

Reducing Victoria's bushfire risk on public land

Fuel management
report 2015–16



The department pays its respect and proudly acknowledges the contribution and continued commitment to land and resource management by Victoria's Traditional Owners, their rich culture and the intrinsic connection they have to country.

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Printed by Mercedes Waratah Digital, Port Melbourne.

ISSN 2207-4627 - Print format

ISSN 2207-4635 - Online (pdf / word) format

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Foreword

Welcome to *Reducing Victoria's bushfire risk on public land: Fuel management report 2015–16*, the fourth annual report about the achievements of Victoria's Bushfire Fuel Management Program on Public Land.

Fuel management is a combined effort by staff of Forest Fire Management Victoria supported by Country Fire Authority across the state to work towards the two primary objectives in the [Code of Practice for Bushfire Management on Public Land 2012](#). They are:

- to minimise the impact of major bushfires on human life, communities, essential and community infrastructure, industries, the economy and the environment: human life will be afforded priority over all other considerations
- to maintain or improve the resilience of natural ecosystems and their ability to deliver services such as biodiversity, water, carbon storage and forest products.

The 2015–16 planned burning season was challenging, but the determination and hard work of all staff was evident in the activities they completed and the new initiatives they undertook. Their accomplishments included the treatment of 197,940 ha, which contributes to about a 30% reduction of bushfire risk for Victoria.

In November 2015, we released [Safer Together: A new approach to reducing the risk of bushfire in Victoria](#). This policy marks key changes in how we will measure success in achieving our bushfire management objectives and how we work with communities and develop partnerships with them, other agencies and all our stakeholders.

The key change in how we measure success is from a hectare-based target for fuel management to a risk-reduction target. Under this new approach, we'll measure how effective our fuel management activities are, not just how much we have burned. As we make this transition, this report will be the last

that reports progress towards hectare-based fuel management targets (which applied in 2015–16), while also reporting on [residual risk](#) trends. Next year's report will complete the transition, recording progress against the risk-reduction targets that will apply in 2016–17 under Safer Together. Also, in this transitional report some items are reported at the landscape scale and some at the regional scale, as appropriate to the particular item.

The key change in how we will work with others is being implemented through our [Community Charter](#). We will be placing a much greater emphasis on understanding what the public consider important about our work, what outcomes they expect from interacting with us and what 'putting the community first' means in practice. As you read this report, and particularly the items about the work of our field staff, I trust you will notice an increasing emphasis on working with the community to ensure they are active and respected partners in our joint efforts to manage bushfire risk.

Thank you for taking the time to read this report, and for your interest in reducing Victoria's bushfire risk on public land.

Stephanie Rotarangi
Chief Fire Officer





Introduction

About fuel management

Victoria is one of the most fire-prone areas in the world. In past decades, Victorians have seen the disastrous effects bushfires can have on communities.

Under the *Forests Act 1958* and in line with the *Code of Practice for Bushfire Management on Public Land 2012*, the Department of Environment, Land, Water and Planning (DELWP) is responsible for managing bushfire risk on public land. We manage bushfire risk — primarily through fuel management — to implement the two code of practices objectives. They are to:

- minimise the impact of major bushfires on human life, communities, essential and community infrastructure, industries, the economy and the environment: human life will be afforded priority over all other considerations
- maintain or improve the resilience of natural ecosystems and their ability to deliver services such as biodiversity, water, carbon storage and forest products.

To do this, we work with a broad range of organisations and individuals — including other Victorian Government agencies, local governments, emergency management organisations, environmental organisations, water companies and industry organisations, and with Traditional Owners through land management partnerships — to manage bushfire risk on almost 8 million hectares (ha) of public land on behalf of all Victorians.

Forest Fire Management Victoria is the lead agency for bushfire management on public land. Our team includes staff from DELWP, Parks Victoria, VicForests and Melbourne Water.

Fuel management is the most effective way to reduce fuel on large areas of public land and the key way we manage bushfire risk. Fuel management includes planned burning (lighting and managing planned fires in the landscape at times of the year when bushfire risk is lower) and mechanical treatment (mowing, slashing, mulching and using herbicides). For fuel management purposes, Victoria is classified into four fire management zones:

- Asset Protection Zone (APZ): an area around properties and infrastructure where we intensively manage fuel to provide localised protection to reduce radiant heat and ember attack on life and property in the event of a bushfire
- Bushfire Moderation Zone (BMZ): an area around properties and infrastructure where we manage fuel to reduce the speed and intensity of bushfires and to protect nearby assets, particularly from ember attack in the event of a bushfire
- Landscape Management Zone (LMZ): an area where we manage fuel to minimise the impact of major bushfires, to improve ecosystem resilience and for other purposes (such as to regenerate forests and protect water catchments)
- Planned Burning Exclusion Zone (PBEZ): an area where we try to avoid planned burning, mainly because ecological assets in this zone cannot tolerate fire.

Targets in transition

Fuel management reduces the amount of fuel available to a bushfire, which can reduce its intensity and rate of spread and so increase opportunities for firefighters to suppress it.

In recent years, Victoria’s emergency management sector, including its bushfire risk managers, has sought to continuously improve the management of bushfire risk. This has led to two significant changes: a focus on Bushfire Risk Landscapes (BRLs) for strategic planning and risk modelling purposes, and the release of the *Safer Together* policy in November 2015.

Safer Together included a move from a hectare-based target to a risk-reduction target for fuel management. As a result, this year’s fuel management report is a transitional report, recording progress towards the hectare-based fuel management targets that applied in 2015–16 while also reporting on residual risk trends. Next year’s report will complete the transition, recording progress in terms of the risk-reduction targets that will apply in 2016–17 under *Safer Together*.

Over the next few years, with input from communities and stakeholders, we expect to expand our risk-based planning to include strategies for bushfire prevention, preparedness, response and recovery. We will also improve how we identify and manage risk using the best-available data and research.

Metrics and reporting scale

This report uses three scales — statewide, BRL and region — to report outcomes and activities. Each reporting metric is represented at the scales that most appropriately represents the outcome or activity. Table 1 shows the scale at which each metric is reported.

Table 1: Metrics and reporting scale

Statewide scale	BRL scale	Region scale
Costs	Residual risk	Burn planning
	Ecosystem resilience	Site preparation
	Community engagement	Fuel reduction
	Monitoring, evaluation and reporting (MER)	





Regions represent areas where we carry out ground activity (such as fuel management including planned burning). For management purposes, DELWP, has divided the state into six regions, each of which comprises two or more fire districts. Figure 1 shows the regions and fire districts.

Bushfire Risk Landscapes (BRLs) are geographical areas of Victoria in which bushfires tend to behave in a similar way. In each BRL we model risk and strategically plan for bushfire management in the landscape. Figure 2 shows Victoria's BRLs.

Through our *Bushfire Science Strategy 2013–17*, we invest heavily in research to improve the modelling and other tools we use to analyse risk and to improve the quality of our data. This investment is generating world-class scientific evidence to inform policy and operations. These improvements will be applied and documented as part of reporting on residual risk and ecosystem resilience. We continually work to improve the science behind our decisions and fully expect updates to be made regularly in light of the improvements. Comparisons between this report and past and future reports should be made in that light.



Figure 1: Regions and fire districts

This report contains technical terms and references to other documents, including legislation.

The main technical terms and documents referred to in this report are printed on their first use in green and are underlined. As many of the technical terms relate to the fuel management achievements, they are also hyperlinked in Table 2: Burn plans, site preparation and fuel reduction, Victoria.

If you are reading this report on a screen, click on the underlined, blue words to hyperlink to the explanation of the technical term in this report, or to go the relevant web page to which the text refers. If you are reading a printed version of the report, the explanation of the technical term is in 'Definitions and further information' at the end of the report.

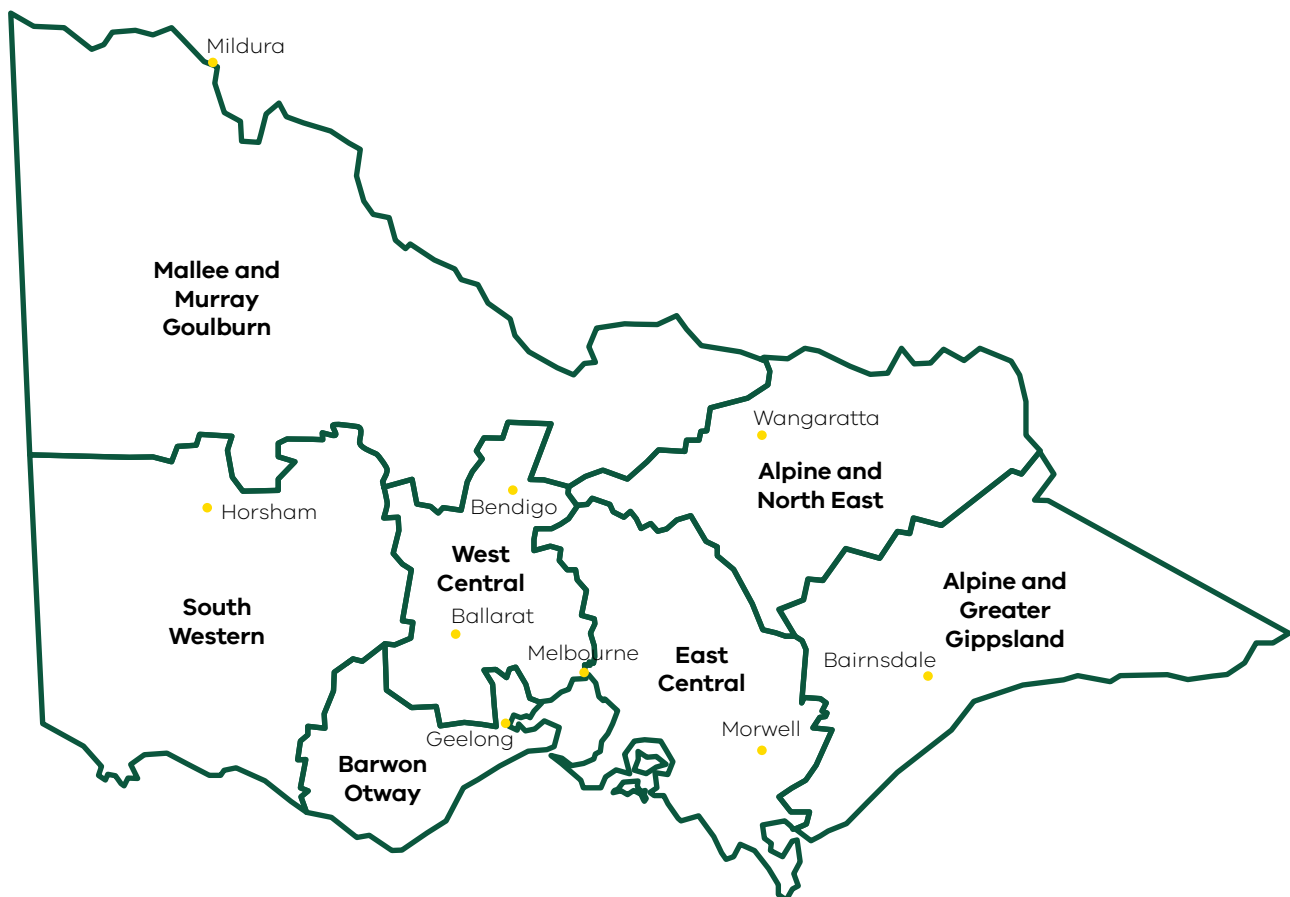


Figure 2: Bushfire risk landscapes







**What we
achieved
statewide**

Residual risk

We manage fuel to reduce bushfire risk, which is the likelihood of a fire starting, spreading and impacting on people, property and the environment. Bushfire risk reduces as bushfires and fuel management activities consume fuel, and it increases as fuel accumulates over time. Residual risk is the amount of bushfire risk which remains after bushfires and fuel management activities reduce fuel.

Figure 3 shows Victoria's modelled residual risk profile, based on historical records of fire from 1980–2016 and on burning planned in 2016–19. We estimate the level of residual risk in Victoria was about 70% for 2015–16.

The figure shows residual risk:

- fell steeply during the first half of the 1980s, largely as a result of the 1983 Ash Wednesday bushfires
- rose steadily from the 1980s through to the early 2000s as fuel re-accumulated across the state
- fell significantly as major bushfires in the 2000s, particularly the 2009 Black Saturday bushfires, reduced fuel; tragically, the reduced risk came at the cost of large losses to life and property

- has begun to rise as fuel has re-accumulated after the major bushfires in the 2000s
- has increased from about 65% in 2015 to about 70% in 2016.

This recent increase is due to unfavourable weather greatly reducing planned burning opportunities, an issue further explained in 'Weather effects on planned burning'. Opportunities were reduced the most in the West Central and Barwon Otway BRLs, both of which have a large proportion of statewide risk.

The figure shows how quickly re-accumulating fuel in Victoria's forests can increase bushfire risk, if fuel is not reduced with a continual fuel management program.

The figure also shows residual bushfire risk will decline steeply from 2015–2016 levels over the next three years if we complete the fuel management activities in the [fire operations plans \(FOPs\)](#), but it will rise steeply over the same period to about 83% if we cannot carry out our planned fuel management activities.

Improving residual risk estimates

In late 2016, improvements were made to data inputs and models used to calculate residual risk, including updated address point location data and fuel type mapping. Modelling at the date of publishing this report calculates residual risk at 62%. The 70% residual risk estimate presented in this report was calculated at the end of the 2016 autumn planned burn program using the best modelling available for the 2015–16 period. We will continue to refine our estimate of residual risk over time as our modelling becomes more accurate.



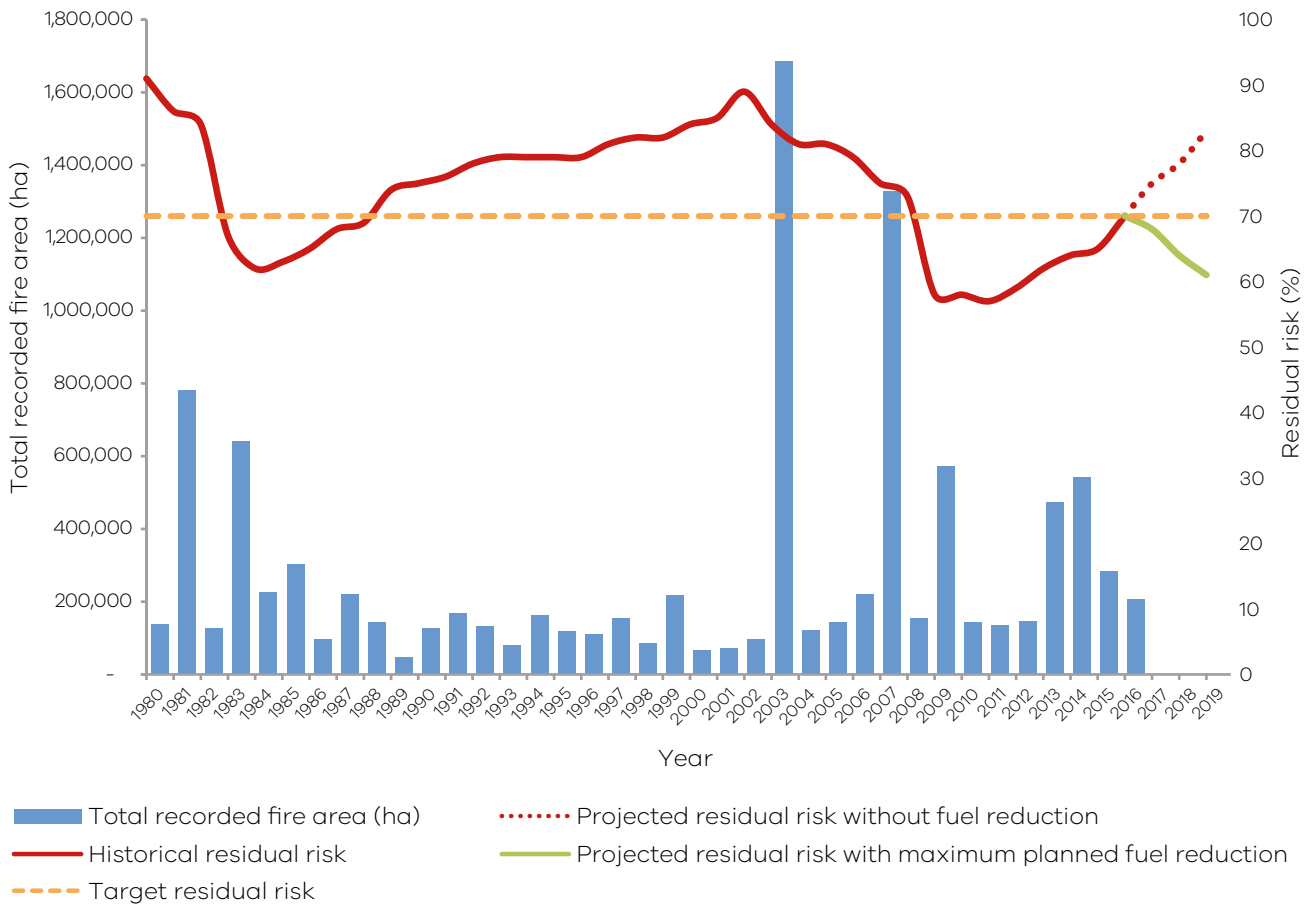


Figure 3: Residual risk profile, Victoria, 1980–2019





Ecosystem resilience

We also manage fuel to maintain or improve ecosystem resilience. 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 functions of its vegetation and its types of vegetation — over time.

