) of the State Bushfire Planning Policy prioritises the protection of human life over all other policy considerations. It also discourages settlement growth and development in bushfire affected areas that are important areas of biodiversity.

Adaptation, including re-settlement planning, will continue to be critical for communities living in increasingly high-risk bushfire areas. Improving our ability to assess the potential impacts of climate change future scenarios on bushfire risk across the state will help us to design protection and risk-reduction measures, including long-term transition planning for settlements facing risks that cannot be mitigated. Using climate change scenarios can also support discussion about long-term risks to settlements and new buildings.

The sector will work with the community to reduce the risk of human-caused bushfires started by illegal or inappropriate use of fire, or inadvertent ignition from activities such as harvesting. This involves agencies, the community, councils, industry and other stakeholders developing and implementing targeted interventions and risk-reduction strategies. Interventions will be informed by evidence-based social and behavioural science, including:

- better understanding the drivers of non-compliance, such as a lack of awareness of the rules and risks, structural impediments to following the rules, a desire for adventure and experience, and a perceived lack of enforcement
- targeting patrols, education and regulatory efforts where there is the highest risk of harm based on visitation, proximity to settlements, environmental conditions and environmental values
- improving coordination and consistency between regulatory agencies.

Human-caused bushfires include escaped campfires or burn-offs and deliberate ignition. Targeted engagement and education programs, regulatory mechanisms and access restrictions can all reduce the likelihood of bushfires from these causes.

CASE STUDY

Preventing human-caused bushfire ignition

In Gippsland, a pilot program identified priority prevention areas where the highest-consequence fires are most likely to occur due to human activities. These areas were identified using historical patterns of ignitions from escaped burns on private land, deliberate ignition and campfire escapes.

Identifying prevention priority areas is improving the effectiveness awareness campaigns, regulation and enforcement activities that minimise the number of human-caused bushfire ignitions.

The pilot program is implementing actions to reduce human-caused bushfire ignitions through:

- engaging, educating and conducting awareness-raising campaigns on campfire safety, burn-offs and the fire danger period
- targeting regular patrols to ensure compliance
- removing or modifying fuels for prevention purposes
- implementing park closures under certain weather conditions.

1.4. Deliver fuel management that addresses the challenges associated with a changing climate

Planned burns and other fuel management will be delivered with a focus on reducing the impact of bushfires on human life, communities, essential and community infrastructure, industries, the economy and the environment. This will be done in partnership with communities, industry, Traditional Owners and non-government organisations. Fuel management programs will take into account any potential impacts on human health and safety, land and property, ecosystem resilience and industry in a way that is adaptable in a changing climate and consistent with *Victoria's Air Quality Strategy*.

Fuel management refers to the intentional modification of the presence, structure or volume of vegetation, including trees, dead wood, leaf litter, bark and shrubs. Fuel management activities include planned burning, mechanical treatments such as slashing, mulching and mowing, and the construction and maintenance of strategic fuel breaks.

Fuel management is central to Victoria's approach to managing bushfire risk. We do not have control over the weather, but we can influence how much fuel there is for a fire to burn.

The Planned Burning and Bushfire Preparedness program will continue to focus on reducing risk to communities, infrastructure and environmentally important locations. It will more broadly address the increasing risk of large-scale bushfires in Victoria by strategically reducing fuels to mitigate the spread, intensity and severity of fires and support firefighters to effectively bring bushfires under control.

The sector will also consider new approaches, based on the latest information available and practices world-wide, to best achieve Victoria's fuel management goals. Delivery of the fuel management program will be conducted with careful and locally-specific consideration of the costs and benefits of different fuel management options, including biodiversity, community assets, cultural sites and smoke impacts.

Treatment types used for fuel management and vegetation control will continue to be carried out on public and private land. These activities will align with and continue to build on established obligations, policies, operating procedures and processes. There will be a focus on improving the cost-effectiveness and efficiency of fuel management activities.

The sector's fuel management program will be informed by an integrated risk-based approach and supported by tools, monitoring, evaluation, reporting and continuous improvement. Technological advances will also enhance effectiveness, for example through the use of drones for ignition and remote sensing for fuel hazard monitoring.

Fuel management options will encompass a suite of approaches that will enable risk management work to continue while issues such as unsuitable weather conditions, impacts of smoke and operational limitations are appropriately managed, and community appropriately consulted and advised. Climate change is a driving influence here, as it is changing when burning can be done safely and effectively. For example, some mechanical treatments can be delivered year-round, under conditions and in places where planned burning may not be appropriate.

Fuel management is not just something done on public land and by government organisations. Individuals, families, companies and community organisations are all responsible for managing vegetation growth and fuel on their land. Reducing the vegetation adjacent to your house, sheds and outbuildings can make a real difference during a bushfire.

Fuel management does not replace the need for communities to take actions to manage risks associated with their own personal circumstances. Although fuel management is one important way to mitigate risk, it is not intended nor able to guarantee protections for all people and assets. It is important for communities to take ownership and be responsible for mitigating their own bushfire risk with appropriate guidance and support from bushfire sector agencies.

What is fuel management?

Fuel management is the intentional modification of the presence, structure or volume of vegetation. Fuel management activities reduce the likelihood of fire starting, severity of fire, fire spread and impacts on communities, infrastructure and the environment. Some activities include planned burning (lighting and managing planned fires at times of lower bushfire risk to reduce leaf litter, twigs, bark and undergrowth), mechanical treatments (mowing, slashing and mulching) and chemical treatments (herbicides). Construction and maintenance of strategic fuel breaks is also a fuel management activity, with additional benefits when firefighters respond to bushfires.

Considering bushfire risk in land-use planning

In 2017, the Victorian Planning Policy Framework 'Clause 13.02-1S Bushfire planning' was updated to emphasise that the protection of human life is to be prioritised in all planning decisions, including strategic planning matters and permit applications.

CASE STUDY

Behavioural Insights project

A collaborative project between Safer Together and Monash University's behavioural insights research unit Behaviour Works Australia (BWA) is using behavioural science to encourage Victorians to undertake bushfire risk reduction activities.

The Behavioural Insights project identified factors that influence the success of community risk awareness programs, at both community and individual levels. These factors are influential in helping communities adopt behaviours that reduce bushfire risks, both before and during emergency events.

A 'behaviour' is an 'observable action.' The project analysed many of the behaviours that help reduce impacts of bushfire on communities. Almost 90 bushfire experts were surveyed to estimate the likely risk reduction that would result from particular behaviours, ranging from mowing lawns and cleaning gutters to leaving homes early on high fire risk days.

The same list of behaviours was used in a survey of almost 3000 Victorian households to understand which of these behaviours households had already adopted and how likely households were to take action.

Analysis of the survey results through a likelihood/risk matrix (which plots the uptake and impact of a single behaviour in terms of effort to adopt a behaviour against the likely impact to reduce bushfire impacts) helped identify a suitable example behaviour for use in a behaviour-change trial. The behaviour selected for use in the trial was 'attending a bushfire safety planning workshop.'

The results of the trial – and collaboration with the researchers – provided valuable insights for future work to support communities to better prepare for bushfires. Notable insights were as follows:

- an apparently simple 'behaviour' requires consideration of a range of other factors. For example, leaving early involves access to and understanding of risk information, cost implications and complexities relating to individual circumstances such as livestock, pets or transportation options
- personalisation of information is important to encourage participants to respond to and make sense of an invitation and advice
- the greater the perceived effort required to adopt the behaviour the less likely community members are to adopt it. It is important to make participation as easy as possible, including through effective communications
- seasonal and weather conditions influence the likelihood people will adopt proactive behaviours, – personalised communications leading up to and during the annual fire season might have particular value
- the likelihood of particular behaviours being adopted is also affected by situational factors. For example, people may be reluctant or less able to attend in-person workshops.

1.5. Limit the impact of bushfires through early control

A key priority for the sector is to limit the impact of bushfires through early control and suppression. The sector will continuously advance Victoria's ability to detect fire at the earliest possible point by adopting new technologies, such as drones and satellites, community reports, aerial reconnaissance after lightning storms and better modelling of potential fire starts. Enhancing and expanding the tools available to incident controllers will also support stronger decision-making around fire suppression strategies.

Improvements to processes, procedures and systems will enable the sector to determine which resources are needed to effectively respond to bushfires on all land tenures. This includes first attack, extended attack and campaign scenarios.

State-wide flexibility, capacity and capability to provide rapid first-attack and sustained firefighting campaign operations will be built by the sector. This includes establishing and maintaining:

- sufficient numbers and coverage of fit, skilled, accredited and experienced firefighters, incident management teams and support staff
- an aircraft fleet that supports on-ground firefighters with detection, suppression and intelligence gathering, as well as providing rapid transport
- fit-for-purpose firefighting equipment, technology and vehicles designed for bushfires
- seamless and integrated incident control and coordination
- modern logistics systems that can be deployed quickly to support ground crews and help manage health, wellbeing and fatigue
- a detection network that supports early identification of fires across all land tenures and readily adapts to include emerging technology such as drones and satellites.

By exploring and implementing opportunities for increased efficiency and effectiveness, the sector will optimise resources and continuously review deployment and utilisation models to provide maximum bushfire protection to communities and improved safety for firefighters.

The sector will ensure relief outcomes are considered during response decision-making and data gathered through initial impact assessments is shared with recovery coordinators to inform relief and recovery planning and activities.

1.6. Support timely and effective community recovery

Stronger partnerships between the sector, communities and the private sector will enable effective preparation for and recovery from bushfires. This includes supporting community recovery by working with communities in the earlier stages of planning and preparation for a disaster.

Listening and responding to local recovery needs will allow the sector to consider the mental health implications that bushfires have on communities. Supporting communities to recover from traumatic experiences can help build long-term community preparedness and resilience.

Effective capacity-building will enable councils and other recovery agencies to work with communities to take greater control in leading recovery decisions and processes, including identifying priorities and developing their own plans where communities choose to do this.[25]

Approaches will be inclusive, reflecting that communities comprise many groups with different values, cultures, experiences and priorities. Decisions and actions will be actively inclusive. The recognition of complexity is a core principle of disaster recovery, with disasters having a range of different impacts and consequences that require a variety of approaches.[26] Each approach should harness local strengths, leadership, networks and structures. The use of local approaches can cultivate cohesion and resilience. This is essential for enduring recovery into the future.[27]

Recovery plans at state, regional and local levels will continue to be aligned, outline clear roles and responsibilities, and be reviewed regularly.

These plans will address recovery needs across the full range of recovery core capabilities. Planning, programs and processes for future recovery efforts will be informed by evidence. The recovery workforce, which makes up part of the bushfire management sector, will continue to build the capabilities and support needed to respond to community needs.

Core capabilities for recovery include – but are not limited to – impact assessment, relief assistance, environmental response, economic recovery, natural and cultural heritage rehabilitation, built recovery, health emergency response and social recovery.

The sector will consider climate change impacts on bushfire risk levels when supporting the rebuild of bushfire-affected communities.

2. Critical infrastructure and economic resilience

Resilient local industry and infrastructure support communities to bounce back quickly from bushfire.

Business and industry are our state's backbone. From small businesses and sole traders such as farmers and butchers, through to larger businesses and sectors such as water and telecommunications, they provide Victoria with the sustenance that supports us to grow. As such, business and industry resilience is critical to Victoria's ability to bounce back from bushfire.

We recognise the unique position businesses and industry occupy – they are an integral part of the community and an economic driving force; they provide services essential to keep our state running.

While primary responsibility for the resilience of business, industry and critical infrastructure rests with their respective owners and operators, government has a role to play to support the protection of essential services.

Emergency events such as bushfire can lead to disrupted access to electricity, water and wastewater services, telecommunications and road networks. For business and industry, this can lead to loss of business, trade revenue and assets such as buildings, machinery and equipment, as well as cause disruption to supply chains and production, and an untold mental and physical toll. Not only are these impacts felt by locally-affected communities, but there can also be downstream impacts on interdependent services and businesses, leading to disruptions for communities across the state.

As seen through the COVID-19 pandemic, the impact of disaster on business and industry is felt far and wide. By fortifying these systems against disruption from bushfire, we not only safeguard our state against economic instability, but also lay the groundwork for a more resilient future.

Although the strategic approach to people and community safety also applies to businesses and industries, these groups have specific requirements and priorities in relation to bushfire management that need to be considered across all phases of bushfire management.

Building the bushfire resilience of business, industry and critical infrastructure is vital to ensure these groups are prepared to face the challenges of bushfires in a changing climate, and in turn supporting a thriving Victoria.

What are the business and industry sectors?

The business and industry sectors include:

- agricultural businesses such as farms, viticulture and apiary
- forestry businesses such as plantations
- small businesses such as butchers, hairdressers, tourism operations and veterinary services
- larger businesses such as supermarkets, fast food restaurants and retail outlets
- critical infrastructure and service providers such as financial, telecommunications, water, health and energy.

Outcome: Business, industry and infrastructure are more resilient to the impacts of bushfires and bushfire management activities.

To achieve this outcome, Victoria must:

2.1. Understand, plan for and minimise economic impacts across all aspects of bushfire management

Business and industry issues and priorities must be considered and planned for in all phases of bushfire management.

The seasonality of some industries, such as tourism and cropping, means they are more susceptible to business disruptions at key times of the year. Disruptions at these key times may result in multi-year or ongoing economic implications and challenges.

By actively considering these concerns and priorities, bushfire management agencies and industry will be able to work together to mitigate bushfire risk in a way that minimises disruption and supports economic resilience.

Recent experiences have shown that the impacts of bushfires can create significant downstream consequences for local and regional economies. The Victorian Government's Department of Treasury and Finance estimated the overall welfare losses to Victoria from the 2019-20 Black Summer bushfires were $2.1 billion in net present value terms (in real 2017-18 dollars).

Accommodation and food services, transportation and construction sectors incurred substantial losses due to their reliance on supply chain linkages with international tourism which was limited due to the fires.

The Victorian Government will continue to support critical industries, which will help build community and business resilience to bushfire impacts.

CASE STUDY

Resources to support primary production and other businesses sectors

Both Agriculture Victoria and Business Victoria have online guidance to support farmers and businesses to plan and prepare for bushfires.

Agriculture Victoria guidance includes Preparing Your Farm for Bushfire – a website page dedicated to helping farmers protect their farm and assets. The page includes guidance on preparation before the bushfire season, survival plans, evacuation, planning for livestock and pets, emergency stock containment and insurance cover. It also provides an opportunity to subscribe to a newsletter for regular updates to keep up to date with the latest farm fire preparedness news, events, resources and support services.

Similarly, Business Victoria has a hub dedicated to businesses. This includes regular articles and advice on topics including bushfire planning, preparedness, risk and resilience.

Following a fire (or any other emergency), the Department of Jobs, Skills, Industry and Regions (DJSIR) on behalf of Emergency Recovery Victoria (ERV) leads the business and economic recovery for the state, and works in partnership with all levels of government, businesses and not-for-profit organisations to achieve the best possible outcome.

As an example, following the 2019-20 bushfires, funding was made available to support businesses, industry and regional economies to get back on their feet, along with the following initiatives:

- immediate regional payroll tax relief in 'state of disaster' areas, so that regional employers only paid 25% of the metropolitan rate
- a 50% concession on stamp duty for eligible properties, allowing businesses to relocate, expand or move into fire-affected areas
- waiving water rates for 12 months for all homes or businesses destroyed or significantly damaged by fire, and providing rebates for customers affected by interruptions to their water supply
- $500,000 for grants to regional industry groups and chambers of commerce to facilitate networking events, tourism opportunities and pro-bono business partnerships
- small business advisers stationed at relief centres to give businesses the support and advice they needed
- support for the wine industry to access technical advice so it was best placed for viniculture.

CASE STUDY

Powerline Bushfire Safety Program

Fire starts from powerlines have caused some of Victoria's most catastrophic and devastating bushfires. The $750 million Powerline Bushfire Safety Program is the biggest powerline safety project undertaken anywhere in Australia, implementing a range of solutions to significantly reduce the risk of bushfires.

The landmark safety program was introduced in response to the Black Saturday bushfires and has been implementing mitigation measures across Victoria ever since, increasing resilience in the community.

As of October 2023, it had achieved a 48.1% relative risk reduction in powerline bushfire risk, protecting over 31,000 kilometres of Victoria's high-voltage powerlines. Spanning 12 years, the impact of the Powerline Bushfire Safety Program includes:

1. State-wide reduction in powerline bushfire risk (progressing to up to 60% in the coming decades)
2. Implementing of rapid earth fault current limiters, which switch off a high-voltage electricity line within seconds of a fault being detected. During the 2019–2020 'Black Summer,' rapid earth fault current limiters detected and managed 33 faults that had a high chance of starting bushfires
3. Protecting 99% of Victoria's highest-risk bushfire environments with 746 kilometres of undergrounding or insulating bare-wire powerlines
4. Protecting Victoria's entire 30,000-kilometre single wire earth-return network using automatic circuit reclosers to stop fires
5. Investing more than $10 million in world-leading research and development programs to support the next generation of powerline bushfire safety technology
6. Fulfilling recommendations 27 (amending regulations under the *Electricity Safety Act 1998*) and 32 (requirements for distributing businesses concerning powerline reclose functions) of the Victorian Bushfires Royal Commission
7. Putting eligible private overhead powerlines in high-risk regions across Victoria underground through the Private Overhead Electric Lines scheme
8. Enhancing government regulations to ensure there is a legacy of continuous improvement to legislation that reduces future state-wide risk of powerline ignited bushfires
9. Installing 343 back-up generators to residential care facilities in high-risk bushfire areas, protecting 16,000 vulnerable Victorians from power outages.

The Powerline Bushfire Safety Program has also paved a pathway for innovation through its research and development grant funding, which has led to world-first trials, including the introduction of rapid earth fault current limiters. This cutting-edge technology has been deployed at all 45 mandated zone substations across the state to keep communities safe post-summer 2022. The third and final tranche of the rollout involves protecting more than 30,000 kilometres of high voltage powerlines across rural and regional Victoria. The completion of the rollout will result in a 48.1% relative risk reduction in powerline bushfire risk, which demonstrates good progress towards the 60% statewide reduction outlined above.

The Powerline Bushfire Safety Program has delivered tangible outcomes for regional Victorian communities by significantly reducing the bushfire threat posed by powerline ignitions, championing Victorian-manufactured technology and creating a legacy of heightened safety measures to continue long into the future.

2.2. Embed business and industry expertise into bushfire management

Just as communities need to be empowered to more effectively manage bushfire risk, businesses and industries need to be able to engage in bushfire management activities. Bushfires and bushfire management activities can have significant impacts on business continuity and resilience. Continuing collaboration to plan for fire and its impacts is essential. Bushfire agencies will support businesses to take on enhanced roles in bushfire management including initiatives related to:

- health – to minimise the impacts of bushfires and planned burns on human mental and physical health
- transport – to support the transport system's preparedness for bushfires and to mitigate bushfire impacts on the transportation of people, freight, food supply and supply chains including the health and safety of livestock and the safe transport of perishable goods and medical supplies[28]
- primary production – to mitigate the impact of bushfires and smoke from planned burns on primary production systems, including ensuring access to key markets and people.[29]

One example of the invaluable role industry can play in bushfire management is Victoria's forest industry brigades (FIBs). These FIBs are drawn from the forestry industry and work with CFA to undertake fire prevention and suppression activities. There are currently 20 FIBs consisting of approximately 800 employees whose specialist firefighting skills, equipment and knowledge can be drawn upon by CFA during bushfires.

Increased involvement of businesses and industry in bushfire planning will support information sharing and allow industry knowledge, perspectives and priorities to be integrated into bushfire preparation, response and recovery.

CASE STUDY

Smoke taint in the North East Wine Zone

The North East Wine Zone consists of 5 regions: Alpine Valleys, Beechworth, Glenrowan, King Valley and Rutherglen. These are some of the most diverse and prestigious wine regions in Victoria, producing a range of cool-climate wines. However, the same regions are also vulnerable to the risk of smoke taint, as the zone is surrounded by forests and prone to bushfires.

Smoke taint is a serious threat to the quality and reputation of wine, as it can impart unpleasant aromas and flavours that are detected by consumers. Smoke taint can also reduce the yield and value of grapes, as some wineries may reject smoke-affected fruit or offer lower prices.

The 2019-20 bushfires saw an estimated impact of $140 million on the Victorian wine industry. Many grape growers and winemakers faced significant financial losses and uncertainty about their future.

In the North East Wine Zone, the Smoke Taint Detection System aims to help winegrowers manage this risk. It was launched in 2022 as a world-first innovation to better protect wineries from bushfire damage. The system consists of 100 'wine industry smoke detectors' that are installed across the 5 wine regions in north-east Victoria. The detectors gather and analyse data to measure the exposure of wine grapes to smoke activity to identify and predict the risk for grape growers and winemakers. The risk is displayed using a traffic light system that allows wine grape growers to react and avoid costs when needed.

This is supported by information, education and extension services to help grape growers and winemakers cope with smoke taint. Agriculture Victoria delivered webinars, workshops, fact sheets and technical support on smoke taint management.

The proactive approach between the industry and the government in north-east Victoria has been effective in strategic planning and resilience building, allowing the region to recover, protect and prevent the potential impact of smoke taint on its vineyards.

The system was developed by La Trobe University with support from Agriculture Victoria, Wine Australia and many other stakeholders and funded through the Regional Economic Stimulus and Resilience Grant by the Australian and Victorian governments.

2.3. Mitigate fire ignition risks from industry and critical infrastructure

Bushfire risks to business, industry and critical infrastructure are steadily escalating as climate change drives increasingly extreme weather patterns. However, critical infrastructure and business activities themselves can also present risks for igniting and spreading fire across the landscape if not carefully managed. Natural causes of fire such as lightning and other extreme weather conditions account for half of all fire ignition in Australia whilst the remaining half of fire starts across the country are attributed to humans (deliberate or accidental).

Although natural causes of bushfires cannot be eliminated, many bushfires are ignited by causes that can be influenced and business and industry have a key role to play in helping protect our communities.

The sector will continue to support industry activities that minimise the risk of fires starting and spreading such as powerline safety programs and roadside programs including fuel management, hazardous tree removal and early detection.

Critical infrastructure

Victoria's Critical Infrastructure All Sectors Resilience Report 2022 defines critical infrastructure as those "physical facilities, supply chains, systems, assets, information technologies and communication networks which, if destroyed, degraded, compromised, or rendered unavailable for an extended period, would significantly impact on the social or economic wellbeing of the Victorian community."

Victorian critical infrastructure delivers services that are essential to maintain the social and/or economic wellbeing by supporting our most basic needs including:

- water and sewerage
- food
- reliable transport
- accessible public health services
- energy for homes and industry
- access to banking, finance and government services
- global communications networks.

What is resilience?

In emergency management, 'resilience' means 'the capacity of individuals, communities, businesses, institutions and systems to survive, adapt and thrive no matter what chronic stresses and acute shocks they experience.'[30]

Community and economic resilience do not just describe the capacity to survive and deal with the consequences of an emergency, but also the ability to adapt and become more able to withstand a range of risks into the future. A strong underlying theme in disaster recovery literature is that the most effective recovery arrangements are those developed in a resilience framework. This has the objective of moving beyond relief and reconstruction, to incorporating local renewal and adaptation to the post-disaster environment. It aspires to create stronger and more vibrant communities better placed to withstand the next disaster.[31] In Victoria, resilience efforts are guided by the *Community Resilience Framework for Emergency Management* published by EMV.[32]

2.4. Invest in resilient infrastructure to minimise disruption to communities

In a changing climate, it is vital that our businesses, industry and infrastructure are able to withstand the increasing frequency, intensity and severity of bushfires.

Bushfires can have a significant impact on the built environment from physical networks, systems and office holdings to community infrastructure owned by local government. These impacts can lead to disruptions to the services that support the liveability of our communities.

High value assets, such as plantations and intensive farming infrastructure, also provide significant employment opportunities, and bushfire damage and destruction can have immediate and long-term impacts for local economies.

To address this growing challenge, the Victorian Government will continue to support business and industry to better plan and prepare for bushfires.

Buildings and infrastructure, both private and public, will be designed, located and retrofitted to better withstand bushfires.

This includes a focus on adaptation to the impacts of climate change as highlighted in Victoria's 7 Adaptation Action Plans.

The bushfire management sector will work with associated sectors, including planning, electricity and water, to identify and implement initiatives that reduce bushfire risk to both human and natural assets and support resilience and reliability.

The bushfire management sector will work with planning agencies to support planning measures that ensure new infrastructure is constructed to standards that allow for escalating climate change impacts. Upgrades to infrastructure construction and maintenance will be encouraged to enhance communities' ability to live with fire and their resilience following fire emergencies. The *Built Environment Adaptation Action Plan 2022-2026* details key actions to ensure that Victoria is well placed to consider climate change impacts, including bushfire risk, in decisions about how we plan for and build communities.[33]

Opportunities to enhance the resilience of the electricity network will be assessed with viable, cost-effective measures implemented. Demonstration of and information sharing about new and emerging technologies, such as microgrids and stand-alone power systems, will support informed and transparent decision-making on bushfire-resilient future energy investments.

Bushfires can have significant impacts on water supply and management. The sector will work with communities, water corporations and catchment management authorities to reduce the impacts of bushfire in critical catchment areas so the water sector becomes more resilient to bushfires and other climate change impacts. The *Water Cycle Climate Change Adaptation Action Plan*[34] details key actions to build the resilience of the water sector and minimise service interruptions.

The sector will also work with critical infrastructure owners and operators through the Critical Infrastructure Sector Resilience Networks to identify, understand and mitigate the risk of cascading failures and dependencies in our infrastructure networks.

3. Aboriginal self-determination in cultural fire and bushfire management

The Victorian Government is committed to advancing Aboriginal self-determination. Meaningfully delivering on this commitment includes proudly supporting the revitalisation of cultural land management tools, such as cultural fire, while removing barriers for Traditional Owners to manage Country.

While ownership of Aboriginal self-determination rests with the Aboriginal community, the Victorian Government can influence many of the systems and structures that can support and enable self-determination.

There is much that bushfire management agencies can do to remove barriers to Traditional Owner-led land and fire management in Victoria. This work needs to be done in partnership with Victoria's Traditional Owners and Aboriginal Victorians.

Bushfire management and cultural fire management are not the same. Bushfire management refers to how the sector and communities manage the risk of, respond to and recover from bushfires. Improving how the sector delivers bushfire management activities is the primary focus of the Strategy.