To understand the impact of fuel management on ecosystem resilience, we measure and monitor the [tolerable fire interval \(TFI\)](#) and the [vegetation growth stage structure \(GSS\)](#) of areas we treat through the Bushfire Fuel Management Program. We have also commissioned universities and institutes to research how best to measure and represent the health of the environment including how best to use 'geometric mean abundance' to represent ecosystem resilience. In 2015–16, we tested the preliminary research results at several locations across Victoria.

Additionally, in 2015–16, we used improved information about fire history to assess TFI and GSS. This improved information more accurately captures the actual disturbances that have occurred on the ground, which improves the accuracy of our ecosystem resilience assessments. Some of the

improvements to the fire history information have more of an effect in recent years, which should be kept in mind when interpreting TFI and GSS trends over time.

Vegetation tolerable fire interval status

Figure 4 shows the TFI status since 1991 of the vegetation on public land across Victoria. It shows about 50% of the vegetation was below its minimum TFI in 2015–16, mainly as a legacy of the 2003, 2006–07 and 2009 bushfires.

The amount of vegetation below minimum TFI will remain consistent for a long time because many bushfire affected vegetation types have relatively long TFIs, ranging from 15–80 years. Large bushfires have the potential to impact how much of the vegetation is below minimum TFI.

The major bushfires since 2003 ended a long period without many major bushfires. Consequently, they burnt out large areas and as a result there are now large areas of public land with single-age vegetation. A landscape dominated by single-age vegetation has lower ecological resilience than that dominated by multi-age vegetation. Further, if fire burns out vegetation that is below minimum TFI, there may be increased ecological risks and ecosystem resilience may worsen.

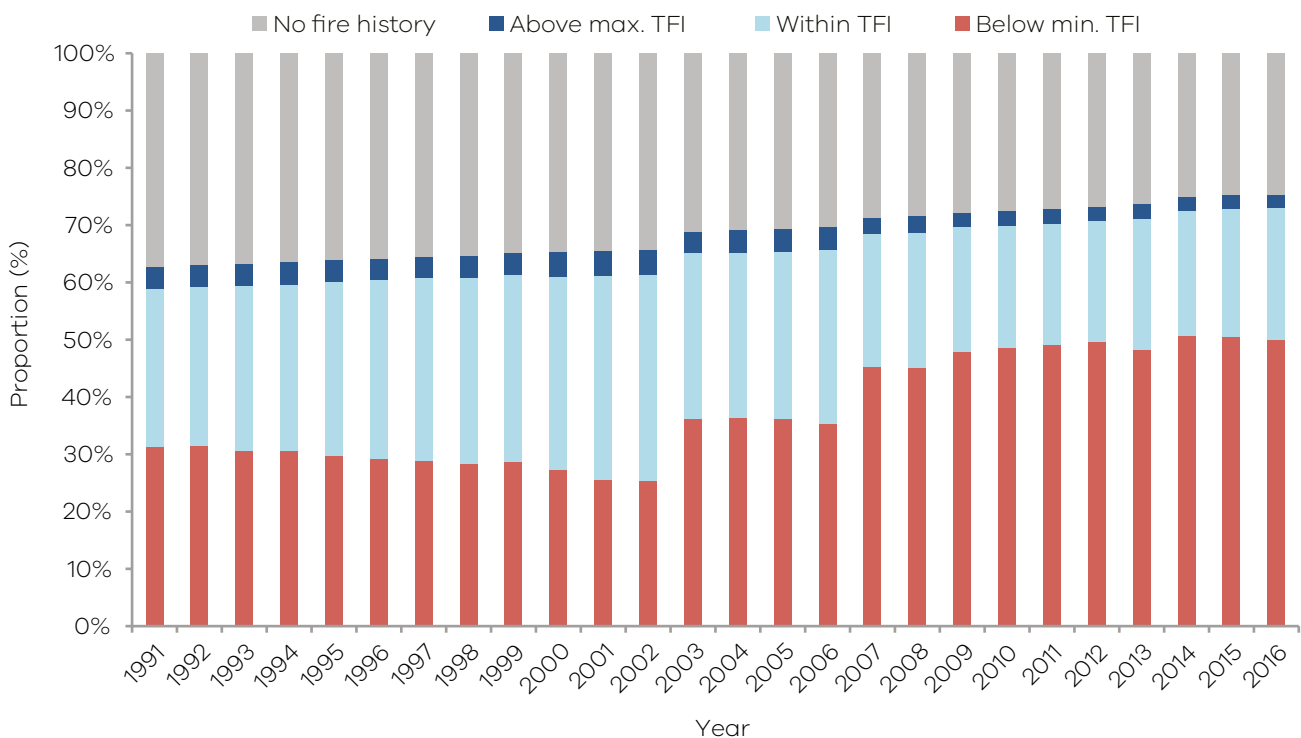


Figure 4: TFI status of public land vegetation, Victoria, 1991–2016

Figure 5 shows the area of public land burnt while below minimum TFI from 1992–2016. This area is a result of bushfires and planned burning.

During the 1990s and 2000s, relatively low levels of fuel management activity contributed to a build-up of fuel across Victoria, culminating in several major bushfires. Some of these bushfires burnt large areas of public land that were already below minimum TFI due to previous bushfires or planned burning. For

example, some areas in the Victorian Alps were burnt by more than one of the 2003, 2006–07 and 2013 bushfires.

Planned burning may be needed in some areas already below minimum TFI to reduce bushfire risk to life, property or important ecosystems. The area burnt while below minimum TFI in 2015–16 was similar to the previous year, with almost all of it a result of planned burning.

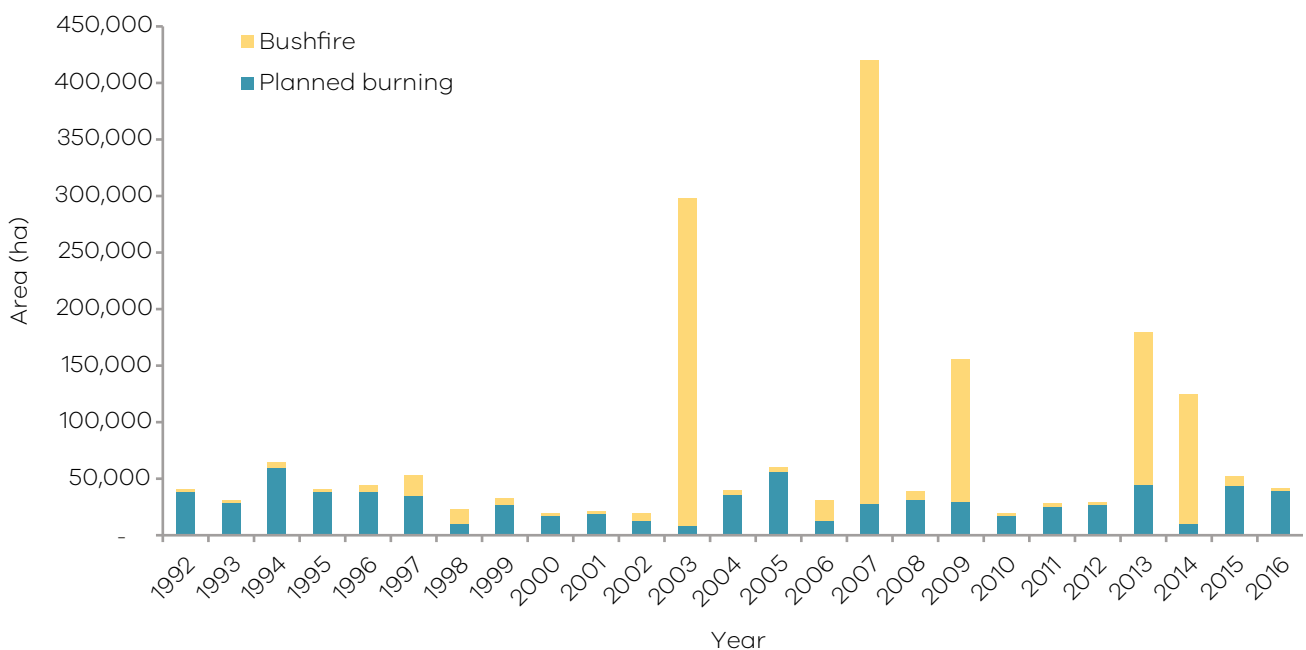


Figure 5: Area of public land burnt while below minimum TFI, 1992–2016

Figure 6 shows the area of each fire management zone treated by planned burning while below minimum TFI between 1992–2016. Figure 7 shows the proportion of each zone treated by planned burning while below minimum TFI over the same period.

Figure 6 shows the greatest areas treated while below minimum TFI are in LMZ and BMZ, with smaller areas treated in APZ. However, Figure 7 shows that the proportion of area treated by planned burning while below minimum TFI is greatest in APZ. This is because APZ is relatively small in area and because we burn more frequently in APZ to protect life and

property. Overall, the proportion of fire management zones treated by planned burning while below minimum TFI was very low in 2015-16 (<1%).

The code of practice requires us to manage bushfire risk to protect people and property as well as to maintain or improve environmental values. It is important we find the right balance between reducing fuel in the various fire management zones and minimising planned burning impacts on environmental values: planning to do so is part of the strategic planning process.

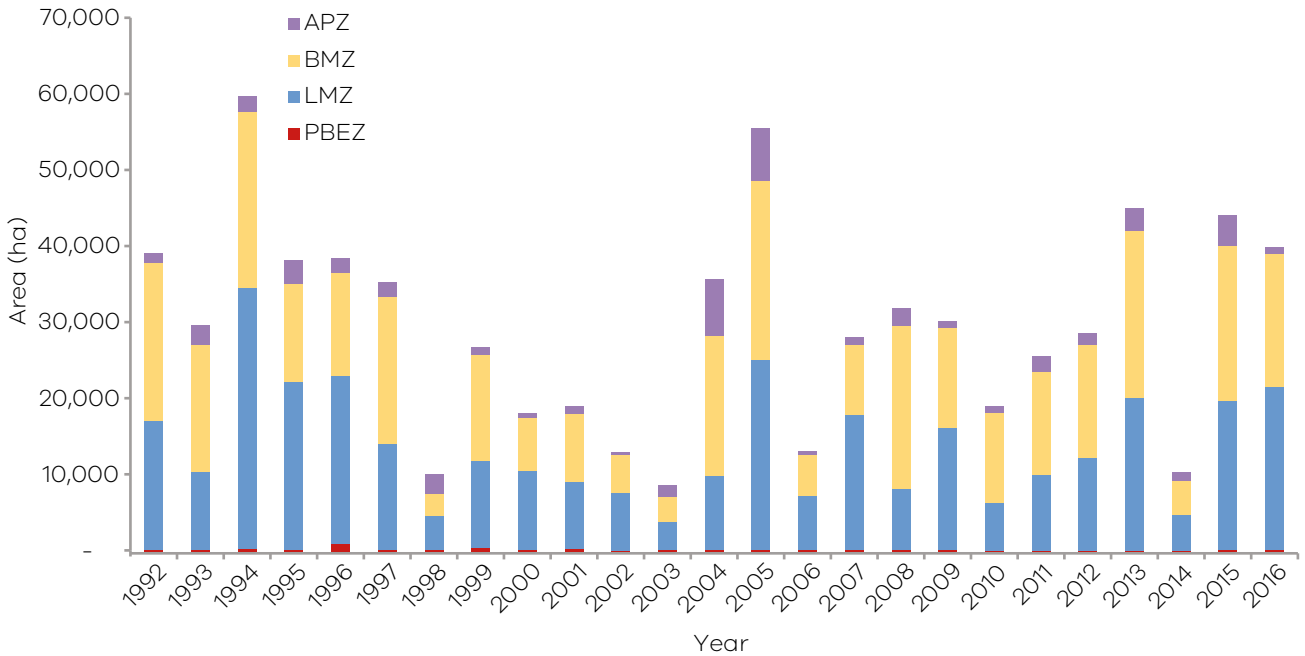


Figure 6: Area treated by planned burning while below minimum TFI, by fire management zone, 1992–2016

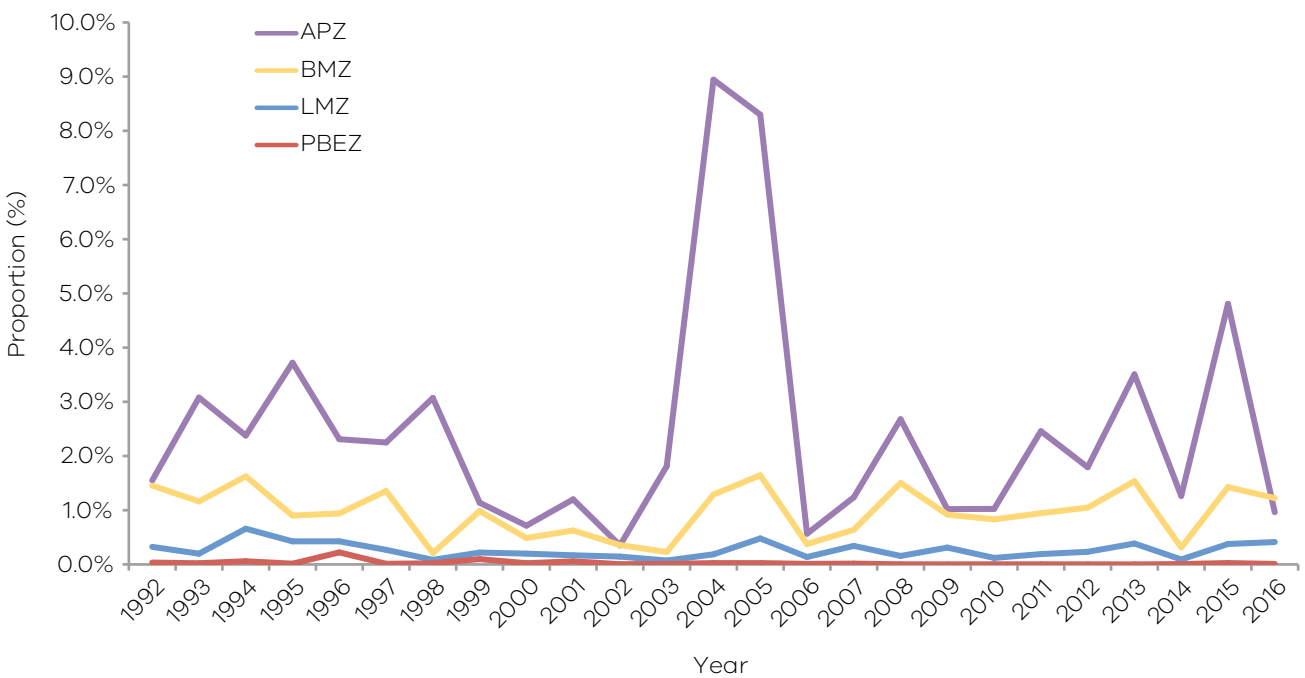


Figure 7: Proportion of each fire management zone treated by planned burning while below minimum TFI, 1991–2016

Vegetation growth stage status

Figure 8 shows changes in statewide vegetation GSS from 1991–2016. It shows that as the vegetation on public land across the state has aged, some vegetation has moved from the juvenile growth stage (down by about 5% in 2016) to the adolescent growth stage (up by about 4%). The figure also shows

the impact of the bushfires of 2003, 2006 and 2009 in changing the statewide GSS.