Cultural fire management refers to practices led by Traditional Owners to fulfil a range of cultural objectives. While the application of cultural fire may reduce bushfire risk, this is not its primary objective. Cultural fire management is a socially and ecologically complex practice, governed by kinship, eldership and spiritual connections to Country. Only Traditional Owners have the authority to lead cultural fire management on Country.

By intentionally using controlled, low-intensity fires during appropriate seasons, cultural burning reduces fuel loads, preventing the buildup of dead vegetation and minimising the risk of bushfires. This approach not only promotes biodiversity by creating diverse habitat structures and supporting the growth of fire-adapted native species, but may also protect communities and vital infrastructure. Additionally, cultural burning helps maintain the ecological balance of ecosystems, enriches soil fertility and preserves traditional knowledge that has evolved over centuries, ensuring a sustainable and holistic approach to fire management and ecosystem health.

Traditional Owner self-determination in cultural fire and bushfire management practices also contributes meaningfully to the holistic health and wellbeing of Aboriginal communities in Victoria.

Over the past few years, the sector has collaborated with Traditional Owners in cultural fire management in some parts of Victoria. However, more needs to be done to meet Traditional Owners' expectations of what true partnership looks like.

This chapter outlines the sector's commitment to working towards a partnership approach with Traditional Owners that removes limitations for Traditional Owners to undertake cultural land and fire management according to their self-determined pathways.

The commitments made in this chapter have been informed by the *Victorian Traditional Owner Cultural Fire Strategy* (Cultural Fire Strategy) and conversations with Victorian Traditional Owners.

The Cultural Fire Strategy was authored by Traditional Owners and provides a clear policy and practice framework for effective Traditional Owner-led cultural fire management in Victoria. The Cultural Fire Strategy is intended to reinvigorate cultural fire through Traditional Owner-led practices across all types of Country and land tenure, enabling Traditional Owners to heal Country and fulfil their rights and obligations to care for Country.

Vision from the Victorian Traditional Owner Cultural Fire Strategy

Future generations of Victorian Traditional Owners will grow up observing their Elders leading the use of right fire for Country. They will be trusted to know the special reasons why fire is used and how it brings health to the land and people. Their children and grandchildren will see culturally valuable plants and animals return to Country and know their stories.

The Cultural Fire Strategy articulates a long-term vision for reinvigorating cultural fire on Country, and outlines 4 specific objectives:

1. Develop operational pathways that enable Traditional Owners to lead the planning and to undertake cultural burns across all land tenures and Country types according to their cultural obligations
2. Build Traditional Owner governance and capacity in cultural fire knowledge and practice
3. Improve management of state forest reserves and private land through the application of collaborative management to heal Country and build resilience in people and landscapes
4. Facilitate the development and strengthening of institutional frameworks that support cultural fire practice.

The sector recognises and supports these objectives. This chapter outlines how the sector will contribute to achieving the objectives of the Cultural Fire Strategy.

The sector also recognises that some Traditional Owners not only want to reinvigorate cultural fire practices, but also wish for greater influence in broader fire management decision-making, including for risk reduction and ecological purposes. In addition to detailing how the sector will contribute to the objectives of the Cultural Fire Strategy, this chapter includes a fifth objective focused on how the sector can support Traditional Owners to have a greater role in areas of bushfire management that are of interest to them.

Actions outlined in this chapter will be undertaken in close partnership with Victorian Traditional Owners to enact state-level reform, as well as to support each Traditional Owner group's individual objectives for cultural fire and involvement in broader bushfire management.

The Strategy does not limit or anticipate the impact and role that a future Treaty or treaties may have on the Victorian Government's efforts to enable self-determination. Treaty will support a new, positive relationship between the Victorian Government and Aboriginal Victorians by determining how each party's priorities, interests and responsibilities can be realised together.

The Strategy will be reviewed regularly to ensure alignment with future actions and changes required to facilitate outcomes of a Treaty or treaties and relevant findings from the Yoorrook Justice Commission.

Cultural burning in wetlands on Gunditjmara Country

Outcome: The sector supports and enables self-determination of Traditional Owners and Aboriginal Victorians in land and bushfire management.

To achieve this outcome, Victoria must partner with Victorian Traditional Owners to achieve the 4 objectives of the *Victorian Traditional Owner Cultural Fire Strategy* and enable Traditional Owners to have a greater role in bushfire management.

3.1. Develop operational pathways that enable Traditional Owners to lead planning and to undertake cultural burns across all land tenures and Country types according to their cultural obligations

As contemporary systems and structures in bushfire management evolve to better meet the expectations and objectives of Traditional Owners (see Objective 4 (3.4)), the sector will work with Traditional Owners to develop operational pathways for Traditional Owners to lead cultural fire practices across land tenures in the short term, while building new systems that enable Traditional Owners to apply cultural fire knowledge and practice.

Traditional Owners require appropriate and sustainable levels of funding to develop and implement their Country-specific pathways to manage the transition to a healthy Country. Traditional Owners must be empowered to deliver cultural fire management.

The sector will contribute to achieving Objective 1 of the *Victorian Traditional Owner Cultural Fire Strategy* by:

- working with Traditional Owners to strengthen partnership approaches with bushfire management agencies
- working with Traditional Owners to create culturally-appropriate processes and procedures for cultural fire across land tenures
- reviewing and strengthening government support for Traditional Owners
- supporting Traditional Owners through targeted programs
- reviewing government procurement strategies to remove barriers and better support Traditional Owners' economic resilience
- removing administrative and institutional barriers to Traditional Owner fire practice.

Land tenure is **the manner in which a party holds or occupies an area of land**. It is a way of identifying who has the right to use and occupy land in accordance with the different types of ownership. Land tenure is the name of the particular legal regime under which land is owned.[35]

3.2. Build Traditional Owner governance and capacity in cultural fire knowledge and practice

Restoring and protecting the cultural fire knowledge and practice system around cultural fire is integral to Traditional Owners' ability to heal and manage Country and to pass this knowledge and practice on to future generations.

The sector will contribute to achieving Objective 2 in the *Victorian Traditional Owner Cultural Fire Strategy* by:

- supporting the establishment of Traditional Owner-led governance arrangements for cultural fire (e.g. the Cultural Fire Authority)
- developing research partnerships with Traditional Owners and lifting the standards in existing approaches to partnerships
- empowering Traditional Owners to identify their own research needs and undertake research
- enabling Traditional Owners to heal their systems of cultural fire knowledge and practice
- ensuring relevant existing research in land and fire management, including findings, are made available to Traditional Owners

- providing greater access to and involvement in existing research projects and findings in land and fire management
- enabling Traditional Owners to develop and manage Indigenous cultural and intellectual property.

3.3. Improved management of state forest reserves and private land through the application of collaborative management to heal Country and build resilience in people and landscapes

Traditional Owners should be enabled to manage Country holistically. Cultural fire is one of many land management tools that has been used by Traditional Owners to manage Country for thousands of years. Not all agencies within the sector have land management responsibilities, but there is a range of actions the sector can take to remove barriers and enable Traditional Owners to manage Country holistically.

The sector will contribute to achieving Objective 3 in the *Victorian Traditional Owner Cultural Fire Strategy* by:

- removing barriers to the application of fire for cultural objectives
- enabling the establishment of collaborative governance arrangements for the management of private and public land
- removing barriers to enable Traditional Owners to achieve other land management objectives (where relevant)
- breaking down internal silos within the sector to remove barriers to Traditional Owners accessing and managing Country and partnering with government more effectively
- facilitating Traditional Owner-led cultural heritage management services.

3.4. Facilitate the development and strengthening of institutional frameworks that support cultural fire practice

As described in the Cultural Fire Strategy, Traditional Owners require their role in managing Country with cultural fire to be embedded in contemporary land and fire management in Victoria. Achieving this objective will require significant reforms to current institutional frameworks related to bushfire management.

The sector will contribute to achieving Objective 4 in the *Victorian Traditional Owner Cultural Fire Strategy* by:

- identifying and removing legislative, regulatory and operational barriers to strengthen the authority and capacity of Traditional Owners in cultural land and fire management
- establishing collaborative governance arrangements that enable and embed Traditional Owner knowledge and practice systems in Victorian Government policy, legislation and procedures
- enabling Traditional Owners to participate in decision-making to enable Traditional Owner-led knowledge and practice to be embedded into policy, planning and the management of Country
- support cultural revitalisation programs which promote and remove barriers to the practice of Aboriginal culture and cultural fire
- increasing the cultural competency of staff to ensure they have the necessary skills and capacity and also understand the importance of cultural and land fire management.

3.5. Enable Traditional Owners to have a greater role in bushfire management according to their self-determined interests and objectives

Traditional Owners have interests in bushfire management that go beyond cultural fire. The sector undertakes a range of actions in preparation, mitigation, response and recovery that impacts Country. Traditional Owners have expressed an interest in having greater involvement in decision-making for bushfire management activities.

The sector will work with Traditional Owners to remove barriers to their participation in bushfire management. This includes:

- enabling the application of fire for cultural objectives
- facilitating a greater role for Traditional Owners in providing cultural heritage advice during emergency response and recovery to protect cultural heritage sites
- enabling Traditional Owner-led cultural heritage management services to decrease the impact of fuel reduction activities on bio-cultural values, including Aboriginal heritage (tangible and intangible)
- enabling Traditional Owners to apply cultural knowledge and practice post-fire to heal and restore Country according to cultural land and fire management objectives
- supporting Traditional Owners to establish fire crews to provide operational firefighting services
- empowering Aboriginal communities to lead their own recovery and healing processes, promoting self-determination and resilience.

Existing frameworks, such as the *Water is Life: Traditional Owner Access to Water Roadmap*, provide guidance on how the sector can effectively consider and balance Traditional Owner self-determination aspirations and other stakeholder interests and rights.

Creating fire using a traditional fire-starting technique. Gunditjmara Country

4. Ecosystem resilience and nature conservation

Healthy and resilient ecosystems are fundamental to successful bushfire management.

Climate change results in more frequent and longer-lasting bushfires. Along with increasing intensity, this is stressing the resilience of Victoria's ecosystems and undermining nature conservation efforts. More frequent fires also impact ecosystems and threaten important fire-sensitive species. Climate change is causing large-scale changes to Victorian ecosystems and increasing the complexity of managing fire impacts on biodiversity, including threatened species. For example, several large-scale fires and the increasing proportion of areas that have been burnt multiple times since the year 2000 need to be considered when managing bushfire risk.[36]

Supporting better environmental outcomes means we need to:

- ensure bushfire management activities, including fuel management, support resilient ecosystems
- actively apply fire where appropriate to promote biodiversity and ecosystem resilience outcomes, for example planned burning to combat woody heathland encroachment
- ensure fuel management and bushfires (to the extent possible) do not impact ecologically sensitive environmental values, including wet forest and fire-sensitive threatened species
- use fuel management and response planning to protect environmental assets, including threatened species and significant ecosystems.

Ecosystems and humans

Ecosystems are living and non-living components of the environment and their interactions with each other.

Natural ecosystems are invaluable to the quality of human life, for example through the provision of clean water, forest products, biodiversity, soil formation, nutrient cycling, air quality, erosion control and carbon storage as well as contributions to emotional and psychological health, and cultural fulfillment to Traditional Owners, spiritually and emotionally.

Protecting Victoria's Environment - Biodiversity 2037 is Victoria's plan to stop the decline of native plants and animals and improve our natural environment. Maintaining and improving the resilience of natural ecosystems is an important goal in its own right and aligns with Biodiversity 2037. It is also essential to continue preserving the ecosystems we depend on.

To do this, we need to continually update our understanding of how ecosystems respond to the impacts of fire. Critical to this is understanding how fire regimes interact with other threatening processes, such as invasive species and drought. In a changing climate, the sector will continuously identify and adopt ongoing, sector-wide improvements to systems, tools and data to better understand the varying impacts of bushfires and fuel management activities on our ecosystems at a landscape and local level.

To achieve genuine ecosystem resilience and positive nature conservation outcomes, the sector will integrate this improved understanding into decision-making. This includes identifying and protecting environmental values and assets during on-ground operations (fuel management and bushfire response) and implementing on-ground programs to manage increased threats to environmental values (such as weeds and pests) resulting from the applied fire regime. This work will be achieved through an adaptive management framework (see box) alongside skills development and focused training for staff.

Decisions about fire regimes, ecosystem resilience, emissions profiles, carbon storage, nature conservation and environmental recovery will be informed by best available biodiversity, climate and fire behaviour science, community priorities and values, and collaboration with Traditional Owners.

Adaptive management

Adaptive management is the process of 'learning by doing.' This means managing with incomplete knowledge by engaging in a continuous cycle of action, using learnings to adjust management actions.

Adaptive management involves a continuous and intentional practice of trying new ways of doing things, learning from the outcomes and changing future actions based on learning. Applying this process helps drive improvement in bushfire management. An example of adaptive management (applied to the development of the Joint Fuel Management Plan) is illustrated in Chapter 5 of the Strategy (**Figure 3**).

Outcome: Fire regimes support healthy and resilient ecosystems and nature conservation in a changing climate.

To achieve this outcome, Victoria must:

4.1. Continuously improve data, tools, systems, and knowledge of the influence of fire regimes on ecosystem resilience and the environment

All those involved in bushfire management in Victoria will work together to continually improve knowledge of fire regimes and apply this understanding to enhance environmental recovery in fire-affected areas. This knowledge-building will include constantly improving how the sector measures and evaluates the influence of fire regimes on ecosystem resilience and nature conservation including the interaction of inappropriate fire regimes with other threatening processes.

It also involves partnering with and empowering Traditional Owners to identify their research requirements to strengthen the existing literature on the importance of traditional biocultural values and the positive impacts of cultural burning on reviving connection and healing of Country and Traditional Owner culture. Protection of critical knowledge gaps will be identified and addressed progressively through focused research, data gathering and sharing, and integrating information to protect Victoria's ecosystems and ensure continuous improvement.[37] Bushfire management agencies will improve on and integrate the data, tools, systems and processes used in fire ecology programs.

This work will inform land management, aiding better decision-making, creating more resilient ecosystems and improving nature conservation. This work connects strongly to the implementation of *Biodiversity 2037 – Protecting Victoria's Environment*, which includes protecting the health of the natural environment by supporting functioning plant and animal populations and reducing species decline, even under climate change.[38]

Ecosystem resistance, resilience and transition

Ecosystem resistance refers to the measure of an ecosystem's ability to withstand disturbance.*

Ecosystem resilience is the capacity of an area to absorb natural and management-imposed disturbance, but still retain its basic structure (the abundance and composition of its species, the function of its vegetation and its types of vegetation) over time.

Ecosystem recovery occurs when an impacted ecosystem regains its ecological function to a reference state or level. Ecosystems may require intervention to recover. Ecosystem recovery refers to the immediate recovery of ecosystems following from bushfire impacts rather than general recovery.

Ecosystem transition occurs when ecosystems shift to a new state, either through impacts or managed change; they do not recover to a reference state or level. For example, they could change structure or composition or – in some cases – even become a new ecosystem.

**Note in this document 'disturbance' refers specifically to disturbance from fire.*

Decision support tools

Bushfire management agencies use a variety of decision support tools to inform and prioritise decisions.

Fire Analysis Module for Ecological Values is a tool that integrates ecological data and models into a single platform. It provides an indication of the time it takes vegetation to recover following impact by fire and facilitates more effective consideration of ecological values in strategic fire management decisions.

Strategic Management Prospects is a tool designed to protect Victoria's environment in line with the Biodiversity 2037 Plan's goals and targets. It enables biodiversity managers and decision makers to integrate and compare the relative cost-effectiveness of conservation actions across species and locations. Achieving the most positive outcomes for biodiversity requires activities that provide the greatest benefit to the most species at the least cost.

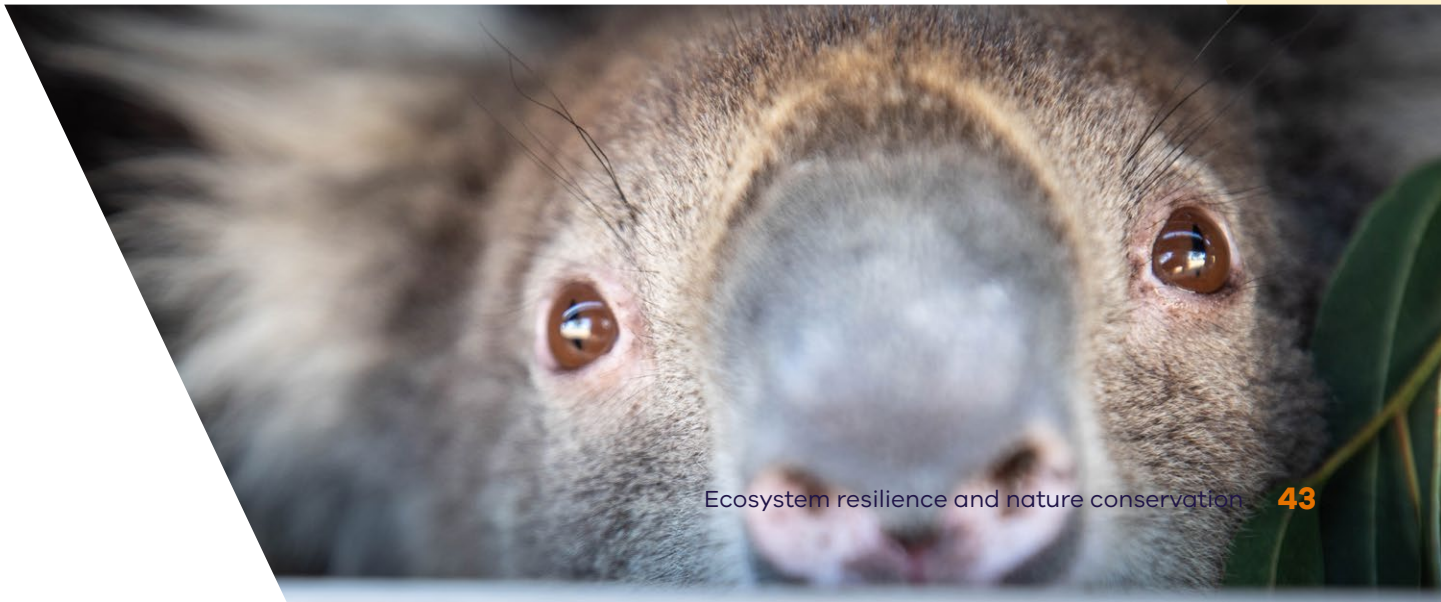
Nature conservation

Nature conservation is the protection and management of living species, communities and ecosystems. Protection of a site can promote ecosystem function, retain areas of natural or cultural significance (or both) and increase resilience.

Actions to support ecological resilience and nature conservation will be underpinned by research and reinforced by well-defined metrics and targets. This will include establishing baseline data on past fire regimes, as well as data on bushfire risk and its impact on ecosystems. This also includes data collection on integrated threat management that responds to the impact fire regimes have on other threatening processes.

Adaptive bushfire management will incorporate the principles and guidance outlined in the *Victorian Waterway Management Strategy*[39] and the *Natural Environment Climate Change Adaptation Action Plan 2022-2026*.[40] This will include evaluating outcomes from fire regimes to identify opportunities to maximise ecosystem resilience and minimise impacts on nature conservation.

The sector will use structured on-ground data collection to test and refine ecosystem resilience theory, modelling and policy. Modelling will increasingly factor in climate change scenarios to better inform planning and decision-making. The sector will also integrate data from decision support tools (such as Fire Analysis Module for Ecological Values (FAME) and Strategic Management Prospects (SMP) (see box) to support improved fire and land management decisions and enhanced ecological resilience and nature conservation outcomes.



CASE STUDY

Reseeding Alpine Ash and Mountain Ash Forest

Alpine Ash and Mountain Ash are iconic features of the Australian Alps and Victoria's high country, providing a range of values to their ecosystem and the Victorian community.

Since 1997, successive bushfires (1998, 2003, 2006–07, 2009, 2013 and 2019) have burnt 2.4 million hectares of high country, with the 2019–20 fires impacting 24,860 hectares of immature ash forest. This unprecedented fire activity created unfavourable conditions for the persistence of ash forests and the potential for their permanent loss from significant parts of the landscape.

Responding to this risk, the sector, in partnership with the University of Melbourne and Greening Australia, developed a strategic prioritisation process for reseeding. This focuses on previously impacted ash forest, biodiversity values and modelled persistence of Alpine Ash under climate change and future fire regimes.

The project successfully used existing specialist skills and equipment from across the sector to increase seed stocks, as well as reseeding priority, fire-affected immature ash forests following the 2019–20 fire season.

The methods developed will be used for future reseeding projects following future significant bushfire events.

4.2. Integrate research and knowledge on climate change into modelling and planning for ecosystem resilience

Victorians will work together to plan and implement land management actions aimed at maximising efforts to safeguard environmental values against a changing climate through all aspects of fire and land management, including recovery. These actions will be informed by key elements of climate adaptation such as resilience, retreat, managed change and transformation. They will be underpinned by the latest climate science. This approach will also enable ecosystems to adapt and respond to changing bushfire patterns and regimes.

The sector has embedded the vision of *Victoria's Climate Change Strategy* into its fire management practices for a climate-resilient, prosperous and liveable Victoria. Climate change is generating significant impacts on Victoria's environment and the conditions in which bushfires occur. The sector will continue to improve its capability to address these emerging risks and will practise evidence-based disaster risk management in the context of a changing climate. To monitor these impacts, the sector will develop trigger points, which will activate escalated ecosystem management measures.

Bushfire agencies will collaborate with and support Traditional Owners to restore their systems of cultural fire knowledge and practice.

Bushfire sector agencies will also incorporate community knowledge through 'citizen science' projects and local on-ground monitoring programs to ensure local ecological values and data are considered when planning and conducting bushfire and land-management activities.

Bushfire sector agencies will also continue to strengthen ties with research organisations to access the latest research and knowledge in fields related to bushfire management, including climate change, bushfire science, fire ecology and nature conservation.

Building better connections with multiple knowledge sources will enable all relevant information to be integrated into modelling and planning for fire regimes and on-ground delivery of bushfire and land-management activities. Modelling and planning will include adaptation principles and guidance outlined in the *Natural Environment Climate Change Adaptation Action Plan 2022 - 2026*.[41]

CASE STUDY

Climate change and fire weather project

Fire managers need access to locally-relevant projections of future climatic changes, as well as access to more granular, interpreted changes to fire weather variables. These increases their understanding of local fire weather conditions and provide guidance on the resources needed to undertake operations.

In 2018-19, fire managers took the projections of 12 global climate models and used sophisticated modelling techniques to create a daily fire weather dataset for Victoria until the year 2100. Analysis of the projected fire weather data reveals how fire risk is expected to worsen through the century.

This information is essential to inform risk-based decision-making in planning, preparedness and future research. It provides fire managers with science-based resources for understanding how fire risk is likely to change under different climate change scenarios.

4.3. Improve monitoring, evaluation, and reporting on fire management practices against ecosystem resilience metrics and targets

Victorian bushfire agencies will continue to monitor, evaluate and regularly report on the performance of key ecosystem resilience metrics, and will establish targets for ecosystem resilience.

No single metric can capture the complex changes in ecosystem resilience that fire regimes cause. Working with research partners, bushfire agencies will determine the combination of metrics to best capture the influence of fire regimes on ecosystem resilience, including markers of healthy ecosystems and those that indicate concerning changes. From this analysis, bushfire agencies can use the metrics and targets that are most ecologically valuable for decision-making processes during short and long-term planning and operations.

This includes improving our understanding of the impact of fire regimes on other threatening processes, such as invasive species and drought, which will support decisions about overall management responses. For example, this may help inform decisions about when to control predators following planned burning to protect at-risk, ground-dwelling mammals from predation following loss of vegetation cover.

Ecosystem resilience and nature conservation metrics are modelled at various scales. The sector will ensure the scale of each target is appropriate and ecologically meaningful across different contexts and decision-making processes. Clear, appropriate and meaningful targets will support more effective connections between bushfire and land management, ecosystem resilience and nature conservation.

4.4. Improve the effectiveness, consistency, and transparency of environmental value assessments

Environmental values assessments will consider cumulative and inter-related impacts to support a more comprehensive approach. Values assessments will consider the cumulative habitat impacts across all disturbance activities.

Bushfire management agencies are legally required to protect environmental values.[42] Bushfire agencies will continue to improve and maintain a clear and reliable environmental value assessment system that is accessible to all practitioners. The system will aim to optimise outcomes and guide decisions to mitigate risk to environmental values. It will include expert support, guidance and tools to ensure decisions and actions are evidence-based and lead to effective outcomes that support transparency and accountability. It will ensure that the best information on environmental values is applied at the appropriate temporal and spatial scales to inform decision-making and will also ensure that environmental values data is collected to a required standard and entered in the appropriate authoritative database for later use. Communities and staff will be trained in values assessment to ensure decision-making across the sector is consistent and aligned.

Decisions about bushfire management will take into account the increased threats to ecosystems posed by high-frequency, high-intensity bushfires likely to result from the changing climate. These decisions will align with existing Victorian Government commitments to enhance how we model the impacts of fuel management on environmental values, including threatened species.

Values assessment

Values assessment is a process the sector uses to identify potential negative impacts on environmental values, which may arise from activities such as forest or fuel management and determine mitigation actions to reduce their likelihood and consequences.

4.5. Strengthen leadership in fire ecology and environmental sciences

The sector will establish effective cross-sector governance structures that integrate the protection of environmental values into decision-making. These structures will be underpinned by robust and consistent policies and operational procedures, backed by strong expertise and leadership in fire ecology and environmental science.

Strong relationships and partnerships with the academic community and stakeholder groups with knowledge of local landscapes will also provide a critical foundation for decision-making.

The sector will also work to align statutory, strategic, tactical and operational planning to more effectively protect and enhance ecosystem resilience. Continuous improvement of processes will help ensure research informs on-ground delivery, practice and community engagement.

4.6. Build community understanding of fire regimes, ecosystem resilience, and nature conservation

Bushfire sector agencies will work with communities to build understanding of the role fire plays in our environment, alongside sharing information about other concepts, such as ecosystem resilience and nature conservation.

The sector will also partner with Traditional Owners to build understanding of pre-colonial fire and the ways traditional fire relationships heal Country.

Better understanding of fire regimes will enhance community resilience and its ability to interact with and support changing ecosystems.

The sector will work with high-bushfire-risk communities to build understanding of bushfire behaviour, including how ecosystems evolve and how changes in fire intensity and frequency may affect these ecosystems.

This work will be informed by an appreciation that changing demographics in fire-prone areas can lead to situations in which many people – particularly those new to an area – are unaware of how natural landscapes evolve as they regrow.