The relatively high proportion (about 25%) of public land with no recorded fire history means the TFI and GSS data should be used with caution: we cannot infer anything about the TFI and GSS of public land with no recorded fire history.

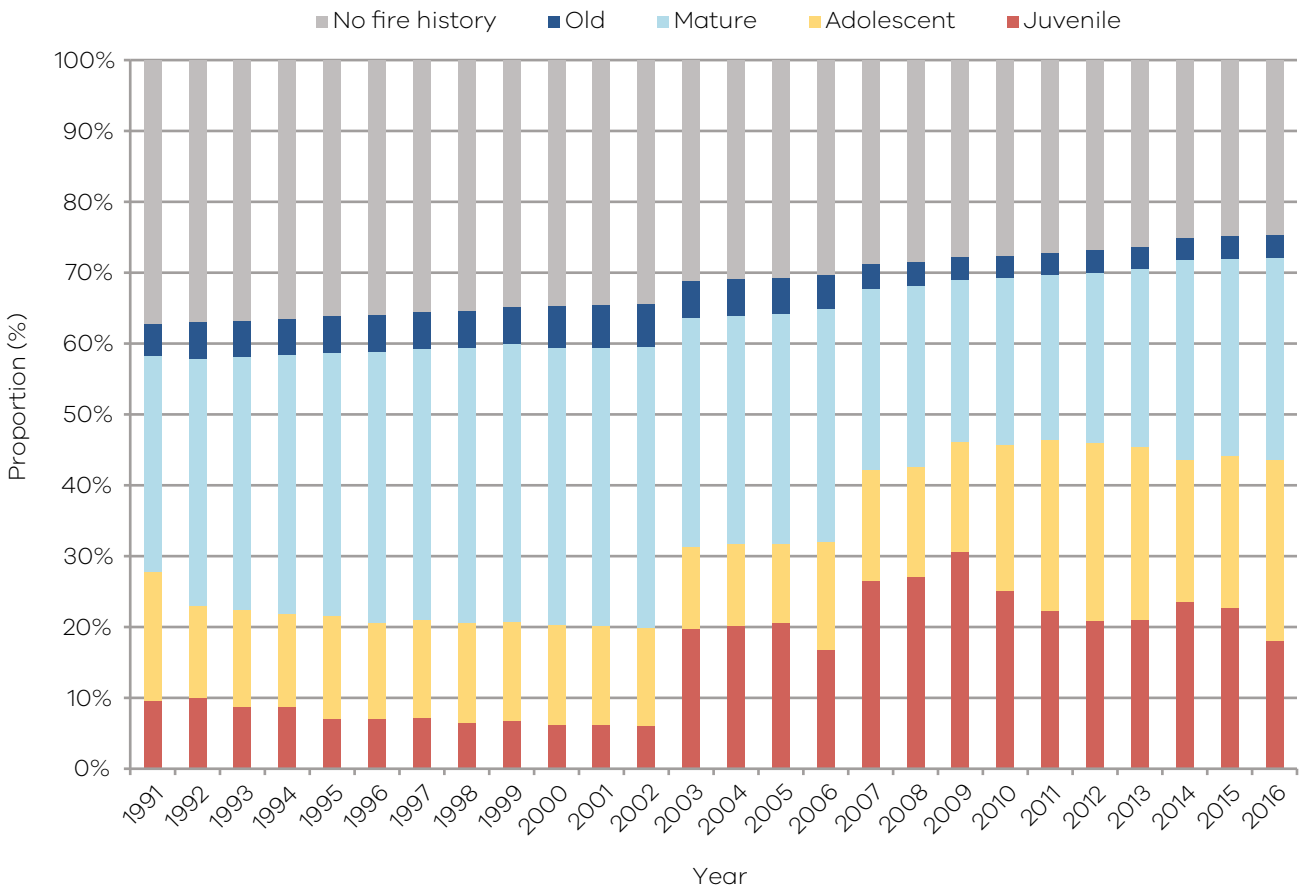


Figure 8: GSS status of public land vegetation, Victoria, 1991–2016

Working with Communities

The year saw many changes in our community engagement approach, the most significant of which was the new Safer Together policy. The policy introduces the 'Community first' approach, a new model of partnership with local communities. Under the policy, Forest Fire Management Victoria matches local risks with relevant information and works with communities to mitigate them.

In January 2016, as part of the development of our [Community Charter](#), we held workshops, focus groups and interviews with the public to understand what they consider important about our work, what outcomes they expect from interacting with us and what 'putting the community first' looks like to them. We learned we need to listen to and talk with the community, act on their input and give them feedback. We released the product of this work—the *Community Charter*—in March 2016.

Our charter promises we will work with the public to provide services that support liveable, inclusive and sustainable communities and thriving natural environments.

To support the *Community Charter's* commitments, we implemented a Community Service and Interaction Training Program for all our staff across Victoria. Its message was that community engagement is part of everyone's role.

The training provided practical advice about managing interactions with the public and stakeholders. It emphasised the importance of

listening to and acknowledging the views and issues of others and of making sure interactions are resolved. Approximately 2600 staff attended this training.

We have continued to invest in social research about how to incorporate community values into decision-making about bushfire risk. We ensure latest research is incorporated into our planning and our approach to working with communities.

Fuel management planning and activity

Figure 9 illustrates our four levels of planning and preparation for fuel management:

- [strategic bushfire management plans](#), which explain the long-term strategy for managing fuel on public land
- fire operations plans, which are how we implement the strategic bushfire management plans and which show all planned burning and other fuel management activities for the next three years
- [burn plans](#), which are tactical plans for the site of each planned burn in the relevant fire operations plan for the current year
- site preparation, by which we prepare each site before the planned burn is approved for ignition.



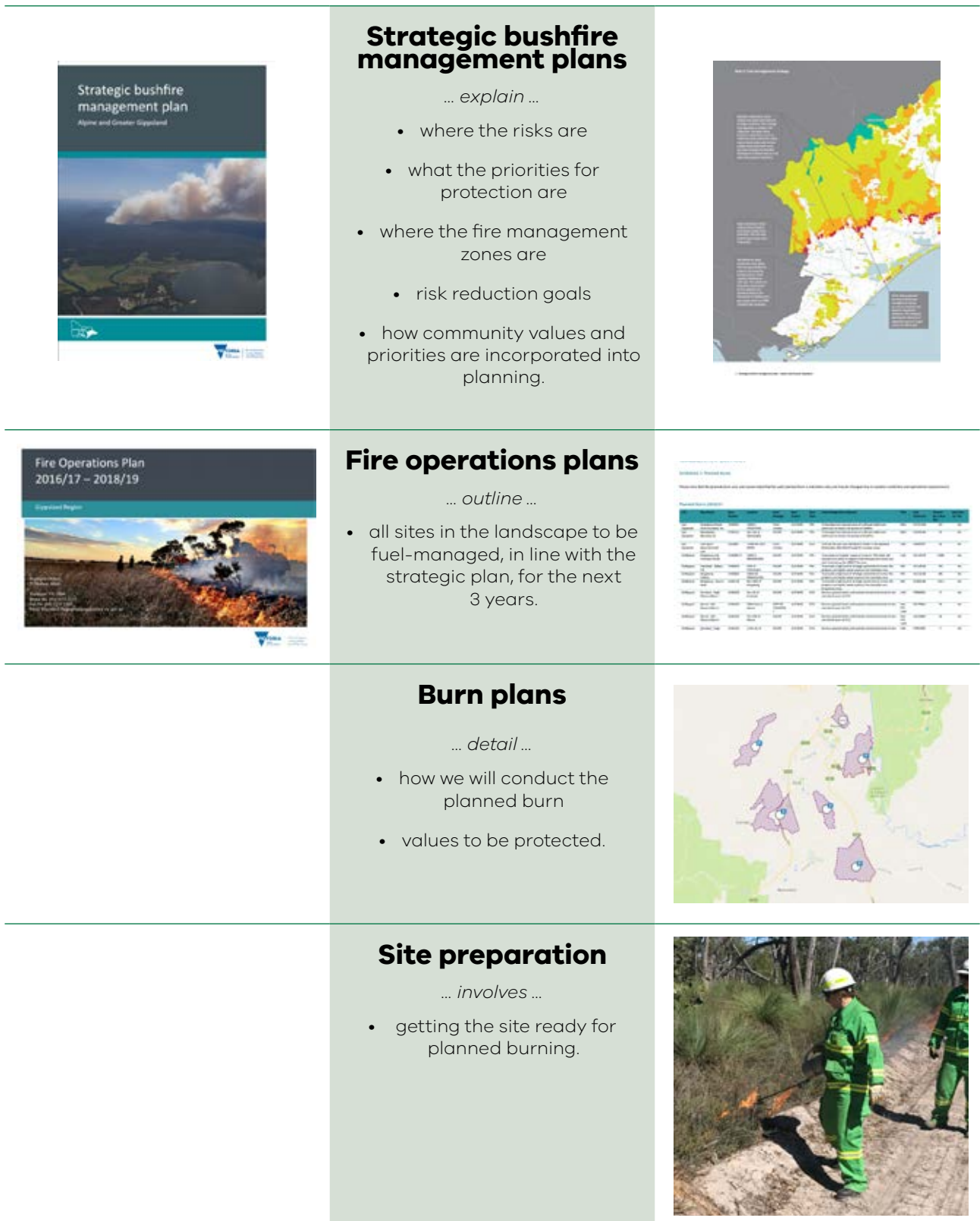


Figure 9: Fuel management planning and preparation

Strategic bushfire management planning

Each of Victoria's BRLs now has a strategic bushfire management plan that explains the landscape's long-term strategy for managing fuel on public land. The [Safer together website](#) has the strategic bushfire management plan and related resources for each landscape.

During the year, each landscape prepared:

- a statement about how the long-term strategic priorities were delivered through the FOP
- the projected residual risk reduction and ecological outcomes of their FOP for the next three years.

Fire operations planning

In September 2015, the annual updates and approvals occurred for FOPs for the 2015–16 fire season. Our [Approved fire operations plan webpage](#) has an interactive map showing all approved fire operations activities approved in current FOPs to 2018–19. This includes planned burning, slashing, mowing and clearing works, creating and maintaining fuel breaks and carrying out fire infrastructure maintenance, like fire dams and lookout towers.

Burn planning, site preparation and fuel reduction

Table 2 shows 2015–16 burn planning, site preparation and fuel management targets and achievements across Victoria. It shows that across the state we prepared burn plans for 170% of the [Target area for fuel management \(TAFM\)](#) and made sites ready for 155% of that area. This was substantial overperformance against both targets. We plan and prepare more sites than the target because unfavourable weather during the year may prevent us burning some sites. Having more than enough sites planned and prepared gives us options should the weather be unsuitable in some locations and maximises the likelihood we will burn the total target area.

The table also shows the actual total fuel-reduced area was 73% of the target, of which 67% was by planned burning: we also reduced fuel by other methods. Fuel was also reduced by bushfires burning areas that were ready — that is, sites with burn plans and made ready for burning — for planned burning.

The weather is the most important factor in determining whether we achieve the TAFM. Most planned burning in Victoria occurs in spring and autumn and we cannot do planned burning if it is too hot, too dry or too wet. The regional summaries in this report explain how weather conditions affected each region's planned burning program.



Table 2: Burn planning, site preparation and fuel reduction, Victoria, 2015–16

Measure		Ha	Ha toward TAFM	% of TAFM
Target area for fuel management (TAFM)		275,000		
Burn planning and site preparation				
Area for which burn plans were prepared (over the three-year FOP)	Target	453,750		165%
	Actual	467,439		170%
Area of sites made ready	Target	385,000		140%
	Actual	425,270		155%
Fuel reduction				
<u>Area treated by planned burning:</u>				
<ul style="list-style-type: none"> • <u>ecological burns</u> 40,921 ha (43 burns) • <u>fuel-reduction burns</u> 141,534 ha (223 burns) • <u>other burns</u> 2,237 ha (184 burns) 		184,693	184,693	67%
<u>Area treated by other fuel management methods</u>		13,247	13,247	5%
Total area treated by the Bushfire Fuel Management Program		197,940		72%
<u>Area suitable for planned burning burnt by bushfires</u> (APZ, BMZ, LMZ)		6,975		
(including area planned for burning on a current FOP)			2,541	1%
Actual fuel-reduced area (total)		204,915	200,481	73%





Table 3 shows the TAFM and the actual fuel-reduced area for each year since 2005. It shows the target area has more than doubled over the period and that with a few exceptions the actual fuel-reduced area has been fairly close to the target area.

Table 3: TAFM and actual fuel-reduced area, 2005–16

Year	Planned burnt (ha)	Other fuel management method (ha)	Area on a FOP but burnt by bushfire (ha)	Total fuel-reduced (ha)	TAFM (ha)	Fuel-reduced / TAFM (%)
2005	127,000			127,000	130,000	97.7%
2006	49,000			49,000	130,000	37.7%
2007	138,490			138,490	130,000	106.5%
2008	156,473			156,473	130,000	120.4%
2009	154,260			154,260	130,000	118.7%
2010	146,106			146,106	130,000	112.4%
2011	188,997			188,997	200,000	94.5%
2012	197,149			197,149	225,000	87.6%
2013	255,227	6,757	19,966	281,950	250,000	112.8%
2014	82,022	12,686	52,333	147,041	260,000	56.6%
2015	234,614	13,616	6,377	254,607	275,000	92.6%
2016	184,693	13,247	2,541	200,481	275,000	72.9%

Note: Blank cells mean data is not available for the item.

Weather effects on planned burning

Victoria was unseasonably hot in November and December 2015, hotter and wetter than average in January 2016 and colder and drier than normal in February. March was hotter and drier than average. The Bureau of Meteorology reported summer was warmer than in previous years, with temperatures about 1.5° higher than average.

An early start to the fire season reduced spring 2015 burning opportunities. The very dry summer conditions extended well into March 2016, meaning many parts of the state were too dry to burn until well into April. Rain at the end of April prevented further substantial burning in parts of the state. Late May 2016 saw more favourable conditions in western Victoria, although shortened burn days (due to there being less daylight) limited burning to smaller burns.

Our continuing work with Country Fire Authority

We have a long history of working with the Country Fire Authority (CFA). Under *Safer Together*, we will integrate the planning and delivery of bushfire management on public and private land. This will mean greater CFA involvement in planned burning on public land. Although *Safer Together* only came into effect in July 2016, we have worked with CFA for many years to deliver the planned burning program.

Table 4 shows the number and area of planned burns we conducted through the year in partnership with CFA.

Table 4: Planned burns conducted in partnership with CFA, 2015–16

Region	Number	Area (ha)
Barwon South West	3	449
Gippsland	26	2,645
Grampians	2	139
Hume	16	6,841
Loddon Mallee	2	w167
Port Phillip	11	243
Total	60	10,484

Traditional Owners partnerships

During the year, seven of the Gunaikurnai Land and Waters Aboriginal Corporation's On Country team members worked with us on planned burns. The team members completed general forest firefighter training and fitness tests and were rostered in pairs throughout the autumn burn season. The team worked on two planned burns including a 45 ha asset protection burn near Bruthen. This joint effort marked an important milestone in getting more Traditional Owners involved in the planned burning program on Gunaikurnai country.

Though individual Gunaikurnai firefighters have done similar work in the past, this is the first year a whole crew worked in the planned burning program. The On Country team provided their own tanker, which was modified to comply with fire management standards.

As part of their involvement, the Gunaikurnai crew followed relevant cultural customs as they worked on the burns. Their involvement was well-received and continuing it will open up opportunities for the team to share their cultural knowledge and land management expertise.



Planned burning breaches

As part of implementing the recommendations of the independent investigation into the Lancefield–Cobaw Croziers Track fire (detailed below under ‘Lancefield–Cobaw Croziers Track bushfire’), we revised our standard operation procedure for planned burning breaches. The revisions took effect on 1 March 2016 and included a change to how breaches of control lines are categorised.

A planned burn is now considered to have gone beyond control lines if it spreads beyond the area designated in the burn plan, cannot be readily controlled with on-site or planned resources and compromises the burn objectives.

A planned burn beyond control lines is now classified as a breach or a bushfire depending on its extent and impact on the community.

A breach is likely to be controlled within the normal timeframes for fire response (by 8 am the next

morning) and does not pose a significant threat to, or have a significant impact on, assets or the community. As part of our continuous improvement processes, we review all breaches.

A bushfire is declared when a planned burn goes beyond control lines and threatens, or is likely to threaten, public safety or private assets and is likely to have a greater impact on the environment. The Inspector-General for Emergency Management (IGEM) will investigate the cause of a bushfire.

In 2015–16, two out of a total 450 planned burns across the state (about 0.4% of all planned burns) went beyond control lines and were declared bushfires. Both spread to private land.

A further eight planned burns breached control lines in 2015–16 and were managed as breaches. In accordance with policy these breaches were not declared bushfires.

Table 5 shows details of planned burns that went beyond control lines in 2015–16.

Table 5: Planned burn breaches of control lines, 2015–16

Burn name	Location	Planned burn / bushfire or breach area (ha)	Impact
1/07/2015–29/02/2016 Guideline 10.1.11 Classification and investigation of escapes from planned burns			
Giffard West–Monkey Creek	3 km south-west of Giffard West	216 / 1 (bushfire)	A fuel-reduction burn in a BMZ was ignited on 27 September 2015 and went beyond control lines on 29 September when a spotover occurred about 400 m from the burn in adjacent private forest. It became fire no. 5 Giffard West–Clements Road.
Lancefield–Cobaw Croziers Track	10 km north-west of Lancefield	266 / 3,010 (bushfire)	A fuel-reduction burn in a LMZ was ignited on 30 September 2015 and went beyond control lines on 3 October, spreading to adjacent state forest and private property. It became fire no. 6 Lancefield–Cobaw Croziers Track and was independently investigated.
1/03/2016–30/07/2016 SOP-3.5.6 Classification, reporting and investigation of breaches of control lines by planned burns			
Tallarook SF Flynns Road A	5 km north of Strath Creek	179 / 25 (breach)	A fuel-reduction burn in a BMZ was ignited on 29 March 2016. We suspect it breached control lines the same day, but it was not identified until 1 April. An investigation found a spotover occurred about 500–600 m from the burn in adjacent private forest and burnt at low intensity. In accordance with policy, this spotover was declared a breach, not a bushfire.

Burn name	Location	Planned burn / bushfire or breach area (ha)	Impact
Loch Sport–Track Five South	5 km north of Paradise Beach	257 / 6 (breach)	A fuel-reduction burn in a LMZ was ignited on 29 March 2016 and breached control lines on 2 April in the adjacent Gippsland Lakes Coastal Park. We believe the breach resulted from a spotover, and about 6 ha was burnt. Using machinery to suppress the spotover would have damaged park values, so we decided to burn out an additional 100 ha in the predetermined contingency area. In accordance with policy, this spotover was declared a breach, not a bushfire.
Powelltown–348-515-0004–New Turkey Spur Rd /11.1 km	10 km north-west of Noojee	27 / 1 (breach)	A regeneration burn in a LMZ was ignited on 22 March 2016. We suspect it breached control lines via a spotover on the same day, but it was not identified until 5 April. The spotover burnt adjacent state forest at low intensity. . In accordance with policy, this spotover was declared a breach, not a bushfire.
Marysville–309-512-0005—Road 8	9 km south-east of Narbethong	9 / 16 (breach)	A regeneration burn in a LMZ was ignited on 4 April 2016. We suspect it breached control lines on 6 April. It burnt adjacent state forest at low intensity. In accordance with policy, this breakaway was declared a breach, not a bushfire.
Alberts–BNP	5 km north of Cudgewa	541 / 4 (breach)	A fuel-reduction burn in a LMZ was ignited on 3 April 2016 and breached control lines on 6 April when several spotovers occurred in adjacent national park. The spotovers combined and burnt into adjacent private (forest and open pasture) land. In accordance with policy, this spotover was declared a breach, not a bushfire.
Upper Murray–749-501-0007–Lanmans Tk	8 km north-east of Glen Valley	20 / 8 (breach)	A regeneration burn in a LMZ was ignited on 12 April 2016 and breached control lines on 13 April when several spotovers occurred in adjacent state forest. In accordance with policy, this spotover was declared a breach, not a bushfire.
Noojee–Trestle Bridge	2 km south-west of Noojee	73 / 1.2 (breach)	A fuel-reduction burn in an APZ was ignited on 28 April 2016. Control lines were not breached, but an area of forested private land (for which permission to ignite had been previously granted) was inadvertently ignited during the burn on 29 April. We treated this as a breach for continuous improvement purposes.
Moe South–Coalville	1 km east of Coalville	23 / 0.9 (breach)	A fuel-reduction burn in a LMZ was ignited on 28 April 2016 and breached control lines on 29 April when a burning tree fell over control lines causing a breakaway in adjacent state forest. The breakaway burnt at low intensity. . In accordance with policy, this breakaway was declared a breach, not a bushfire.

Lancefield–Cobaw Croziers Track bushfire

On 30 September 2015, we conducted a planned burn at Lancefield–Cobaw Croziers Track in the Macedon Ranges. Three days later, the planned burn breached containment lines, was declared a bushfire and burned for a further 10 days. The fire was contained on 13 October 2015 after burning more than 3,000 ha and destroying dwellings, sheds and many kilometres of fencing.

In response to the fire, the Victorian Government announced an independent investigation to be led by Mr Murray Carter, Director of the Office of Bushfire Risk Management in Western Australia. The terms of reference stated the investigation was to focus on:

- the adequacy of planning and resourcing of the Lancefield–Cobaw Croziers Track planned burn (the planned burn)
- the appropriateness of the weather and other conditions for conduct of the planned burn on 30 September 2015
- what caused the planned burn to break containment lines on 3 October 2015 and on 6 October 2015
- decision-making, management and control of the planned burn, including the adequacy of the patrol strategy adopted following its ignition
- the adequacy of communication with the community in the lead-up to the planned burn and after it broke containment lines.

The investigation recommended improvements to our systems and processes for the delivery of planned burning throughout Victoria. The Victorian Government accepted all 22 of the recommendations, as well as a commitment to making changes to the way it operates across the state, to improve delivery of Victoria's planned burning program.

Our response to the recommendations of the independent investigation into the Lancefield–Cobaw Croziers Track fire also outlined additional commitments to improve the delivery of the Bushfire Fuel Management Program. Broadly, these additional commitments included:

- rebuilding community trust
- making it clear who is in charge of the planned burning program
- implementing improved systems and processes
- addressing other issues in the planned burning program
- building on the positives
- independent oversight of the monitoring and reporting of the implementation of recommendations.

We developed a program of work to implement the 22 recommendations and 10 commitments, grouped under seven themes:

- implementation of *Safer Together*
- implementing improved systems and processes
- audit and quality assurance framework
- organisation structure
- operational improvements
- community engagement
- independent oversight.

IGEM released its [final \(August 2016\) progress report](#) on implementation of the recommendations and commitments from the independent investigation into the Lancefield–Cobaw Croziers Track fire. In the final progress report, IGEM found the department had satisfactorily implemented 19 of the 22 recommendations and all 10 of the additional commitments made by the department. The three outstanding recommendations will be implemented as part of *Safer Together*, the government's new approach to reducing the risk of bushfires in Victoria. The IGEM will report on implementation of these three recommendations as part of the *Safer Together* progress reporting.



Planned burn risk assessment tool

The planned burn risk assessment tool is a decision-support tool for assessing and documenting risks, risk mitigation activities and for approving planned burns. This was developed as part of the commitment we made in response to the Lancefield–Cobaw Croziers Track Fire independent investigation. We first used the tool in March 2016 and all burns after 1 September 2016 must be approved using the tool.

The tool:

- ensures a common understanding of the risks and proposed risk mitigation activities
- ensures approval of the planned burn at the district, regional and state levels including by the Burns Controller and Burn Officer-in-Charge.

PBRAT V3.0 has a three-phase approval process before igniting a burn. Phase 1 is the prescheduling assessment, undertaken at least 10 days before ignition. In this phase, the District Burn Team reviews the planning, preparation and proposed conduct of the planned burn and records risks and how they will be mitigated. Phase 2 is the operational delivery review, done 24–48 hours before ignition. Phase 3 is the pre-ignition review, done on the day of the burn before ignition. In Phase 3, the burn incident management team inputs the day's weather forecast data and the Burns Controller compares it to the pre-ignition risk assessment to identify any change in risks. If risks have increased, the burn must be re-endorsed.

The tool supports staff to make the best possible decisions about managing risk when planning, preparing for and conducting fuel management activities. This may include changing the proposed fuel management activity to minimise risk. It also provides a record of the process for MER and improvement.

Smoke management

In December 2015, Emergency Management Victoria updated the [State Smoke Framework](#). The framework provides guidance for agencies, communities and industries to prepare, respond to and recover from significant smoke events. The framework sets classes of impacts of particulate matter and carbon monoxide on the health of communities and firefighters. We aim to minimise smoke impacts when conducting planned burning.

In collaboration with us, the Bureau of Meteorology and CSIRO developed a smoke modelling system. The system uses an advanced meteorological model and enables the Victorian emergency management sector to better predict the spread, dissipation and constituents of smoke from planned and unplanned fires. Using 3–4 day weather forecasts, the system predicts hourly average concentrations of particulate matter, nitrogen dioxide, sulphur dioxide, ozone and carbon monoxide.

We are currently trialling the system to model the atmosphere's ability to disperse smoke. In January 2016, we used the model to predict the movement

and accumulation of smoke in Victoria from fires in Tasmania, and we used this information to warn communities about incoming smoke. If the trial proves the system is effective, we will use it to inform decisions about planned burning.

Hazardous Tree Removal Project

Fire-affected falling trees and branches are dangerous for firefighters staff working in and travelling through affected areas. The Victorian Government committed \$7 m in the 2015–16 budget to remove fire-damaged and hazardous trees in high-risk and priority areas of state forests and national parks.

The [Hazardous Tree Removal Project](#) focuses on priority areas of public land: strategic roads, firebreaks, recreation sites, dams and helipads. Some of the most dangerous trees are found along roadsides. The program will treat up to 1,000 km and up to 100 ha of public land by the end of 2016–17.

During the year, 415 km of roadsides and 67 ha of high-use sites were treated to reduce risk.

Bushfire response

In 2015–16, we attended 1,148 fires that affected 25,676 ha of public and private land. These fires destroyed large amounts of crop and areas of pasture, 145 houses, 70 sheds, over 580 km of fencing, 4,600 sheep, other stock and cattle and horses, and more than 442 tonnes of hay.

In November and December 2015, Victoria had several days of severe and extreme fire danger with high temperatures, damaging winds and thunderstorms. Major bushfires that developed during this period included Scotsburn Finns Road (4,570 ha), Wye River–Jamiesons Track (2,520 ha) and Wyperfield–Eucy Track (1,566 ha). Other major bushfires during the fire season were Lancefield–Cobaw Croziers Track (3,055 ha), Mount Bolton–Laverys Road (1,202 ha) and Barnawartha–Indigo Creek Road (6,675 ha).

During the year, Victorian firefighters (including over 400 DELWP personnel) were deployed to support firefighters in Canada, the United States of America, Indonesia, South Australia and Tasmania, all of which had consequential fire seasons. Firefighters from New South Wales and New Zealand helped respond to the Victorian bushfires.

Victorian Bushfire Monitoring Program

This year, MER activities focused on implementing our [*Monitoring, Evaluation and Reporting \(MER\) Framework for Bushfire Management on Public Land*](#). Each BRL appointed a landscape evaluator to coordinate MER activities and develop a MER plan for their landscape. MER plans specify how the landscape will translate the MER framework into actions to evaluate their bushfire management strategies, to answer the key evaluation questions (KEQs) in the MER framework over the next five years.

The Barwon Otway and East Central BRL teams finalised their MER plans in mid-2015 and started monitoring in autumn 2016. The Alpine and North East, Alpine and Greater Gippsland, Mallee and Murray Goulburn and West Central BRLs finalised their MER plans in mid-2016 and will implement them in 2016–17. The South Western BRL finalised its MER plan at the end of 2016. The first versions of the MER plans aim to increase the rigour with which we monitor changes to fuel hazard on public land (by answering KEQs about outcomes for life and property) and determine if our planned burns met their operational objectives (the tactical planning KEQ).

In the first year of a three-year project to monitor ecosystem resilience, La Trobe University researchers reviewed our legacy monitoring programs against the ecosystem resilience KEQs in the MER framework.

The Pre- and Post-Fire Flora Monitoring of Planned Burning on Public Land Project began in 2006. The project improves our understanding of the interactions between, and responses of, plant species to planned burning. It addresses several of the MER framework's KEQs and provides useful information for fire management planning. During the year, the project:

- completed a five-year program to collect post-fire data at 119 sites, working with BRL teams
- recorded a total of 646 plant species
- continued to maintain and update its database
- transferred knowledge to staff through summary reports and on-site communication.

We piloted a new sampling design to improve the consistency with which our *Overall Fuel Hazard Guide* is applied. We also piloted a geographic-information-system-based plot selection tool and a fuel hazard app, and we trained our staff to use them. For quality assurance purposes, we compared the results of the new sampling design and the app with those reported by staff and external assessors. We completed pre-burn fuel hazard assessments for 46 burns and post-burn fuel assessments for 25 burns.

Our Monitoring, Evaluation and Reporting (MER) Research Project runs for three years from April 2015. It is evaluating the effectiveness of legacy monitoring programs in answering the ecosystem resilience KEQs in the MER framework. The project has developed monitoring questions to address the ecosystem resilience KEQs and a draft sampling approach. It is progressing toward a scientifically rigorous approach to measuring ecosystem resilience.