CASE STUDY

Emergency fauna extraction and preservation

Fire is a factor that can place endangered species in jeopardy within their natural habitat.

During the 2019-20 Black Summer fires, there was a critical need for the emergency extraction of an eastern bristlebird population to reduce risk of extinction or further decline.

The sole Victorian population of this highly endangered species was imminently threatened by the raging fires and temporarily relocated.

Additionally, during extraction, the Victorian Government collected threatened flora seeds and cuttings, ensuring the population could return to its native environment following the fires.

The bristlebird extraction team consisted of individuals from various organisations possessing expertise in ecology, animal health, handling and maintenance.

Melbourne Zoo and Healesville Sanctuary played a pivotal role, with their zookeepers, veterinarians and management taking responsibility for the birds at their respective locations.

The knowledge and experience acquired during this extraordinary extraction event have paved the way for future extractions, ultimately leading to enhanced health and welfare outcomes for wildlife imperilled by emergency situations.

5. Informed decision-making, evidence-based approaches and tools

Bushfire management decisions will draw on the latest science, best practice and local knowledge.

Victoria's risk-based approach to bushfire management helps the sector ensure it is achieving key outcomes for people and communities, biodiversity, environmental and social values, cultural heritage, ecosystem services and economic values such as agriculture.

This risk-based approach informs all tiers of planning, from strategic to operational. It assesses the likelihood of fires starting and spreading and also considers the possible impacts of fires and fire response activities on human life, health and wellbeing, communities, cultural heritage, the environment and critical infrastructure.

The risk-based approach relies on many tools to inform decision-making about how best to protect what we value. These tools include accurate data, new science, modelling, and decision-support tools, community input and partnership with Traditional Owners.

Risk metrics and targets

A **metric** is a measure of risk to a particular value, whereas a **target** is a threshold value for a risk metric.

Setting a risk target means that we aim to undertake activities that reduce risk to below that threshold. Metrics need to be developed first, which then enables the development of targets.

Climate change is further influencing the dynamic nature of bushfire risk. Adapting to and reducing the influence of climate change on bushfire risk requires a strong and continuously improving knowledge and evidence base.

Outcome: Victoria uses the best available science, innovation and knowledge to support evidence-based decisions.

To achieve this outcome, Victoria must:

5.1. Invest in high-quality shared data, science and research

High-quality data will be essential to decision-making. Evidence collection will be strategically determined, and data will be gathered through both short and long-term research and monitoring. This will equip decision-makers with the most useful data available.

Victoria's data governance framework supports the consistent collection and sharing of data for land and fire agencies, emergency management planners, Traditional Owners and the public, in an appropriate manner that is consistent with intellectual property obligations. This enables bushfire agencies to grow the wealth of existing science and supports more coordinated and consistent research approaches.

Ongoing use of scientific methods to obtain, analyse and interpret data will improve knowledge about the complex nature of fire behaviour, fire ecology, operations, fuel management, community risk and climate change. The sector will use this data to better identify bushfire risk and work with communities to respond appropriately.

Bushfire management agencies will consult broadly to target and define research questions and will engage with a range of researchers to continuously develop new knowledge. This engagement will include co-designing research with end-users to increase its uptake and its influence on decision-making and behaviour change.

One of the most fundamental sources of information is fire behaviour modelling, which underpins our understanding of the potential spread, extent and severity of fire. Modelling outputs are interpreted in conjunction with 3 additional considerations:

- **values** that might be impacted by a fire and a vulnerability model for each value (essentially, will a particular value be impacted by a fire of the simulated size and intensity?)
- **management levers** that reduce the occurrence of fire, the spread of fire, or presence of a particular value in that fire
- **a likelihood model** that considers ignition and weather conditions.

The fire behaviour model is just one of many tools used to assess options for protecting values by application of management levers. For example, evacuation modelling considers the ability to protect the value (human life) from a bushfire through the management lever of evacuation. The sector will develop, apply, and continuously improve fire behaviour and other modelling tools to support end-to-end, risk-based bushfire management across public and private land. These tools will help identify areas of highest risk, the potential for new bushfires (or growth of existing bushfires) and the cost-effectiveness of risk-reduction activities.

Investment in next-generation bushfire risk-modelling tools and input datasets will enhance the accuracy of predictive services and the effectiveness of strategic planning. The improved modelling capability will support decision-making to identify the most constructive and cost-effective opportunities for reducing bushfire risk. Climate change scenario modelling and mapping will be integrated into bushfire risk modelling and used to inform decisions. The sector will share risk data and other risk assessments to improve overall understanding of state-wide and localised risks.

Sector agencies will work with communities to collect high-quality, reliable data, particularly data gathered through long-term studies and on-ground monitoring. It will continue to improve foundation datasets and ensure data regarding fuel loads, vegetation characteristics, threatened species locations, climate and other relevant values are built and maintained.

Decision-making and planning approaches will integrate science-based evidence, community knowledge, on-ground monitoring and a collaborative approach to Traditional Owner insight. The sector will communicate clearly and simply how its programs are informed and supported by evidence and timely feedback.

The sector will improve transparency and accountability to support improved information about the effectiveness of different bushfire management activities in local areas.

Fire behaviour modelling tools

Phoenix RapidFire is the primary modelling tool used by all eastern-Australian fire agencies to model and manage bushfire risk. Phoenix RapidFire uses data (such as vegetation type and condition, terrain and weather) to estimate key fire properties (such as intensity, rate of spread and flame height) and then calculate the number of houses across the state that would be destroyed if that modelled scenario occurred. While house loss is a significant consequence in itself, it can also indicate how many lives may be lost in a bushfire.

Victoria and other states are currently preparing to implement a new modelling system called SPARK, developed by CSIRO, which has been built upon the success of Phoenix and can be more easily updated with the latest research.

5.2. Prioritise resources on actions that will most effectively reduce bushfire risk and impacts

Bushfire agencies will use evidence to inform risk-based bushfire and land and water management and prioritisation strategies – including efficient and effective use of resources – across mitigation, planning, preparedness, response and recovery on public and private land. Prioritisation will be based on evidence, including data from monitoring, evaluation, research, modelled risk information and place-based knowledge.

The sector will continue to establish and implement monitoring, evaluation and reporting programs that improve practices and provide transparent reporting to the public on the effectiveness of bushfire risk management activities.

Programs will be informed by data and evidence collected consistently by the sector. Evidence will also be generated through investment in science and research, enabling the sector to identify and prioritise actions that have the biggest impact on reducing bushfire risk.

CASE STUDY:

Cost effectiveness of bushfire-risk-reduction activities

Bushfires pose risks to property, business, critical infrastructure and environmental values including biodiversity. To reduce this risk, fire and land management agencies (including DEECA and CFA) undertake a range of bushfire risk reduction activities, including planned burning, suppression and mechanical fuel treatments such as strategic fuel breaks slashing and mulching.

These management actions can be costly. Quantifying this cost can help deliver better return on investment for communities. In July 2021, DEECA initiated a project with the University of Melbourne's Flare Wildfire group to investigate the cost-effectiveness of the primary bushfire-risk-reduction methods available to land managers in Victoria.

The research uses a modelling framework to examine changes in risk, and their associated costs. It is one of very few bushfire simulation studies to incorporate changing fire regimes under climate change scenarios. This project is currently being finalised and will allow land managers to use cutting-edge scientific methods to tailor efficient and effective land management solutions for their area.

Multiple peer-reviewed journal articles have been published directly from this project, showing a clear commitment to scientific rigour underlying practical decision-making.

5.3. Build a culture of transparent evidence-based decision-making at all levels of fire management

The bushfire sector will continue to build a culture of transparent evidence-based decision-making. Knowledge and insights gained from monitoring, evaluation and research will be used to inform decisions about managing bushfire risk most effectively.

The sector will implement best practice monitoring, evaluation and reporting processes as part of the adaptive management cycle (see **Figure 3**) across public and private land for all bushfire management activities.

The sector will embed evidence-based decision-making in all aspects of bushfire planning and operations. Systems, tools and processes will progressively incorporate lessons from monitoring, evaluation and research into all levels of decision-making. Wherever possible, bushfire agencies will share information about evidence and how it is being used to support transparency and accountability.

Bushfire sector staff will increase their capability through knowledge sharing, training and mentoring that draws on local, interstate and international best practice. Decision-makers will be empowered to make decisions that are underpinned by the evidence and science available. Through training, access to tools and engagement with subject matter experts, they will be able to make informed decisions rapidly.

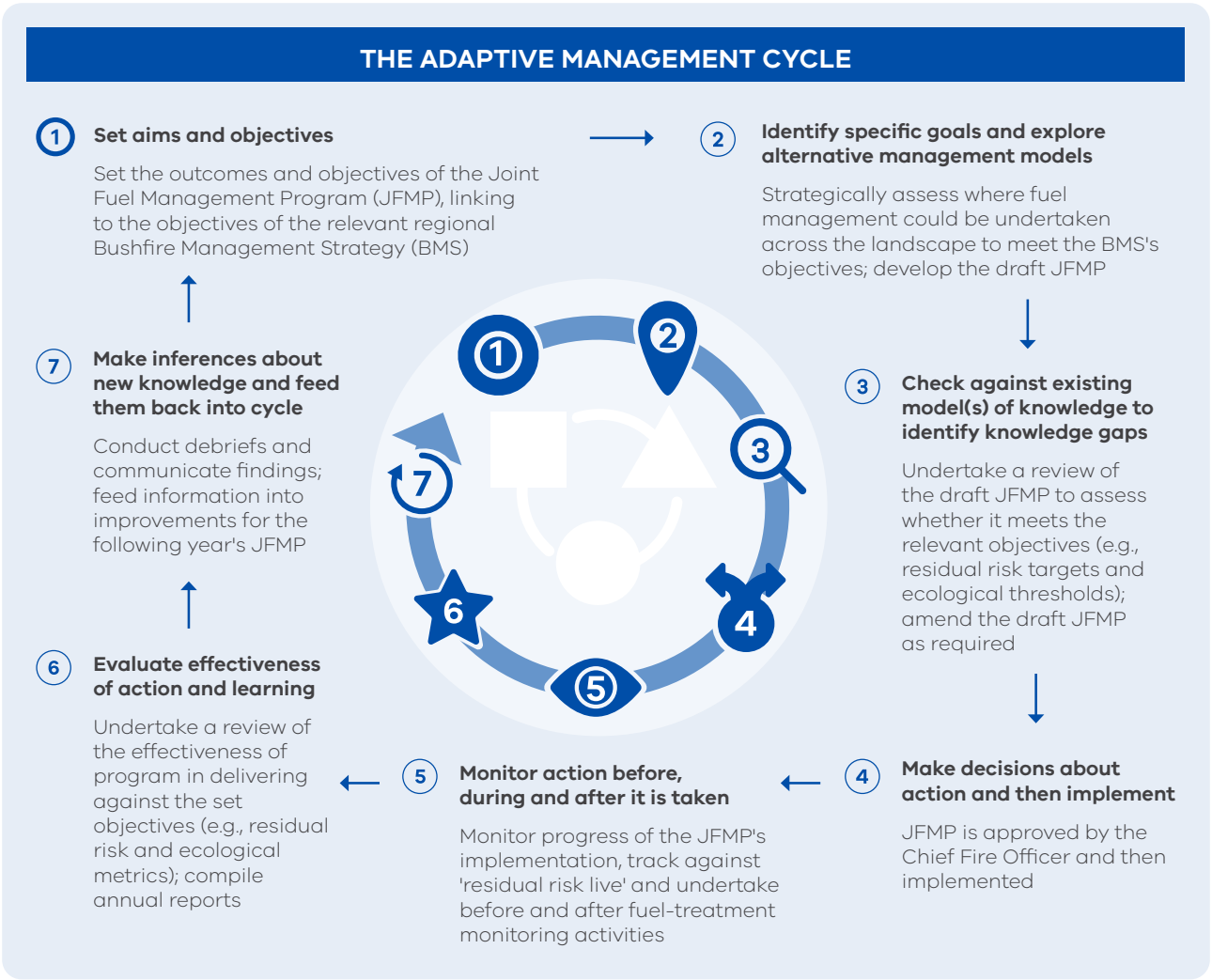


Figure 3: Example application of the adaptive management cycle to the development of the Joint Fuel Management Program

5.4. Embed Traditional Owner and community insights in evidence and decision-making

Bushfire agencies and communities will work closely together to share and apply bushfire risk knowledge and information transparently and effectively. This will include local knowledge on:

- climate change and the environment
- available tools and technology
- place-based data
- cultural and environmental values.

Bushfire agencies will work with communities to understand local values and incorporate these meaningfully into decision-making (informing decisions on community safety, the environment, and other values). The sector will also work with communities to develop engagement strategies and planning processes that ensure community knowledge and values inform planning decisions.

In addition, the sector will partner with Traditional Owners to ensure that bushfire management decisions are made collaboratively and reflect Traditional Owner values and aspirations.

6. Working together, accountability and shared responsibility

When it comes to bushfire management, all Victorians have a role to play. As the climate changes, and bushfire risk increases across the landscape, shared responsibility becomes increasingly important.

Since its release in 2015, Safer Together has set new foundations for improved collaboration between agencies and communities. It has guided the development of innovative community engagement programs, joint agency planning activities and integration plans across public and private land.