We continued evaluating the strategic bushfire management planning process by developing a tool BRL teams can use to assess their compliance with the strategic planning process and identify deficiencies in the process or gaps in their skills or capabilities.

We developed a tool to evaluate the alignment of the strategic bushfire management planning process with international standard *AS/NZS ISO31000:2009 Risk management - Principles and guidelines*. This is a major step towards continuous improvement in fire management planning.

The department hosted a science forum in November 2015 to highlight research funded through the Bushfire and Natural Hazards Cooperative Research Centre and the Integrated Forest and Ecosystem Research Program. The three-day event was attended by department and research organisation staff and members of the public and examined research about fire behaviour, ecology, smoke modelling, health impacts and even tidal waves!

Cost

Table 6 shows the costs in 2015–16 of our fire management efforts. It shows the cost of the entire effort was \$275 million (m). Of this, direct fuel management costs were \$44.3 m and indirect fuel management costs \$88.9 m. Costs under the program for activities other than fuel management (such as fire suppression) were \$141.8 m.

Table 6: Fuel management costs, by group and region, 2015–16

Region	Direct fuel management (\$)	Indirect fuel management (\$)	Non-fuel management (\$)	Total
Barwon South West	2,721,625	4,403,076	35,578,488	42,703,189
Gippsland	14,782,889	12,182,632	19,619,552	46,585,073
Grampians	4,727,217	4,984,479	17,674,772	27,386,468
Hume	12,772,288	7,966,947	15,258,637	35,997,872
Loddon Mallee	4,966,857	4,474,450	11,355,397	20,796,704
Port Phillip	4,298,836	3,541,119	5,573,023	13,412,977
Regional Services Directorate	61,131	774,260	8,669,303	9,504,694
Total Regional Services	44,330,843	38,326,963	113,729,172	196,386,977
Office of Chief Fire Officer	0	28,473,519	4,963,932	33,437,452
Fire and Emergency Management	0	21,966,017	2,203,803	24,169,820
Other corporate functions	0	179,957	20,869,994	21,049,951
Total Land, Fire and Environment Division and Corporate Services	0	50,619,494	28,037,729	78,657,223
Total	44,330,843	88,946,456	141,766,901	275,044,200

**Excludes trust, capital asset charge, depreciation and corporate overheads.*

Table 7 shows the indirect fuel management costs using the new item structure we adopted during the year for budgeting and accounting of fuel management activities. The table is a dissection of the \$88.9 m total in Table 6 for indirect fuel management costs. The table shows the largest cost items were resource management and equipment and infrastructure.

As well as for planning, preparing and conducting planned burning, and the other initiatives explained in this report, the amounts in the table also provided for:

- implementing recommendations from the Lancefield–Cobaw Croziers Track Fire investigation including community awareness training, investigating the increased use of emerging technologies and developing an audit and quality assurance framework
- reviewing and implementing policies including the *Safer Together* policy and the transition towards a risk-based approach
- improving smoke modelling tools and air quality monitoring methods (with Environment Protection Authority Victoria)
- increasing staff capability and mobility with stand-by and overtime pay, training, medicals and moving taskforces around the state
- more equipment and vehicles to support field activities
- improving how we engaged with stakeholders through roundtables and other forums
- working with stakeholders (such as the Red-tailed Black-Cockatoo Recovery Project team) and working with vigneron to research the effects of smoke on wine quality
- investigating the use of drones for fuel management and firefighting.

Table 7: Indirect fuel management costs, by cost item, 2015–16

Item	% of indirect costs	\$
Business management	8%	7,012,859
Capability	4%	3,476,445
Engagement	4%	3,346,605
Equipment and infrastructure	54%	48,263,303
Monitoring, evaluation and reporting	3%	2,929,708
Operational planning	3%	2,404,580
Research and learning	1%	546,025
Resource management	16%	14,720,271
Strategic planning	7%	6,246,660
Total	100%	88,946,456









Bushfire Risk Landscape reporting

Alpine and Greater Gippsland

Residual risk

Figure 10 shows the residual risk profile for the Alpine and Greater Gippsland BRL for 1980–2019. It shows:

- residual risk in the landscape for 2015–16 was about 52%
- residual risk fell sharply after major bushfires in the early 1980s and then increased as fuel slowly re-accumulated
- residual risk fell again in 2003 and 2006–07 after major bushfires in the Alpine areas; planned burning kept residual risk down to historically low levels in the years after these bushfires, but risk has been increasing in recent years as fuel has re-accumulated in bushfire-affected areas

- implementation of our risk-based fuel management strategy on public land is projected to keep residual risk well below what it was before the 2003 and 2006–07 bushfires

- if conditions allow us to do all the planned burning scheduled in the FOP for the next three years, we project residual risk will decrease to about 42% by 2019: without planned burning, we project residual risk would be above 75% by 2019.

Many communities in the Alpine and Greater Gippsland BRL are vulnerable to major bushfires as they are close to large, continuous areas of vegetated public land. We can manage fuel on most of this public land by planned burning and so manage bushfire risk in the landscape.

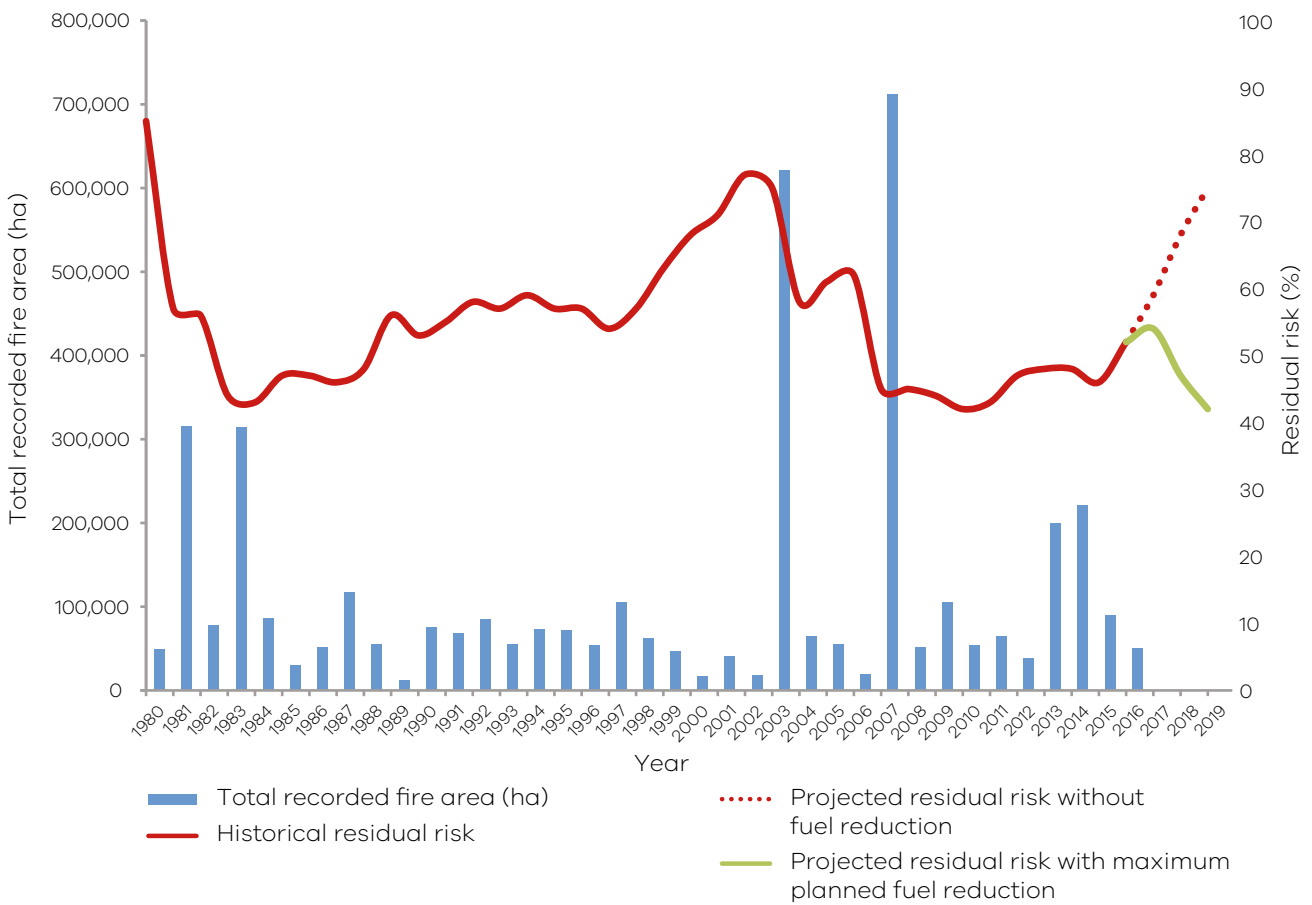


Figure 10: Residual risk profile, Alpine and Greater Gippsland BRL, 1980–2019

Ecosystem resilience

Figure 11 shows the TFI status and Figure 12 the GSS status of the vegetation on public land in the Alpine and Greater Gippsland BRL for 1991–2016. Figure 11 shows:

- in 2015–16 about 66% of the vegetation was below minimum TFI
- in 2015–16, less than 1% of the vegetation was burnt by bushfire or planned burning while below minimum TFI
- over the past 15 years, the area below minimum TFI has doubled from about 36% to about 66%, primarily as a result of the Alpine bushfires of 2003 and Great Divide bushfires of 2006–07 which burnt 1.2 m ha in the landscape but also due to several bushfires in 2014 and recent increases in the level of planned burning

- in the past three years the proportion of the vegetation below minimum TFI has remained constant.

Figure 12 shows about 64% of the landscape for 2015–16 was in the juvenile and adolescent growth stages. The 2006–07 bushfires had the largest single effect on GSS in recent times by reducing the amount of mature and old vegetation from about 37% to about 20%. In recent years, this has increased to about 24% of the landscape.

Maintaining older vegetation growth stages in the landscape is important for many reasons, like providing habitat for animal species that rely on hollow-bearing trees or coarse, woody debris.

The landscape will have a large proportion of young vegetation for some time because it can take decades for many types of vegetation to move through the growth stages and reach minimum TFI after significant disturbance.

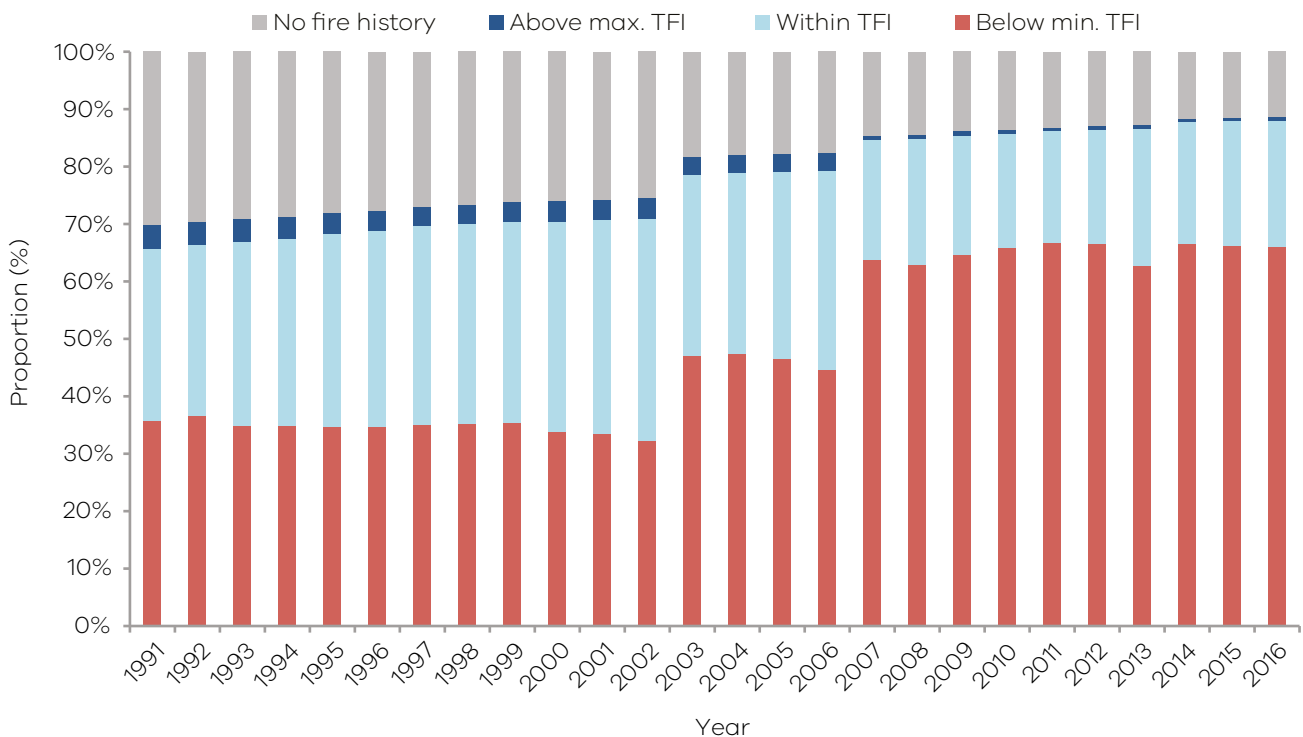


Figure 11: TFI status of public land vegetation, Alpine and Greater Gippsland BRL, 1991–2016



Community engagement

During the year we introduced *Safer Together* to stakeholders across the BRL including partner agencies, local governments, regional and municipal fire management networks, the East Gippsland Wildfire Taskforce, the Gippsland Apiarists Association and the Far East Gippsland Roundtable. This foundational work built the knowledge and commitment necessary to successfully implement *Safer Together*.

We consulted intensively with the community as we developed and implemented the FOP. The engagement team had many conversations about fuel management with people at community hubs; distributed post cards, smoke health flyers and community advisory maps; and knocked on doors and did extensive letter-box drops.

We sought to improve community awareness about the complexities of planned burning by conducting pre- and post-burn walk-throughs. We invited the public to attend some planned burns and did a live radio broadcast about how a burn was progressing. Our engagement with Woodside Primary School

about a planned burn close by was well-received and the school invited us back to talk with staff and students about our work.

We worked with communities to develop local solutions to reduce the impact of planned burning. We built a geographic-information-system dataset incorporating local school bus routes to help notify bus operators of planned burns and identified a path for cyclists along the Nowa Nowa section of the East Gippsland Rail Trail that avoided smoke.

As explained under 'Traditional Owners partnerships' earlier in this report, we strengthened our partnership with the Gunaikurnai Land and Waters Aboriginal Corporation. This included providing firefighting training to the corporation's On Country team who lit the first burn of the season and were a regular part of the burning crews during the season.

We actively involved CFA brigades in developing the FOP and, where possible, in delivering it. We worked with CFA brigade captains to ensure CFA members were available to join us in conducting planned burns.

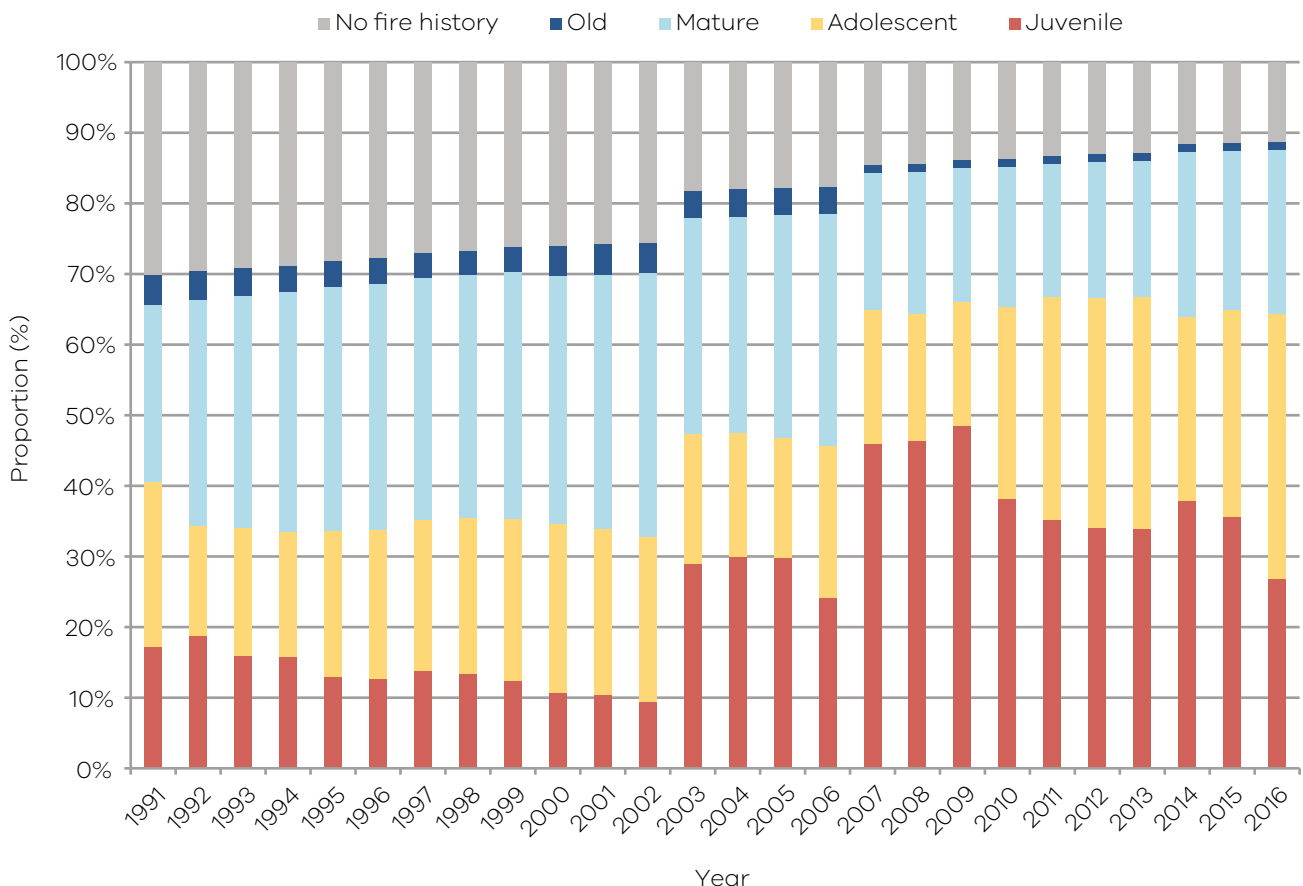


Figure 12: GSS status of public land vegetation, Alpine and Greater Gippsland BRL, 1991–2016

We started using surveys to better understand how our community engagement efforts are seen. Businesses and the community members were very supportive of the new *Safer Together* approach.

Monitoring, evaluation and reporting

We developed a MER plan for our landscape. Endorsed in June 2016, it describes the monitoring activities we will undertake in the 2016–17 year to show how effectively our fuel management activities reduced risk to life and property and maintained or improved ecosystem resilience.

Our MER activities included:

- detailed mapping (using aerial imagery and assessments of the extent and severity of fires) of about 60,000 ha of fuel reduction burns for 2015-16
- continued assessment of burn coverage at established *Banksia spinulosa* monitoring sites and monitoring of seed production of identified *Banksia spinulosa* shrubs to improve our understanding of optimum fire intervals
- evaluation and reporting of previously collected data about *Banksia spinulosa* regeneration; our internal report provided context for the field results, related the results to the KEQs and recommended future approaches to the TFI for this species
- drafting of a scientific manuscript describing the connection between disturbance (including by bushfires and planned burning) and species presence using previously collected monitoring data for six glider and possum species including the Yellow-bellied glider and the Greater glider
- publishing a report on the collapse rate of hollow-bearing trees in planned burns; the report also had management recommendations to minimise the impact of planned burning on hollow-bearing trees, recommendations we shared through presentations to natural resource managers in Victoria and interstate
- continuing a study to establish the most effective method to protect individual hollow-bearing trees from planned burning
- publishing a scientific paper testing the distribution and fire response models for the Ground parrot in East Gippsland.



Alpine and North East

Residual risk

Figure 13 shows the residual risk profile for the Alpine and North East BRL for 1980–2019. It shows:

- residual risk in the landscape for 2015–16 was about 64%
- over the last few decades, residual risk has fallen sharply in response to several large bushfires close to townships including 2003 Alpine bushfires and the 2006–07 Great Divide bushfires

- after the 2006–07 Great Divide bushfires, planned burning kept residual risk at about 50% for five years
- in recent years residual risk has been increasing as fuel re-accumulates in areas burnt by recent major bushfires
- if conditions allow us to do all the planned burning scheduled in the FOP for the next three years, we project residual risk will decrease to about 48% by 2019: without planned burning, we project residual risk would be above 78% by 2019.

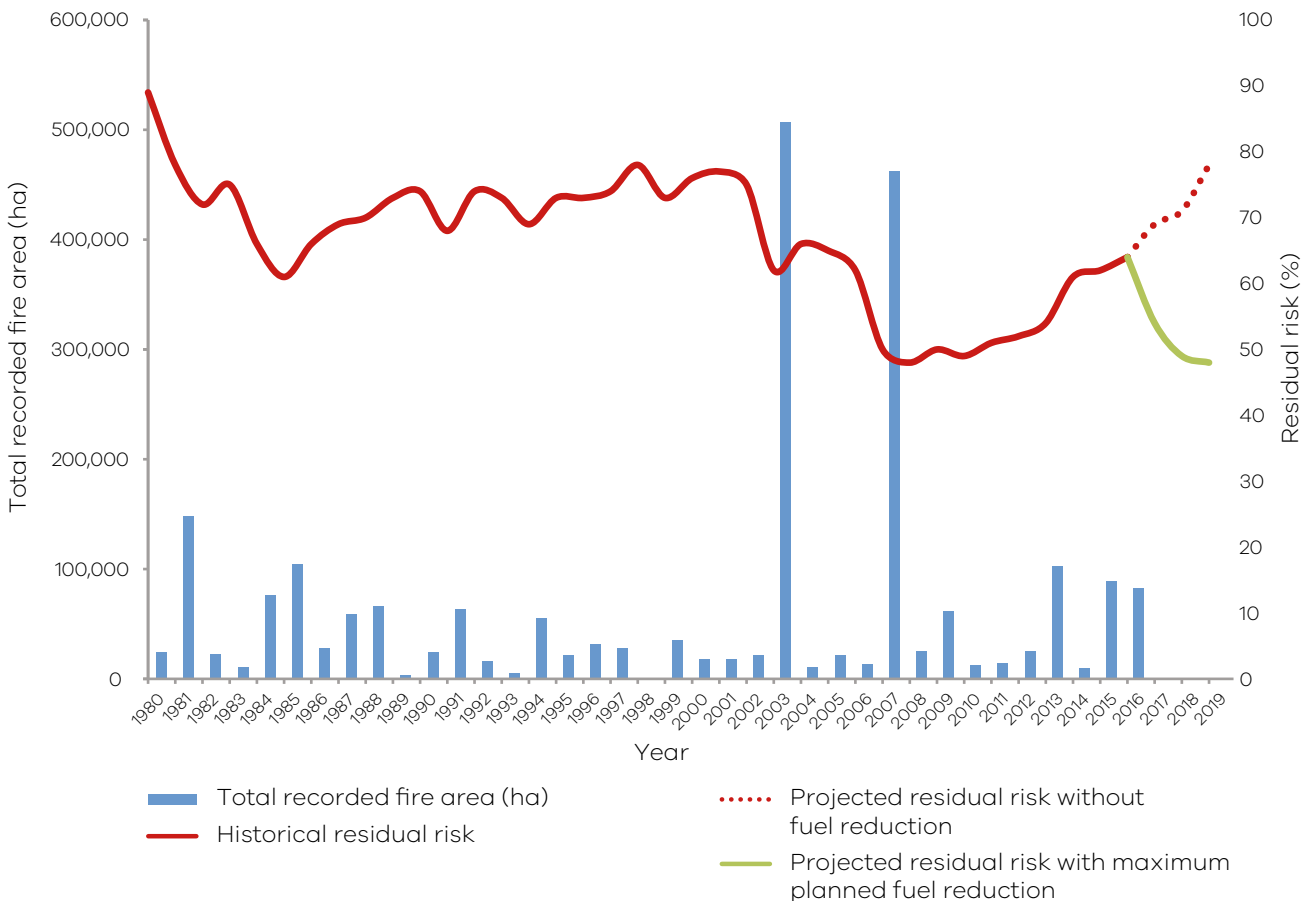


Figure 13: Residual risk profile, Alpine and North East BRL, 1980–2019

Ecosystem resilience

Figure 14 shows the TFI status and Figure 15 the GSS status of the vegetation on public land in the Alpine and North East BRL for 1991–2016. The figures show:

- in 2015–16 about 63% of the vegetation was below minimum TFI
- in 2015–16, about 1% of the vegetation was burnt by bushfire or planned burning while below minimum TFI, most of this by planned burning in the LMZ and BMZ
- over the past 15 years, several major bushfires have dominated the TFI and GSS trends including the 2003 Alpine bushfire, the 2006–07 Great Divide bushfires and the 2013 Harrietville bushfire; these

bushfires have resulted in large and increasing areas of young vegetation

- from 2002–12, the proportion of the vegetation below minimum TFI tripled (from about 23% to about 69%); in the same period the proportion in the mature growth stage fell from about 47% to about 11% and the proportion in the younger growth stages rose from about 20% to about 70%
- in recent years, the proportion of the vegetation in the mature growth stage has increased to about 24%.

Because the affected vegetation types take a relatively long time to reach maturity, there will continue to be a large proportion of younger vegetation for some time.

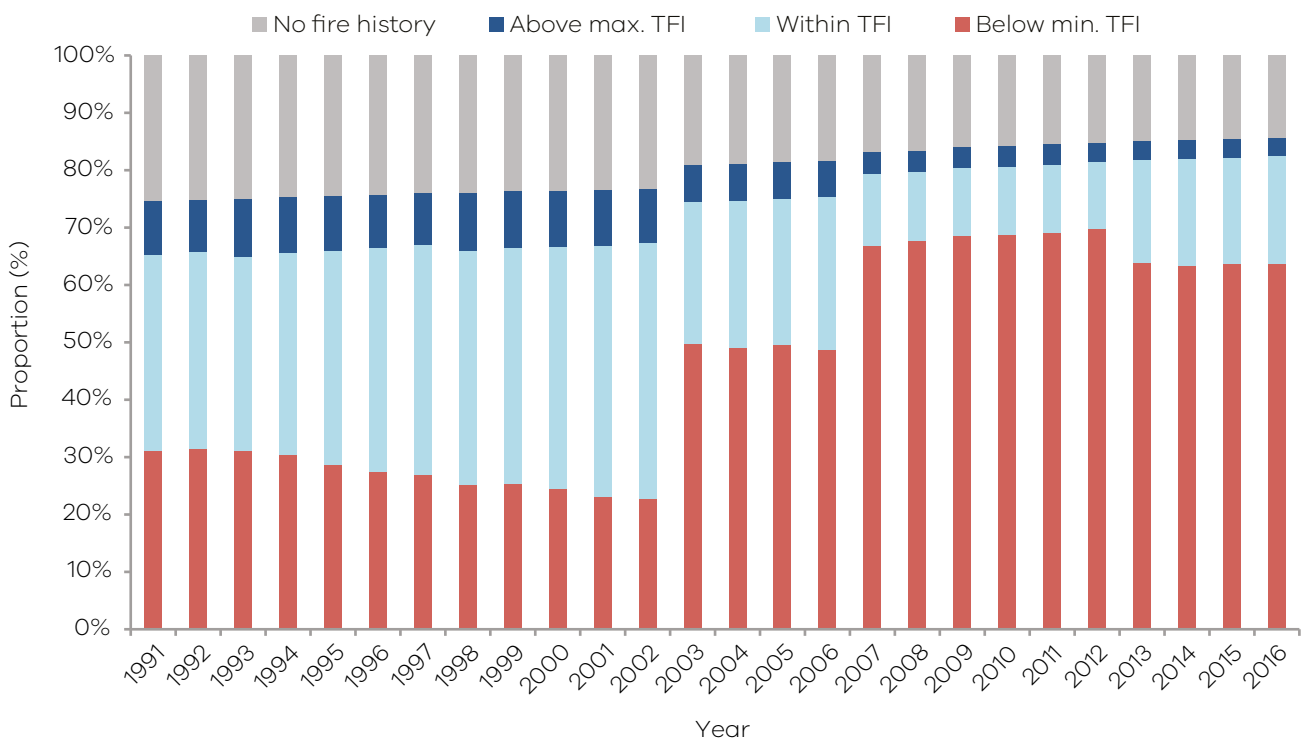


Figure 14: TFI status of public land vegetation, Alpine and North East BRL, 1991–2016



Community engagement

During 2015–16, we conducted community engagement activities before, during and after the spring and autumn planned burning seasons to involve stakeholders and the public in planned burning decisions and to plan burns in consultation with other agencies and land managers.

Before each season, we met with individual members of the public and held neighbourhood and community meetings. We sent out letters and attended local events. During each season, we put up signs, doorknocked, sent the media information, sent out email notifications and followed up concerns people raised.

We increased our use of social media. For example, we posted a video about planned burns around Tawonga in the Ovens fire district to communicate the importance of planned burning in protecting local communities. Social media also enabled the community to question us.

After each season, we sought feedback from stakeholders and the public about the delivery of the program, to improve our practices.

While developing our FOP, we consulted widely and tried new ways to engage about fire management, not just about planned burning. In the Goulburn fire district, staff attended the Mansfield Do It! festival to discuss fire management, before the planned burning season.

In the Upper Murray fire district, staff met with Hancock Victorian Plantations when developing the FOP. They shared their risk mapping with the company, which used it to prioritise asset protection works.