How the sector operates is constantly evolving and demands ongoing work. Strengthening communities to live with bushfire risk means continually working to realise the benefits of collaboration and partnership.

As organisations, stakeholders, sector partners and communities' priorities change, sustaining effective partnerships requires strong frameworks and ongoing commitment to the principles that guide bushfire management.

Outcome: The sector, land managers, communities and industry work together effectively and share responsibility for managing bushfire risk across public and private land.

To achieve this outcome, Victoria must:

6.1. Collaborate with the community and other stakeholders

The sector will work in collaboration with stakeholders to manage fire and its impacts and will support industry and the community to take on enhanced roles in bushfire management. This includes harnessing opportunities through and providing support to work being delivered within and beyond the bushfire management sector. This includes initiatives related to education and training, to help schools and early childhood services prepare for and respond to extreme weather and bushfires and comply with bushfire preparedness guidelines.[43]

All Victorians will have a role to play in managing bushfire risk effectively across public and private land – including land managed by government agencies, local government, industry, the community and Traditional Owners.

The sector will work with communities to develop a shared understanding of the best approaches to collaborate in bushfire management, including ways to balance the impact of bushfires and risk mitigation activities with environmental, cultural, social and economic values.

The sector will establish and maintain bushfire management governance that enables bushfire agencies to work effectively together at state, regional, municipal and local levels to manage bushfires. Beyond this, bushfire management agencies will facilitate cross-border coordination that delivers integrated and consistent support for border communities and businesses.

6.2. Establish and maintain a comprehensive bushfire management framework

The Victorian Government will develop and deliver an end-to-end bushfire management framework where all land and fire managers will work together to achieve the Strategy's shared outcomes, resulting in reduced bushfire risk.

Shared responsibility

In emergency management, shared responsibility refers to the collective obligations and accountabilities held by a range of actors. A commitment to shared responsibility recognises that no single actor can be responsible for emergency mitigation, preparedness, response or recovery. Individuals, communities, businesses, all levels of government and the not-for-profit sector all have a role to play.

Updated performance targets will be made publicly available and help drive accountability for fuel management across all agencies and land types. Fuel management reporting will expand to provide sector-wide assurance and accountability.

Throughout the implementation of the Strategy, the legislative framework will be reviewed to ensure it is fit for purpose in supporting communities and land and fire managers through bushfire prevention, preparedness, response and recovery.

Specifically, land and fire managers' responsibilities, powers and functions for fuel management will be considered through a review of fuel management legislative frameworks. This review will also:

- support agencies to work together more closely
- ensure all firefighters have sufficient legal protections when carrying out fuel management
- consider what statutory support may be required to implement the end-to-end framework effectively.

This will ensure all bushfire agencies have the powers and protections necessary to manage bushfire risk in a changing climate.

Regulation and compliance are other important aspects to bushfire management. The Office of the Conservation Regulator provides intelligence-led, risk-based compliance activities around safe campfires on public land to support prevention of bushfires.

6.3. Apply an integrated bushfire management planning framework

The Bushfire Management Planning Framework (the Planning Framework) will be integrated with broader emergency management planning at municipal, regional and state levels, enabling collaboration and consistency in planning across public and private land.

The Planning Framework will support the sector and land managers, including government, Traditional Owners, industry and the community, to:

- make informed, evidence-based decisions about how we manage bushfire
- reduce bushfire risk to multiple values including communities, essential and community infrastructure, industries, the economy and the environment, with human life as the highest priority

- maintain or improve the resilience of natural ecosystems and their ability to deliver services such as biodiversity, water, carbon storage and forest products.

Drawing on scientific research and local knowledge as well as collaboration with Traditional Owners, the Planning Framework will identify the best interventions available to reduce bushfire risk and will be essential to bushfire risk management in a changing climate.

6.4. Increase transparency to support greater accountability in bushfire management

Shared responsibility for bushfire management means equipping the community with the data, knowledge and information it needs. Sharing this information increases community understanding and decision-making transparency. This includes information used in decision-making, planning processes, and data relating to evaluation and improvement opportunities.

To further enhance Victoria's capability to prepare for and respond to bushfire, the Victorian Government will use collaborative approaches to build the community's understanding of and ability to interpret and apply data and information.

6.5. Share bushfire risk decision-making with communities

Communities and government will work together to understand bushfire risk, agree on strategies, and take action to deliver on their individual and shared responsibilities.

The sector will be responsible for actions including:

- delivering education and behaviour change programs
- issuing fire danger warnings and advice
- reducing fuel through planned burning and mechanical treatments
- commissioning bushfire science research and sharing lessons
- recruiting and training firefighters
- compliance and enforcement to prevent bushfires from starting
- facilitating an integrated approach and response with neighbouring state agencies.

The State Emergency Management Plan and its Bushfire Sub-Plan provide more details on each agency's bushfire management roles and responsibilities.

The sector will explore the use of interactive technology to support the community to understand and identify risks to its particular context, including how fires interact with different building features and how different vegetation types respond to fire.

Community members will be responsible for actions including:

- Keeping up to date, understanding and abiding by fire restrictions and regulations
- Putting out campfires and burn-off fires and monitoring them until they are fully extinguished
- developing and practising their own personal bushfire plans
- preparing themselves and their property for bushfire emergencies
- participating in community bushfire preparedness activities and events.

Everyone, including the sector, communities, land managers and landholders will be responsible for actions such as:

- building an understanding of bushfire risk in their area
- sharing information through community and social channels
- developing, practising and implementing plans to protect what matters most to local communities.

The sector, community members, businesses, land managers and landholders will all play their part in the full suite of bushfire management activities – mitigation, planning, preparedness, response and recovery. Responsibilities will be clearly defined and assigned to those best placed to undertake them.

7. Enhanced capability and capacity

Investing in our people is critical to ensure we can safely manage bushfires in a changing climate.

To manage bushfire risk, Victoria relies on the skills, equipment, capability, and capacity of the sector. Enhancements and improvements to Victoria's workforce capacity and capability will be increasingly critical in our efforts to manage bushfires in a changing climate. The extended duration, frequency and severity of fires will continue to increase strain on the sector, putting pressure on the management of fatigue, safety, and wellbeing among emergency services personnel.

To ensure the sector is better equipped for bushfire events now and into the future, it will develop enhanced systems, processes, tools and programs that offer improved training and support to all sector staff. These improvements will be made with consideration of the sector's increasingly diverse and inclusive workforce and will be consistent with other relevant strategies, such as the Victorian Fire, Emergency and Land Management Aviation Strategic Action Plan.[44]

However, in a changing climate it will also be imperative that we lean into our shared responsibility model and turn to our longstanding partners when needed. It will be essential that we continue to work closely with the Australian Government to understand its capability and capacity and identify opportunities to build on and leverage its support to supplement state-based response and recovery efforts.

We will also continue to work closely with our partners in local government, non-government organisations and industry, who play essential roles in our bushfire management arrangements to ensure they also have the capabilities they need to help keep Victorians safe and resilient.

What is capability and capacity?[45]

Capability foundations

Definitions:

Capability – our collective ability to reduce the likelihood and consequences of an emergency before, during and after.

Capacity – the extent to which the core elements of capability can be sustained before, during and after an emergency.

Capability principles:

- Drive improved public value by working as one
- Maximise use of capability and capacity
- Embrace continuous improvement, innovation and research

Core capacity elements:

- People
- Resources
- Governance
- Systems
- Processes

Enhancing the sector's capability and capacity will better equip bushfire agencies to respond to bushfire and other emergency events, both nationally and internationally.

Outcome: Victoria is supported and equipped with the skills, equipment, capability and systems to safely and effectively manage bushfire.

To achieve this outcome, Victoria must:

7.1. Better support interoperability and decision-making through standardisation

The sector will align systems and processes to support common standards across agencies. Systems that share information between agencies will continue to be developed, enhanced and maintained. Wherever possible, information will be shared with communities to support transparency and enable communities to make better informed decisions.

Where responsibilities are shared across agencies, the sector will review and consolidate guidelines to better use and support incident management staff, with a focus on rostering, shift length, deployment guidelines and fatigue management.

Standardising our systems and processes means we can contribute more efficiently to national and interstate emergency response.

7.2. Build capability through education, coaching and mentoring programs

The sector will invest more in learning and development, including training programs, coaching, mentoring and accreditation systems. This will ensure there are enough capable incident-management and support staff on the ground when needed. This investment will help to identify opportunities for consistent, nationally-accredited training so skills are transferable across the sector and can also be transferred interstate and internationally. The sector will design new learning and development programs that attract and retain skilled and experienced workers who can manage complex, multi-hazard emergencies. These programs will use technologies such as artificial intelligence and simulated training systems that replicate bushfire emergencies so bushfire management personnel can improve their response to real events.

Bushfire agencies will build a culture of trust and partnerships that recognises, values and supports skills and knowledge to be leveraged, exchanged and transferred between staff and across the sector. This includes bridging the gap between research and operational knowledge to drive improvement and innovation in bushfire management, while also exploring opportunities for new approaches to knowledge sharing.

The bushfire sector will create opportunities for learning and developing practical skills and knowledge for sharing among all those involved in bushfire management, including Victorian Government land and fire management agencies, local councils, industry, academics and community groups at a local level. These shared learning systems will facilitate collaboration and increase Victoria's capacity and capability to prepare for, respond to and recover from bushfires.

One mechanism through which this shared learning can occur is the Municipal Emergency Management Planning Committee (MEMPC), which can offer an opportunity for communities to partner with agencies in local bushfire planning and risk management.

The bushfire sector will improve the capability of emergency management leaders to manage emergencies through training that clearly defines expectations. Leaders in senior on-ground and incident management roles will be well equipped to support responses to bushfire and other emergency events.

7.3. Embed physical and mental health, wellbeing, and safety

The Victorian Government is committed to the health and safety of people and recognises their invaluable service and the dangerous work they do protecting the community.

The sector will provide contemporary mental health and wellbeing programs that better prepare emergency workers involved in bushfire prevention, preparedness, response and recovery to manage the long-term health impacts of forest firefighting. These programs will increase support for staff who experience trauma as well as help build the resilience of the bushfire sector in the face of longer and more frequent fire seasons.

Bushfire agencies will review fatigue management strategies regularly to ensure they reflect current best practice for reducing fatigue and improving survivability during burn-over or entrapment events.

Safety and welfare are our top priorities. The bushfire management sector will support emergency workers and volunteers' safety by improving safety systems and processes to identify and reduce risks. This includes firefighter protection systems, updating aviation safety systems, enhancing vehicle ergonomics, and improving vehicle safety, handling and occupant protection systems.

Across the sector, safety management systems – including reporting and investigation processes – will integrate cross-agency safety trends and lessons learnt.

7.4. Increase diversity at all levels of fire management

The sector will develop fire and emergency management training programs and recruitment processes to attract and retain women and people with diverse lived experiences, with consideration for gender identity, sexuality, race, culture, disability, socioeconomic factors, age and caring responsibilities. To do so, work environments must be safe and inclusive, accessible, and free of discrimination and harassment.

Bushfire management agencies will reinforce workplace cultures that are safe, inclusive, and free from discrimination and harassment. Workplace cultures will be grounded in common principles, with all staff across the sector required to adhere to consistent standards and expectations.

The sector will explore innovative and more flexible ways of working so staff with family or caring responsibilities have the same access to work opportunities, including leadership roles.

The sector will work to ensure its staff reflect the Victorian community by promoting diversity and inclusion at all levels of the sector, including leadership through training programs, recruitment processes and mentoring.

Diversity strengthens communities

Diversity across the sector is improving service delivery, promoting strong leadership and supporting community partnership and engagement.

7.5. Build sector capacity and capability in a changing climate

The sector will enhance its resources and capability to deliver a year-round, all-hazards and all-agencies approach through regional and state-level capacity-building programs. These programs will be flexible, accessible and attractive to surge capacity personnel, and will help the sector to engage a regional workforce with local knowledge, bush skills, bushfire management knowledge and experience.

The sector will work collaboratively to develop a more sustainable and reliable resourcing model for state-wide incident management team (IMT) capacity and capability. To support this, the sector will review readiness arrangements, facilities and models of control, coordination and escalation to ensure they appropriately reflect the level of emergency risk and meet the needs of control agencies at state, regional and incident tiers.

Surge capacity requirements will be clear and appropriate. Access will be available to contractors as required for firefighting (including forestry contractors) and interstate and international resource sharing arrangements.

The sector will continue to build its understanding of climate change and its risks, including implications for workforce capacity. Responding to these implications will require innovative approaches to prepare for and manage more frequent and longer fire seasons. Improved understanding and approaches will help to strengthen responders' first attack success.

The sector will invest in relief and recovery capability and capacity to cement mitigation strategies and subsequently reduce the economic, environmental and social impacts of future emergency events. This will help to address significant risks to public safety and people's health and wellbeing, the environment and biodiversity, infrastructure and assets, energy security, businesses and the economy, and Aboriginal culture and healing.

CASE STUDY

Australia's firefighting cooperation interstate and internationally

In Australia, firefighting efforts are primarily coordinated by state and territory governments, with support from the Australian Government as needed. During major bushfire events, firefighting resources and personnel are often shared between states and territories through mutual aid agreements.[46] Australia also has agreements in place for international assistance with countries such as Canada, the United States and New Zealand, which have provided personnel, equipment, and other resources to assist with bushfire suppression efforts.[47]

The Australasian Fire and Emergency Service Authorities Council (AFAC) represents fire and emergency services across Australia and New Zealand and helps to facilitate resource sharing. Through AFAC, fire and emergency services can share information and resources, such as equipment and personnel, to better respond to bushfires and other natural disasters.