In November 2015, we met (as we do annually) with north-east vignerons to share concerns, plan for the season and hear from experts about the latest smoke and grape research findings. We hold annual forums and field days with the North Eastern Apirarists' Association and this year, in response to feedback, we made an agreement to provide timely,

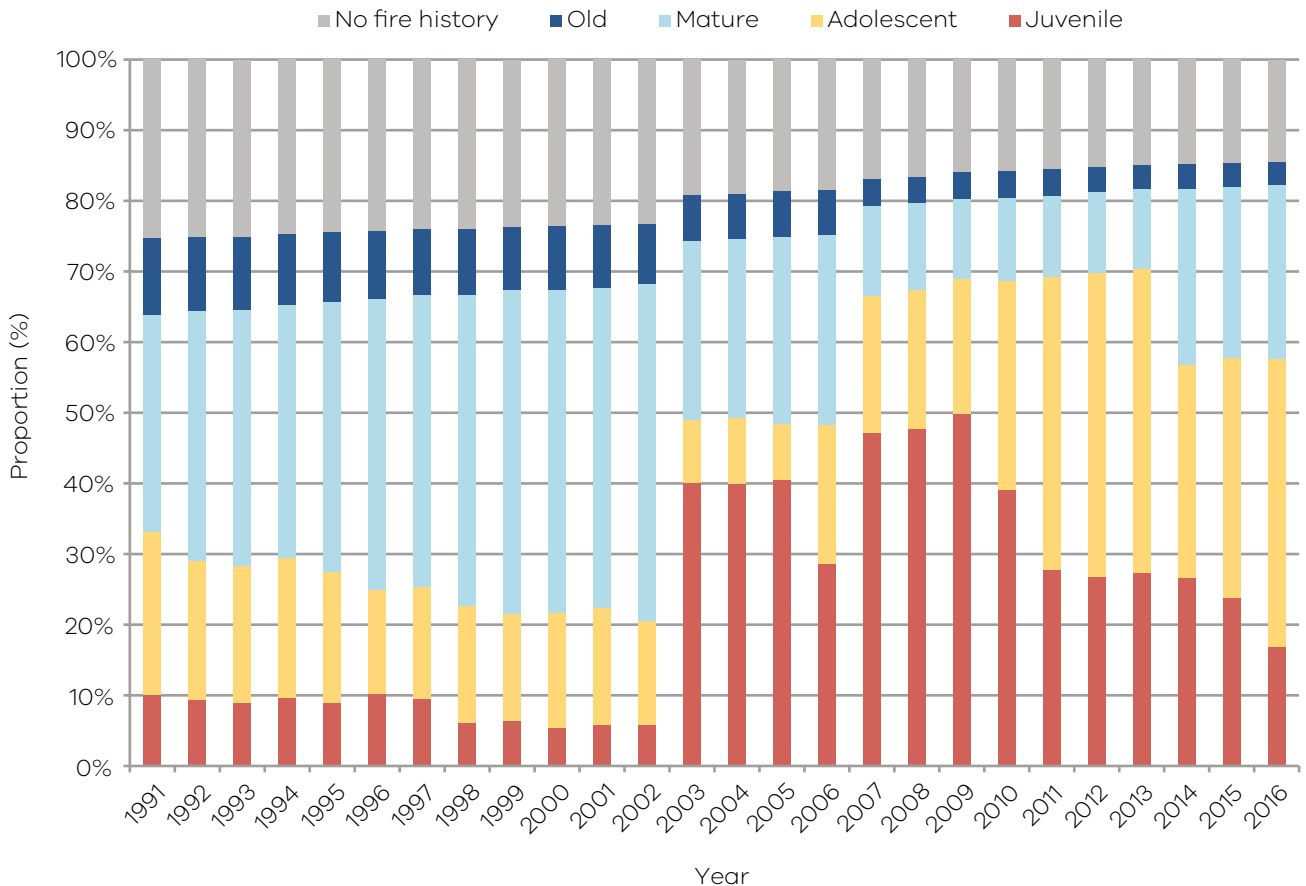


Figure 15: GSS status of public land vegetation, Alpine and North East BRL, 1991–2016

relevant communications. We are always seeking to improve and we used debriefs and evaluation questionnaires after each season.

Staff attend multi-agency fire awareness days at local schools and the local show during Resilience month, an initiative of Alpine Shire's Community Resilience Committee that was formed after the 2009 bushfires. In 2016, the committee decided to communicate bushfire risk to tourism businesses and the community using risk analysis information and bushfire scenario workshops. In the Strathbogie Ranges, an independently facilitated community fire planning group was established.

Monitoring, evaluation and reporting

During the year, the newly appointed Landscape Evaluator led development of an MER plan for our landscape. The plan was approved in July 2016. Priority activities for the first year of the plan are fuel management on public land, which will be measured with overall fuel hazard (OFH) assessments.

In early autumn 2016, two district and two regional staff were trained in OFH assessments so we could conduct OFH monitoring at four planned burns. In all,

we completed 40 pre-burn OFH assessments, 10 at each burn. We could not do post-burn assessments: wet weather prevented ignition at two of the burns and issues with planned burning in the Strathbogie Ranges prevented ignition at the other two. This meant these sites were not burnt and therefore could not be evaluated in 2015–16.

Public concerns about the loss of hollow-bearing trees as a result of planned burning led us to develop a pilot project to determine the collapse rate of these trees. Tree hollows provide important habitat for many animal species including, in the Strathbogie Ranges, the Greater glider (which is nationally listed as vulnerable) and the Powerful owl (state-listed as vulnerable). We established the project at two burns in the Strathbogie Ranges, trained two district staff and completed pre-burn assessments. The BRL team also helped district staff to consult widely and engage with the Strathbogie Emergency Fire Planning Group.

As part of the ongoing Landscape Mosaic Burning (LMB) Program in the Upper Murray District, 22 pre-burn LMB assessments were completed for Scrubby Thowgla LMB which was ignited in autumn 2016.



Barwon Otway

Residual risk

Figure 16 shows the residual risk profile for the Barwon Otway BRL for 1980–2019. It shows:

- residual risk in the landscape for 2015-16 was about 67%
- residual risk fell sharply in 1983 after the Ash Wednesday bushfires, highlighting that a significant portion of risk in the landscape is in the Eastern Otways
- risk steadily increased between 1983 and the early 2000s as fuel re-accumulated across the landscape

- since the mid-2000s, there has been an increased focus on strategic fuel management in the landscape concentrating on fuel management within 2–3 km of high-risk townships and burning along the northern slopes of the Otway Ranges; this focus has resulted in a sustained 20–25% reduction in bushfire risk in the landscape
- if conditions allow us to do all the planned burning scheduled in the FOP for the next three years, we project residual risk will decrease to about 48% by 2019; without planned burning, we project residual risk would be above 77% by 2019.

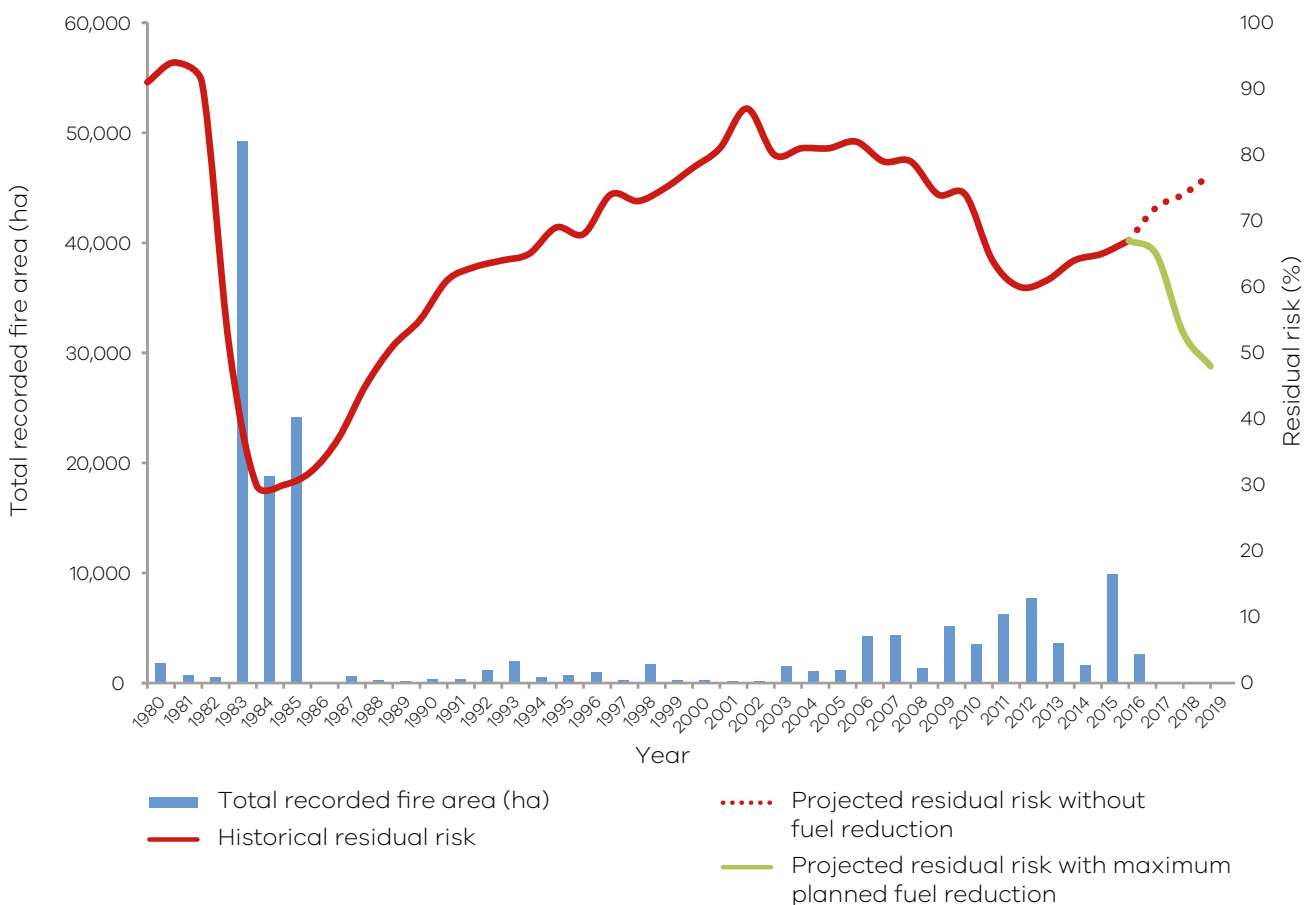


Figure 16: Residual risk profile, Barwon Otway BRL, 1980–2019



Ecosystem resilience

Figure 17 shows the TFI status and Figure 18 the GSS status of the vegetation on public land in the Barwon Otway BRL for 1991–2016. The figures show:

- about 22% of the vegetation is below minimum TFI and about 17% of the vegetation is in the younger (juvenile or adolescent) growth stages
- in 2015–2016, a small (530 ha) area was burnt by bushfire while below minimum TFI and no area was burnt by planned burning while below minimum TFI
- from 1991–2000, the area below minimum TFI slowly decreased from about 25% to about 18%; similarly, the area of vegetation in the juvenile and adolescent growth stages fell from about 24% in 1991 to about 13% in 2000 as the vegetation burnt by the 1939 Black Friday bushfires and 1983 Ash Wednesday bushfires shifted to within TFI or the mature growth stage
- after having been fairly stable from 2000–07, the area of vegetation below minimum TFI has steadily

increased: the proportion in the juvenile and adolescent growth stages has also increased from about 14% to about 17%, corresponding with increased levels of planned burning of treatable vegetation types

- as the proportion of the vegetation in the younger growth stages has risen over the past six years, the proportion of the vegetation in the older (mature and old) growth stages has fallen, from about 47% in 2010 to about 43% in 2016.

We project that the area burnt while below minimum TFI and the amount of vegetation in the juvenile and adolescent growth stages will increase over the next decade due to planned burning in higher-risk areas. An increase in the area in the younger (juvenile and adolescent) growth stages affects animals by reducing the abundance of important habitat such as vegetation cover, logs and hollow-bearing trees.

A large proportion of this landscape has no recorded fire history. It should not be assumed that these areas are above minimum TFI or in an older growth stage.

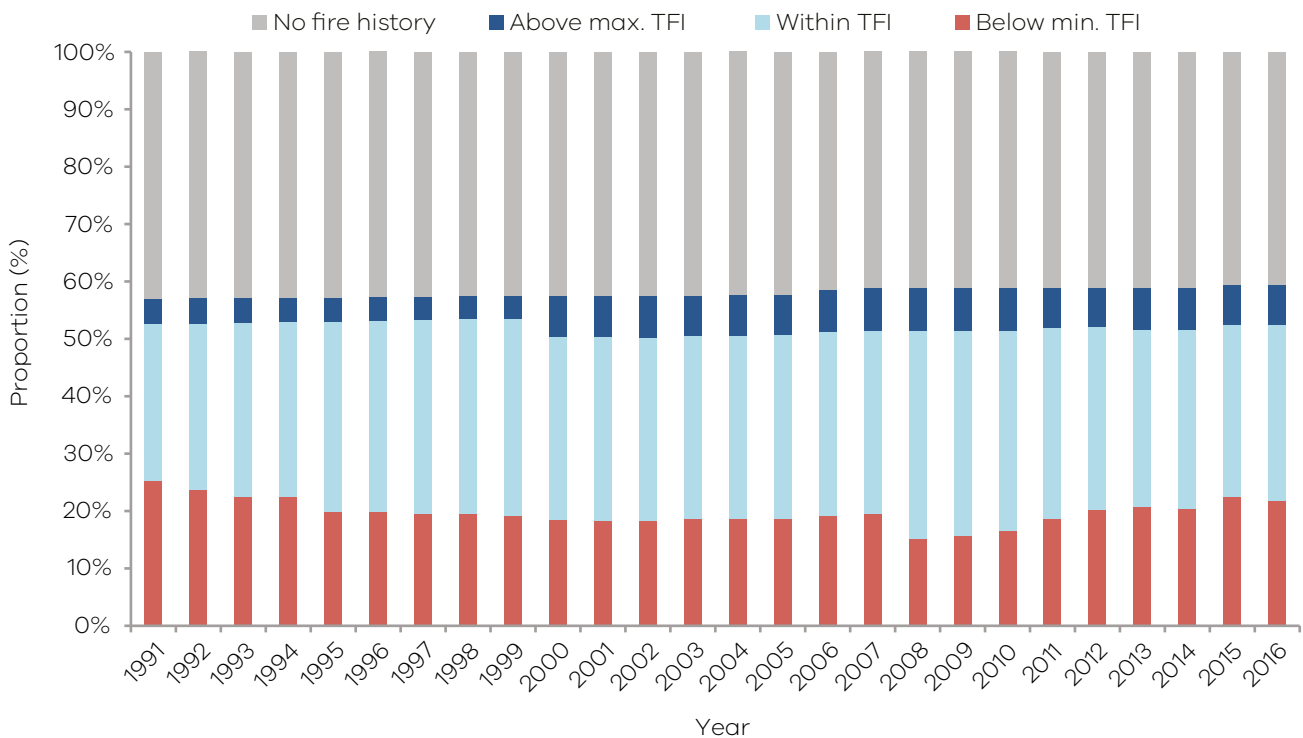


Figure 17: TFI status of public land vegetation, Barwon Otway BRL, 1991–2016

Community engagement

During the year, we worked to ensure our engagement approach was consistent with *Safer Together* and DELWP's *Community Charter*. We also worked with the community and partner agencies on recovery activities after the Wye River Christmas Day fire.

Through our engagement efforts, we seek to form constructive, strategic partnerships with the community and partner agencies by building shared goals, aspirations, understanding and trust. To do this, we seek to better understand community values. Strong relationships meant we could quickly bring together the right agencies for the Wye River recovery efforts.

We worked with CFA to plan the delivery of private property and cross-tenure burns, improving the interagency relationship that underpins the *Safer Together* approach. We engaged with the community at local shows and schools about bushfire planning and fuel management. We brought

agencies and the Wadawurrung Registered Aboriginal Party together for a cultural heritage field day around Anglesea.

We supported Committee for Lorne members to distribute weekly information about our fuel management activities to over 800 people. We also ran a project to identify community values about bushfire management that conducted three community focus groups and a survey. As a result, we strengthened relationships with partner agencies locally; we now better understand community values and can incorporate them into our work. Communities are more aware of our bushfire management activities and have more opportunities to work with us as we develop programs.