One example of interstate and international cooperation occurred during the 2019-2020 bushfire season, when fires in New South Wales and Victoria prompted the deployment of firefighting resources from other states. South Australian and Queensland firefighters, as well as aircraft and equipment, were sent to assist with suppression efforts. The Australian Government deployed military personnel and equipment to support firefighting efforts.[48]

The Australian Government also requested and received assistance from the United States, Canada and New Zealand. This assistance included the deployment of personnel and equipment, such as firefighting aircraft.

Other relevant international agreements include the *International Charter Space and Major Disasters* – an agreement between countries and organisations that provides for the rapid sharing of satellite imagery and other data in the event of a major disaster, such as a bushfire, to support response efforts, and Global Fire Monitoring Centre, which is an international organisation that promotes cooperation and coordination in the monitoring and management of major fires.

Sharing resources internationally will be increasingly important as we manage bushfire risk in a changing climate but will also be more challenging for the sector to manage as bushfire seasons overlap and support is needed for other emergency response efforts.

7.6. Secure the necessary equipment and infrastructure for bushfire management in a changing climate

To better manage bushfire emergencies and their aftermath, the sector will seek to acquire and maintain equipment and infrastructure appropriate to current and future needs. This equipment and infrastructure will be versatile, safe and effective for use across the sector at any time of year.

The sector will seek to invest in a vehicle fleet that meets current and future bushfire management needs and develop clear expectations and operational activities for vehicle personnel.

The sector will improve its capability to operate effectively in various environments, conditions and terrains by developing mobile assets that facilitate decision-making closer to areas of operation.

The sector will maintain and supplement infrastructure, such as roads and bridges, to better support delivery of fire prevention, preparedness, fuel management, suppression and recovery activities. The sector will continually look for opportunities to improve resilience and adaptability of emergency services infrastructure for future bushfire and other emergency events.

CASE STUDY

Securing water supplies in remote areas

Remote and mountainous forest areas of Hume and other north-eastern regions of Victoria are prone to bushfire ignition from dry lightning.

During bushfire suppression, helicopters must attend the nearest accessible water sources to reload fire suppressants. A shortage of suitable water sources can lead to longer turnaround times, increasing the risk of bushfires growing in speed and intensity.

The Department of Energy, Environment and Climate Action (DEECA) Hume region started a pilot project to identify the best locations to build waterpoints in remote, high-elevation areas for crews to access water stores during emergencies.

DEECA selected sites using spatial analysis and modelling, working with technical site and specification specialists with local knowledge of high-risk bushfire areas.

'Heli-dip' sites have been established in 3 Victorian regions – Hume, Port Phillip and Gippsland. The sites comprise 'heli-dip' water tanks with a capacity to contain 25,000 litres of water, enabling helicopters to quickly re-fill their tanks with water and return to fires.

Timing is essential to contain bushfire. The availability of these heli-dip sites means firefighting crews can ready access water to help suppress fires before they spread and potentially impact communities, the environment and cultural values. The project has employed local suppliers and contractors, providing vital economic stimulus to support regional communities.

1685
WOODLANDS

8. Implementation, monitoring and reporting

Delivery of the Strategy will be supported by the Implementation Plan and the Monitoring, Evaluation and Reporting Framework.

Outcomes framework

The Strategy was developed in line with the Victoria's Emergency Management Sector Outcomes Framework (the Outcomes Framework). The Outcomes Framework ensures that the Victorian Government can meet the long-term needs of the community. It has been developed in consultation with the bushfire management sector, community, non-government organisations and Traditional Owners.

Outcomes can be defined at different levels, such as the community level, the system level, the program level or the individual level. The Outcomes Framework focuses on the community-level outcomes, which establish what is most valuable to the community, and the systems level, which establishes the systems that must be in place to achieve good community outcomes.

Work ahead to further refine the bushfire risk management outcomes framework

Bushfire risk management is a complex space involving contributions from dozens of agencies, tens of thousands of Victorians with roles in fire services, community groups and volunteer organisations, and every Victorian living in a community exposed to the risk of bushfire. The development of a whole-of-sector outcomes framework will assist the community to understand how all that work comes together to reduce the risk and impact of bushfires on communities, critical infrastructure, the environment, social and cultural values and local economies.

Review of the Strategy

The Strategy will be reviewed after 5 years to ensure it continues to reflect the community, sector and Traditional Owners' needs across all domains and is fit for purpose in a rapidly changing climate.

Implementation plan

To support delivery and drive accountability, the Victorian Government has developed an Implementation Plan – a 3-year rolling plan to be refreshed annually to strengthen delivery of the Strategy's outcomes.

The Implementation Plan outlines actions, agency responsibility and planned timeframes for delivery. Actions in the Implementation Plan will help Victorian Government agencies work towards the Strategy's outcomes and strategic directions, driving future improvements in bushfire management. The initial Implementation Plan reflects current, funded projects and actions that the Victorian Government is delivering towards the Strategy's outcomes, including actions delivered in partnership between multiple government agencies, local government and non-government organisations.

The Implementation Plan's annual refreshing will provide opportunities to strengthen delivery and support planning and prioritisation of government investment. A full review will be conducted every 3 years with input from the sector, community, industry and Traditional Owners. This will allow for continued innovation and prioritisation of new actions to deliver on the Strategy's vision.

This approach enables adaptability to emergency events, new insights generated by research, evaluation, and community feedback and the scheduled 5-year review of the Strategy.

Monitoring, evaluation and reporting

Victoria's Bushfire Monitoring, Evaluation and Reporting Framework (the Framework) has been developed to support the assessment of performance against the Strategy and to inform evidence-based decision-making and continuous-improvement processes e.g. Strategy reviews. The Framework provides a high-level framework to set the foundations for effective monitoring, evaluation, and reporting (MER). This includes outlining the:

- objectives and principles for MER
- evaluation focus areas and associated evaluation questions
- assessment of progress towards outcomes
- reporting and improvement processes.

More detailed guidance will be provided by a supporting monitoring, evaluation and reporting plan that will be regularly reviewed and updated to ensure it remains relevant and fit for purpose.

The Framework builds on the domains and outcomes identified in this Strategy by outlining intermediate outcomes that articulate the change we need to see to achieve the Strategy outcomes. These intermediate outcomes have been designed to connect the high-level outcomes and the strategic directions in the Strategy, allowing a deeper understanding of the factors that contribute to the Strategy outcomes.

Indicators and measures will be developed to support the assessment of whether we are achieving those outcomes. This assessment will also be informed by more comprehensive periodic evaluations that will use qualitative evidence such as information gathered through surveys and interviews. These evaluations will be important to ensure we adapt to the strategic drivers of the Strategy, learning from our progress and the change we are seeing within the sector, our communities and the environment.

Appendix 1 – Strategy overview

DOMAIN	OUTCOME	STRATEGIC DIRECTIONS
1. People and community safety	Communities are more resilient to the impacts of bushfires and bushfire management activities	1.1. Empower people and communities to manage local bushfire risk, response and recovery 1.2. Build the resilience of at-risk cohorts through education and collaboration 1.3. Use a range of mitigation strategies to reduce fire starts and impacts 1.4. Deliver fuel management that addresses the challenges associated with a changing climate 1.5. Limit the impact of bushfires through early control 1.6. Support timely and effective community recovery
2. Critical infrastructure and economic resilience	Business, industry and infrastructure are more resilient to the impacts of bushfires and bushfire management activities	2.1. Understand, plan for and minimise economic impacts across all aspects of bushfire management 2.2. Embed business and industry expertise into bushfire management 2.3. Mitigate fire ignition risks from industry and critical infrastructure 2.4. Invest in resilient infrastructure to minimise disruption to communities
3. Aboriginal self-determination in cultural fire and bushfire management	The sector supports and enables self-determination of Traditional Owners and Aboriginal Victorians in land and bushfire management	3.1. Develop operational pathways that enable Traditional Owners to lead the planning and to undertake cultural burns across all land tenures and Country types according to their cultural obligations 3.2. Build Traditional Owner governance and capacity in cultural fire knowledge and practice 3.3. Improved management of state forest reserves and private land through the application of collaborative management to heal Country and build resilience in people and landscapes 3.4. Facilitate the development and strengthening of institutional frameworks that support cultural fire practice 3.5. Enable Traditional Owners to have a greater role in bushfire management according to their self-determined interests and objectives

DOMAIN	OUTCOME	STRATEGIC DIRECTIONS
4. Ecosystem resilience and nature conservation	Fire regimes support healthy and resilient ecosystems and nature conservation in a changing climate	4.1. Continuously improve data, tools, systems, and knowledge of the influence of fire regimes on ecosystem resilience and the environment 4.2. Integrate research and knowledge on climate change into modelling and planning for ecosystem resilience 4.3. Improve monitoring, evaluation, and reporting on fire management practices against ecosystem resilience metrics and targets 4.4. Improve the effectiveness, consistency, and transparency of environmental value assessments 4.5. Strengthen leadership in fire ecology and environmental sciences 4.6. Build community understanding of fire regimes, ecosystem resilience, and nature conservation
5. Informed decision-making, evidence-based approaches and tools	Victoria uses the best available science, innovation and knowledge to support evidence-based decisions	5.1. Invest in high-quality shared data, science and research 5.2. Prioritise resources on actions that will most effectively reduce bushfire risk and impacts 5.3. Build a culture of transparent evidence-based decision-making at all levels of fire management 5.4. Embed Traditional Owner and community insights in evidence and decision-making
6. Working together, accountability and shared responsibility	The sector, land managers, communities and industry work together effectively and share responsibility for managing bushfire risk across public and private land	6.1. Collaborate with the community and other stakeholders 6.2. Establish and maintain a comprehensive bushfire management framework 6.3. Apply an integrated bushfire management planning framework 6.4. Increase transparency to support greater accountability in bushfire management 6.5. Share bushfire risk decision-making with communities
7. Enhanced capability and capacity	Victoria is supported and equipped with the skills, equipment, capability and systems to safely and effectively manage bushfire	7.1. Better support interoperability and decision-making through standardisation 7.2. Build capability through education, coaching and mentoring programs 7.3. Embed physical and mental health, wellbeing and safety 7.4. Increase diversity at all levels of fire management 7.5. Build sector capacity and capability in a changing climate 7.6. Secure the necessary equipment and infrastructure for bushfire management in a changing climate

Appendix 2 – List of acronyms

Term	Acronym
AFAC	National Council for Fire & Emergency Service
AFDRS	Australian Fire Danger Rating System
BRMC	Bushfire Risk Mitigation Committee
BWA	Behaviour Works Australia
CBBM	Community-Based Bushfire Management
CFA	Country Fire Authority
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEECA	Department of Energy, Environment and Climate Action
DE	Department of Education
DGS	Department of Government Services
DH	Department of Health
DJSIR	Department of Jobs, Skills, Industry and Regions
DPC	Department of Premier and Cabinet
DTP	Department of Transport and Planning
EMV	Emergency Management Victoria
ERV	Emergency Recovery Victoria
FAME	Fire Analysis Module for Ecological Values
FDR	Fire Danger Ratings
FFMVic	Forest Fire Management Victoria
FIB	Forest Industry Brigades
FMS	Fuel Management System
FOPS	Falling object protection structures

Term	Acronym
FRV	Fire Rescue Victoria
ICIP	Indigenous Cultural Intellectual Property
IGEM	Inspector-General for Emergency Management
IMT	Incident Management Team
IP	Implementation Plan
JFMP	Joint Fuel Management Program
LGV	Local Government Victoria
MAV	Municipal Association Victoria
MEMPC	Municipal Emergency Management Planning Committee
MER	Monitoring, Evaluation and Reporting
PV	Parks Victoria
RFAs	Regional Forest Agreements
RMR	Regional Mobile Radios
SAP	Strategic Action Plan
SCRC	State Crisis and Resilience Council
SEMC	Security and Emergency Management Committee
SEMP	State Emergency Management Plan
SMP	Strategic Management Prospects
Triple Zero	Triple Zero Victoria
VAGO	Victorian Auditor General's Office
VBMERF	Victoria's Bushfire Monitoring, Evaluation and Reporting Framework
VBMS	Victoria's Bushfire Management Strategy
VicSES	Victoria State Emergency Service

References

1 Department of Environment, Land, Water and Planning 2015, *Strategic bushfire management – environmental features*, viewed January 2023, https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0029/442964/Victorias-Climate-Science-Report-2019.pdf

2 Parks Victoria 2021, *Nature Conservation Strategy for parks and reserves managed by Parks Victoria*, viewed January 2023, <www.parks.vic.gov.au/get-into-nature/conservation-and-science/conserving-our-parks/nature-conservation-strategy>

3 SGS Economics & Planning, 2019, *The growing risk of natural perils: preemptive action needed*, viewed March 2022, <https://www.sgsep.com.au/publications/insights/research-note-the-growing-risk-from-natural-perils>

4 Inspector General for Emergency Management, 2020, *Inquiry Into the 2019/20 Victorian Fire Season, Phase 1 – Community and sector preparedness for and response to the 2019–20 fire season Report*, pp 59

5 Arriagada, N B, Palmer, A J, Bowman D MJS, Morgan, G, Jalaludin, B B, & Johnston, F H 2020, 'Unprecedented smoke-related health burden associated with the 2019–20 bushfires in eastern Australia', *The Medical Journal of Australia*, vol. 213, no. 6, DOI: 10.5694/mja2.50545

6 Ademi, Z, Zomer, E, Marquina, C, Lee, P, Talic, S, Guo, Y, & Liew, D 2023, 'The Hospitalizations for Cardiovascular and Respiratory Conditions, Emergency Department Presentations and Economic Burden of Bushfires in Australia Between 2021 and 2030: A Modelling Study', *Current Problems in Cardiology*, vol. 48, no. 1, DOI: 10.1016/j.cpcardiol.2022.101416

7 Inspector General for Emergency Management, 2020, *Inquiry Into the 2019/20 Victorian Fire Season, Phase 1 – Community and sector preparedness for and response to the 2019–20 fire season Report*, pp 58

8 State of Victoria, 2021, 'The economic impacts of the 2019-20 bushfires on Victoria', *Victoria's Economic Bulletin*, vol. 5, no. 1, pp. 33-54

9 Department of Environment, Land, Water and Planning 2020, *Victoria's bushfire emergency: biodiversity response and recovery*, version 2, viewed January 2023, <www.wildlife.vic.gov.au/__data/assets/pdf_file/0030/484743/Victorias-bushfire-emergency-Biodiversity-response-and-recovery-Version-2-1.pdf>

10 Victorian Government, 2010, The impacts, losses and benefits sustained from five severe bushfires in south-eastern Australia. Fire and Adaptative Management. Report n 88. Viewed January 2023, <Report-88-The-Impacts-Losses-and-Benefits-Sustained-from-Five-Severe-Bushfires-in-SE-Aust..pdf (ffm.vic.gov.au)>

11 Parliament of Victoria, 2010, '2009 Victorian Bushfires Royal Commission', Summary Report, viewed January 2023, <VBRC_Summary_PF.pdf (royalcommission.vic.gov.au)>

12 State of Victoria, 2021, 'The economic impacts of the 2019-20 bushfires on Victoria', *Victoria's Economic Bulletin*, vol. 5, no. 1, pp. 33-54

13 Bishop, J et all, Fire on the Farm. Assessing the impacts of the 2019-20 bushfires on food and agriculture in Australia, viewed 24 January 2023, <https://www.wwf.org.au/ArticleDocuments/353/WWF%20Report-Fire%20on%20the%20Farm_converted.pdf.aspx>

14 Harris, S & Lucas, C 2019, 'Understanding the variability of Australian fire weather between 1973 and 2017' PLoS ONE, vol. 14, no. 9, DOI: 10.1371/journal.pone.0222328; Dowdy, A J 2018, 'Climatological variability of fire weather in Australia', Journal of Applied Meteorology and Climatology, vol. 57, no.2, pp. 221–234; Harris, S, Nicholls, N, Tapper, N, & Mills, G 2019, 'The sensitivity of fire activity to inter-annual climate variability in Victoria, Australia', Journal of Southern Hemisphere Earth System Science, vol. 69, no. 1, pp 146-160, DOI: 10.1071/ES19008; Harris, S, Mills, G, Brown, T & Ackland, A 2019, 'Victorian fire weather trends and variability', paper presented at the 6th International Fire Behavior and Fuels Conference, International Association of Wildland Fire, 29 April – 3 May

15 Department of Environment, Land, Water and Planning 2019, *Victoria's Climate Science Report 2019*, viewed January 2023, <https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0029/442964/Victorias-Climate-Science-Report-2019.pdf>

16 Canadell, J G, Meyer, C P, Cook, G D, Dowdy, A, Briggs P R, Knauer, J, Pepler, A, & Haverd, V 2021, 'Multi-decadal increase of forest burned area in Australia is linked to climate change', *Nature Communications*, vol. 12, no. 6921, DOI: 0.1038/s41467-021-27225-4

17 Harris, S, Mills, G, Brown, T & Ackland, A 2019, 'Victorian fire weather trends and variability', paper presented at the 6th International Fire Behavior and Fuels Conference, *International Association of Wildland Fire*, 29 April – 3 May

18 Department of Environment, Land, Water and Planning 2019, *Victoria's Climate Science Report 2019*, viewed January 2023, <https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0029/442964/Victorias-Climate-Science-Report-2019.pdf>

19 Department of Environment, Land, Water and Planning 2019, *Victoria's Climate Science Report 2019*, viewed January 2023, https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0029/442964/Victorias-Climate-Science-Report-2019.pdf

20 Department of Environment, Land, Water and Planning 2019, *Victoria's Climate Science Report 2019*, viewed January 2023, <https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0029/442964/Victorias-Climate-Science-Report-2019.pdf>

21 Department of Environment, Land, Water and Planning 2019, *Victoria in Future 2019: Population Projections 2016 to 2056*, viewed March 2022, <https://www.planning.vic.gov.au/__data/assets/pdf_file/0032/332996/Victoria_in_Future_2019.pdf>

22 The Victorian Traditional Owner Cultural Fire Knowledge Group 2019, *The Victorian Traditional Owner Cultural Fire Strategy*, viewed March 2022, <https://knowledge.aidr.org.au/media/6817/fireplusstrategyplusfinal.pdf>

23 Emergency Management Victoria 2019, *Resilient Recovery Strategy*, viewed March 2022, <https://files.emv.vic.gov.au/2021 08/Resilient%20Recovery%20Strategy.pdf>; University of Melbourne 2021, *10 Years Behind Bushfires Report*, viewed March 2022, <https://mspgh.unimelb.edu.au/__data/assets/pdf_file/0009/3645090/BB-10-years-report_spread.pdf>; Australian Disaster Resilience Handbook Collection 2020, *Community Engagement for Disaster Resilience*, viewed March 2022,<https://knowledge.aidr.org.au/media/7989/aidr_handbookcollection_communityengagementfordisasterresilience_2020.pdf>

24 Upperbeacstorymap 2021, *Upper Beaconsfield, Guys Hill and Dewhurst: A Community led values based bushfire risk mitigation project*, viewed March 2022, <https://storymaps.arcgis.com/stories/62bd8146b33e4994a1cec1a7405686f5>

25 Emergency Management Victoria 2019, *Bushfire Safety Policy Framework*, p. 14, viewed March 2022 <https://files.emv.vic.gov.au/2021-05/Bushfire%20Safety%20Policy%20Framework%202018.pdf>

26 Australian Institute for Disaster Resilience 2018, *National Principles for Disaster Recovery*, viewed January 2023 <https://knowledge.aidr.org.au/resources/national-principles-for-disaster-recovery/>

27 Australian Institute for Disaster Resilience 2018, *Community Recovery Handbook*, p. 31, viewed January 2023 <https://knowledge.aidr.org.au/media/5634/community-recovery-handbook.pdf>

28 Department of Transport and Planning 2022, *Education and Training Adaptation Action Plan 2022–2026*, viewed January 2023, https://transport.vic.gov.au/-/media/tfv-documents/transport-climate-change-adaptation-action-plan-2022-2026.pdf?la=en&hash=3EDF1F80CECE5DF0FC17615EB6EFAAC9

29 Department of Jobs, Precincts and Regions 2022, *Primary Production Climate Change Adaptation Action Plan 2022–2026*, viewed January 2023, https://agriculture.vic.gov.au/__data/assets/pdf_file/0004/838246/Primary-Production-Climate-Change-Adaptation-Action-Plan-2022-2026.pdf

30 Emergency Management Victoria, *Critical Infrastructure Resilience*, https://www.emv.vic.gov.au/about-us/current-projects/critical-infrastructure-resilience

31 Victorian Government, Community Resilience Framework for Emergency Management, *Creating effective economic and community recovery and resilience*, https://www.vic.gov.au/economic-recovery-practice-framework/appendix-1-role-government/creating-effective-economic-and

32 Emergency Management Victoria, Community Resilience Framework for Emergency Management, https://www.emv.vic.gov.au/how-we-help/resilience/community-resilience-framework-for-emergency-management

33 Department of Environment, Land, Water and Planning 2022, *Built Environment Climate Change Adaptation Action Plan 2022–2026*, viewed March 2022, <https://www.planning.vic.gov.au/__data/assets/pdf_file/0037/557389/Built-Environment-Climate-Change-Adaptation-Action-Plan-2022-2026.pdf>

34 Department of Environment, Land, Water and Planning 2021, *Water Cycle Climate Change Adaptation Action Plan 2022–2026*, viewed March 2022, <https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0025/558421/WaterCycleAdaptationActionPlan.pdf>. Department of Environment, Land, Water and Planning 2020, *Powerline Bushfire Safety Program Progress Report 2012-2019*, viewed September 2023, Powerline-bushfire-safety-program-Progress-report-2012-19.pdf (energy.vic.gov.au) Powerline-bushfire-safety-program-Progress-report-2012-19.pdf (energy.vic.gov.au)

35 https://www.austrade.gov.au/land-tenure/land-tenure/about-land-tenure

36 Department of Environment, Land, Water and Planning 2020, *Victoria's bushfire emergency: biodiversity response and recovery, version 2*, viewed January 2023, <www.wildlife.vic.gov.au/__data/assets/pdf_file/0030/484743/Victorias-bushfire-emergency-Biodiversity-response-and-recovery-Version-2-1.pdf>

37 Department of Environment, Land, Water and Planning 2019, *Biodiversity Knowledge Framework*, Version 1, viewed January 2023, <www.environment.vic.gov.au/__data/assets/pdf_file/0024/462390/Knowledge-framework-Version-1.pdf>; Department of Environment, Land, Water and Planning 2017, *Protecting Victoria's Environment – Biodiversity 2037*, viewed January 2023, <www.environment.vic.gov.au/__data/assets/pdf_file/0022/51259/Protecting-Victorias-Environment-Biodiversity-2037.pdf>

38 Department of Environment, Land, Water and Planning 2017, *Protecting Victoria's Environment – Biodiversity 2037*, viewed January 2023, <www.environment.vic.gov.au/__data/assets/pdf_file/0022/51259/Protecting-Victorias-Environment-Biodiversity-2037.pdf>

39 Department of Environment and Primary Industries 2013, *Victorian Waterway Management Strategy*, viewed October 2023; < https://www.water.vic.gov.au/waterways/victorian-waterway-management-program/victorian-waterway-management-strategy>

40 Department of Environment, Land, Water and Planning 2022, *Natural Environment Climate Change Adaptation Action Plan 2022–2026*, viewed March 2022, <https://www.environment.vic.gov.au/__data/assets/pdf_file/0030/558264/Natural-environment-Climate-Change-Adaptation-Action-Plan-2022.pdf>

41 Department of Environment, Land, Water and Planning 2022, *Natural Environment Climate Change Adaptation Action Plan 2022–2026*, viewed March 2022, <https://www.environment.vic.gov.au/__data/assets/pdf_file/0030/558264/Natural-environment-Climate-Change-Adaptation-Action-Plan-2022.pdf>

42 *Flora and Fauna Guarantee Act 1988* (Vic); *Environment Protection and Biodiversity Conservation Act 1999* (Cth)

43 Department of Education and Training 2022, *Education and Training Adaptation Action Plan 2022–2026*, viewed January 2023, https://www.vic.gov.au/sites/default/files/2022-02/education-and-training-climate-change-adaptation-action-plan-2022-2026_1.pdf

44 Emergency Management Victoria 2015, Emergency Management Capability Blueprint 2015-2025, viewed March 2022, <https://www.emv.vic.gov.au/how-we-help/emergencymanagement-capability-in-victoria/emergency-management-capability-blueprint-2015-2025>

45 Emergency Management Victoria 2015, *Emergency Management Capability Blueprint 2015-2025*, viewed March 2022, <https://www.emv.vic.gov.au/how-we-help/emergency-management-capability-in-victoria/emergency-management-capability-blueprint>

46 https://www.afac.com.au/initiative/nrsc/article/principles-of-arrangement-for-interstate-assistance

47 https://www.afac.com.au/initiative/nrsc/article/operating-plan-for-the-exchange-of-wildland-fire-management-resources-between-united-states-of-america-and-australian-participants
https://www.afac.com.au/initiative/nrsc/article/operating-plan-for-the-exchange-of-wildland-fire-management-resources-between-canadian-and-australian-participants

48 https://www.transparency.gov.au/annual-reports/department-defence/reporting-year/2019-20-130

Image credits

Page	Credit
Cover	State of Victoria, Safer Together
3	Jacque Quaine
5	State of Victoria, DEECA
13	Jacque Quaine
15	Jacque Quaine
16	Jacque Quaine
17	Tome Lowe
18	Jacque Quaine
19	Jacque Quaine
20	Conservation Regulator
23	State of Victoria, Safer Together
25	Jacque Quaine
27	Lachlan Sparks
30	Jacque Quaine
31	Lavinia Zirnsak
32	Powerline Bushfire Safety Program's Powerline Replacement Fund
35	Tracey McRae
36	Levi Lovett
39	Levi Lovett
41	State of Victoria, DEECA
43	Marcia Riederer
44	Jacque Quaine
45	Jacque Quaine
48	Jacque Quaine
49	Marcia Riederer
51	State of Victoria, DEECA
55	William Smith
57	Jacque Quaine
58	State of Victoria, Safer Together
61	State of Victoria, DEECA
62	Tracey McRae
64	State of Victoria, DEECA
65	William Smith
66	David Ross
67	Jacque Quaine
69	Marcia Riederer

VICTORIA
State
Government