Engagement activities with the Wye River community before, during and after the fire included talking with businesses and our community contacts and conducting street walks and door knocks. We established a shopfront Bushfire Information Centre to disseminate bushfire information and to provide advice and referrals to professional services. Our

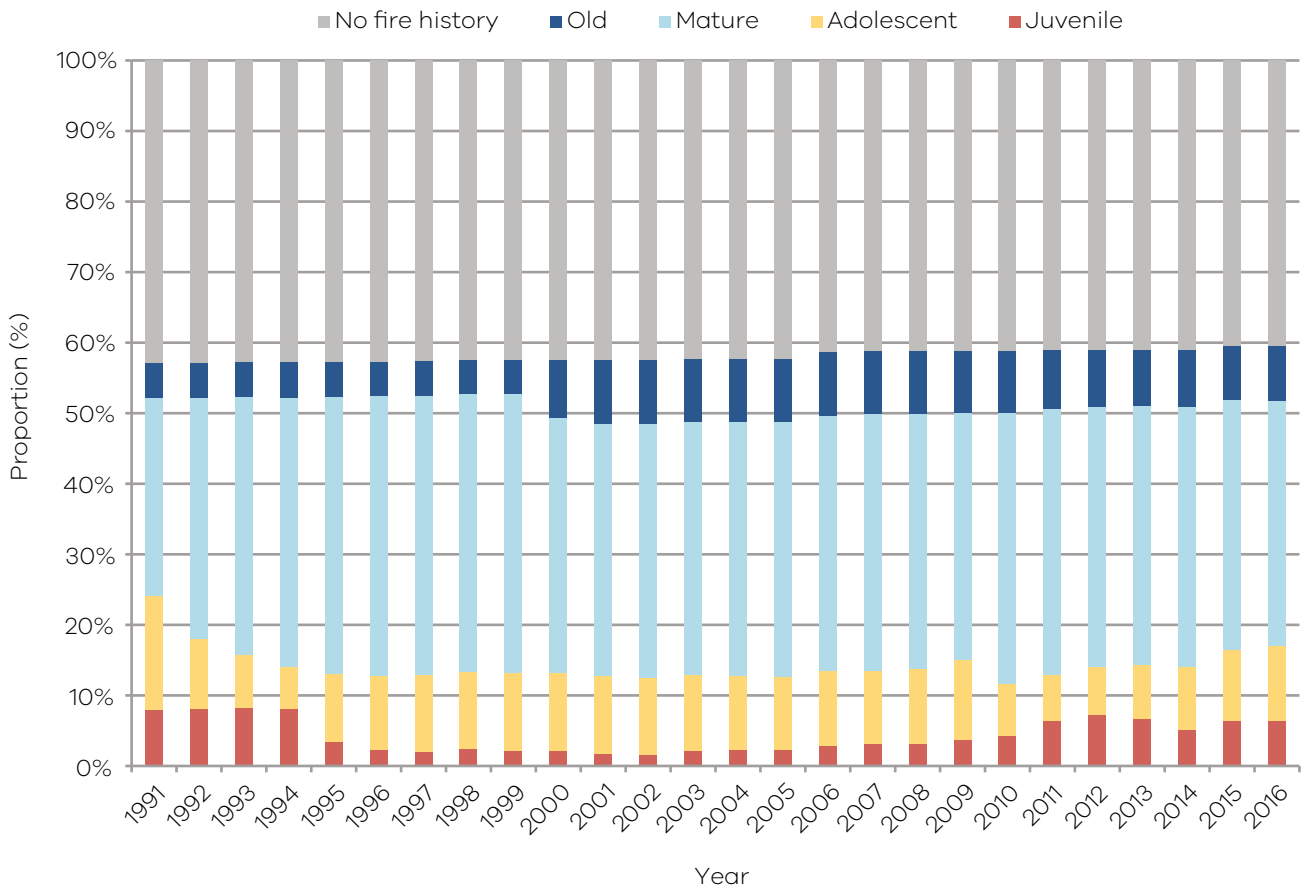



Figure 18: GSS status of public land vegetation, Barwon Otway BRL, 1991–2016



return-to-property engagement included community meetings and meetings with property owners individually and in groups. We made a point of listening carefully and ensuring we were visible and aware of the issues on the ground. Recovery is a long-term process and our engagement is ongoing. It has included many community meetings and more-targeted neighbourhood cluster meetings: through these, we link landholders with each other and with independent experts to examine rebuilding and risk management aspirations and ideas.

Monitoring, evaluation and reporting

During the year, we developed a Barwon Otway MER plan to better plan and implement MER activities. We also:

- trained 17 Otway fire district staff to monitor fuel hazard resulting in pre-burn monitoring at four sites
- completed severity mapping for the Wye River–Jamieson Track fire and the Deans Marsh–Winchelsea Rd planned burn to inform the fire history layer
- established 24 monitoring plots in the Wye River–Jamieson Track bushfire area, beginning a long-term project to monitor fuel accumulation over

time: the project results will help validate bushfire models for the forest herb-rich fuel type (filling a known knowledge gap) and will in turn inform strategic planning, including where and how we use planned burning to reduce risk

- monitored fuel moisture in the lead-up to and during planned burning to ensure we could take all opportunities to manage fuel
- conducted 45 surveys at 20 sites to assess key fire response species and so understand whether the current TFI is appropriate and useful for determining the reproductive success of those species in areas frequently treated by planned burning.

We intend to conduct further monitoring of ecosystem resilience soon, but it is on hold pending the results from a La Trobe University study to define ecosystem resilience monitoring questions and methodologies.

During the year, we evaluated the Strategic Bushfire Risk Assessment and Strategy Selection Project and the strategic bushfire planning process, to inform future strategic planning.





East Central

Residual risk

Figure 19 shows the residual risk profile for the East Central BRL for 1980–2019. It shows:

- residual risk in the landscape for 2015-16 was about 79%
- residual risk fell sharply after the 1983 Ash Wednesday bushfires and again after the 2009 Black Saturday bushfires, reaching less than 50% in 2010

- since 2009, residual risk has steadily increased as fuel re-accumulated across the landscape but we have conducted planned burning to slow the rate of increase
- if conditions allow us to do all the planned burning scheduled in the FOP for the next three years, we project residual risk will stabilise (about 78%): without planned burning, residual risk would rise to above 89% by 2019.

East Central has several major towns that adjoin land on which we cannot safely do planned burning to reduce risk, so other activities (such as community education to improve preparedness and safety, and mechanical works) are very important.

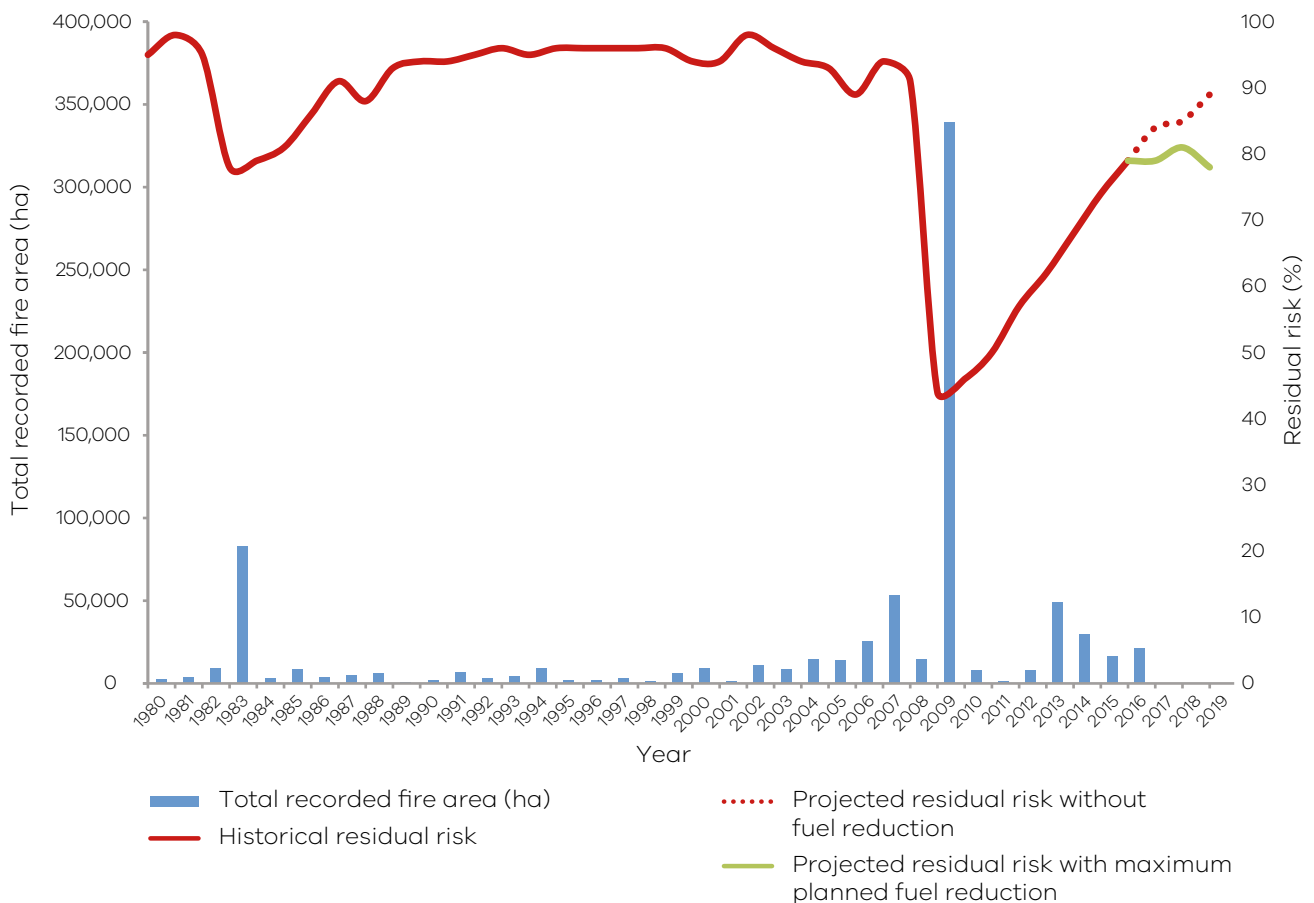


Figure 19: Residual risk profile, East Central BRL, 1980–2019

Ecosystem resilience

Figure 20 shows the TFI status and Figure 21 the GSS status of the vegetation on public land in the East Central BRL for 1991–2016. The figures show:

- in 2015–16 about 58% of the vegetation was below minimum TFI
- in 2015–16, less than 1% of the vegetation was burnt by bushfire or planned burning while below minimum TFI, mainly due to planned burning in the BMZ and LMZ
- from 2000–08, the proportion of the landscape below minimum TFI gradually increased from about 32% to about 40%, increasing to about 59% after the 2009 Black Saturday bushfires which also greatly reduced the proportion of mature

vegetation (from about 48% to about 29%), shifting the landscape away from the older growth stages

- in 2015–16 about 48% of the landscape was in the younger vegetation growth stages (juvenile and adolescent) and about 35% is in the older growth stages (mature and old).

The ecological implications of these changes for some animals (such as Leadbeater’s possum and Smoky mouse) are significant. These species depend on vegetation in the mature growth stages for habitat (such as hollow-bearing trees and coarse, woody debris). It will take a long time to recover from this shift in growth stages: some vegetation communities can take 50 years or more to reach maturity.

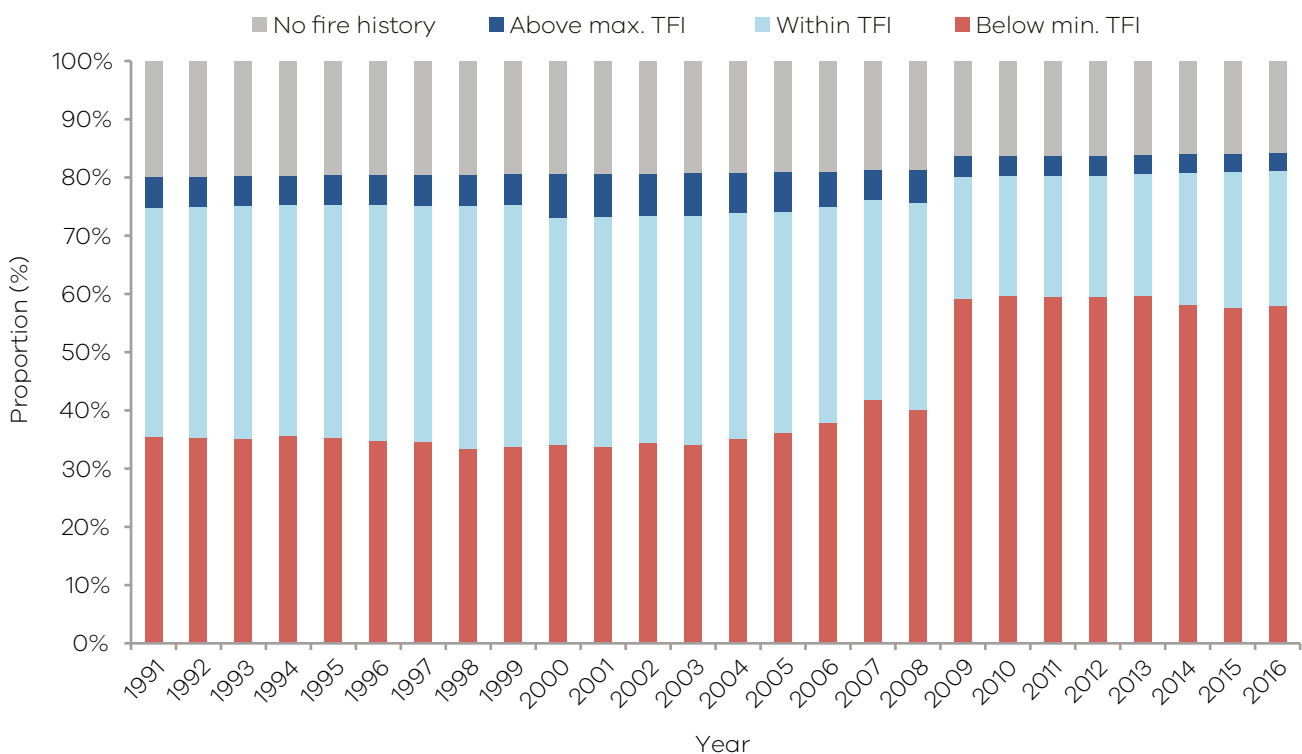


Figure 20: TFI status of public land vegetation, East Central BRL, 1991–2016

Community engagement

This year, we completed two long, complex and high-profile planned burns at Mt Dandenong and Arthurs Seat. Both required considerable long-term engagement with the local community, including with tourism operators at both sites, local councils, the vigneron's association, business groups and CFA. At both planned burns, we had officers on-site to provide information to locals affected by the burn.

Engagement about our FOP included meetings with environmental and community groups and with Traditional Owners and other stakeholders (particularly vignerons, PV and CFA), as well as with landowners about cross-tenure burns.

Our online engagement portal particularly helps people who do not attend engagement events. It provides information about upcoming events and allows discussions about bushfire risk and the community's experiences of bushfire. People used it to provide feedback about the 2015-16 FOP and to nominate fuel treatments.

In partnership with Nillumbik Shire Council, we conducted a pilot series of community conversation

at St Andrews. The conversations aim to improve understanding of how people can contribute to a better whole-of-community approach to bushfire risk and emergency management.

The two-day Living with Bushfire Community Conference was developed by our team, Federation University, CFA, Latrobe City Council and PV. It provided the opportunity for the public and staff of other agencies to learn about bushfire management issues and research.

The Fire Learning Network launched this year. Participants include our team, members of the public and university, local government and other agency representatives. Participants share knowledge through presentations, discussions, papers and conversations about bushfire. The network helps build relationships and understanding of bushfire science and community concerns about bushfire management and bushfire safety.

The East Central BRL team, in collaboration with PV, CFA, Yarra Ranges Council and Warburton Emergency Planning Group, ran a bushfire session in Warburton for the community. The session included

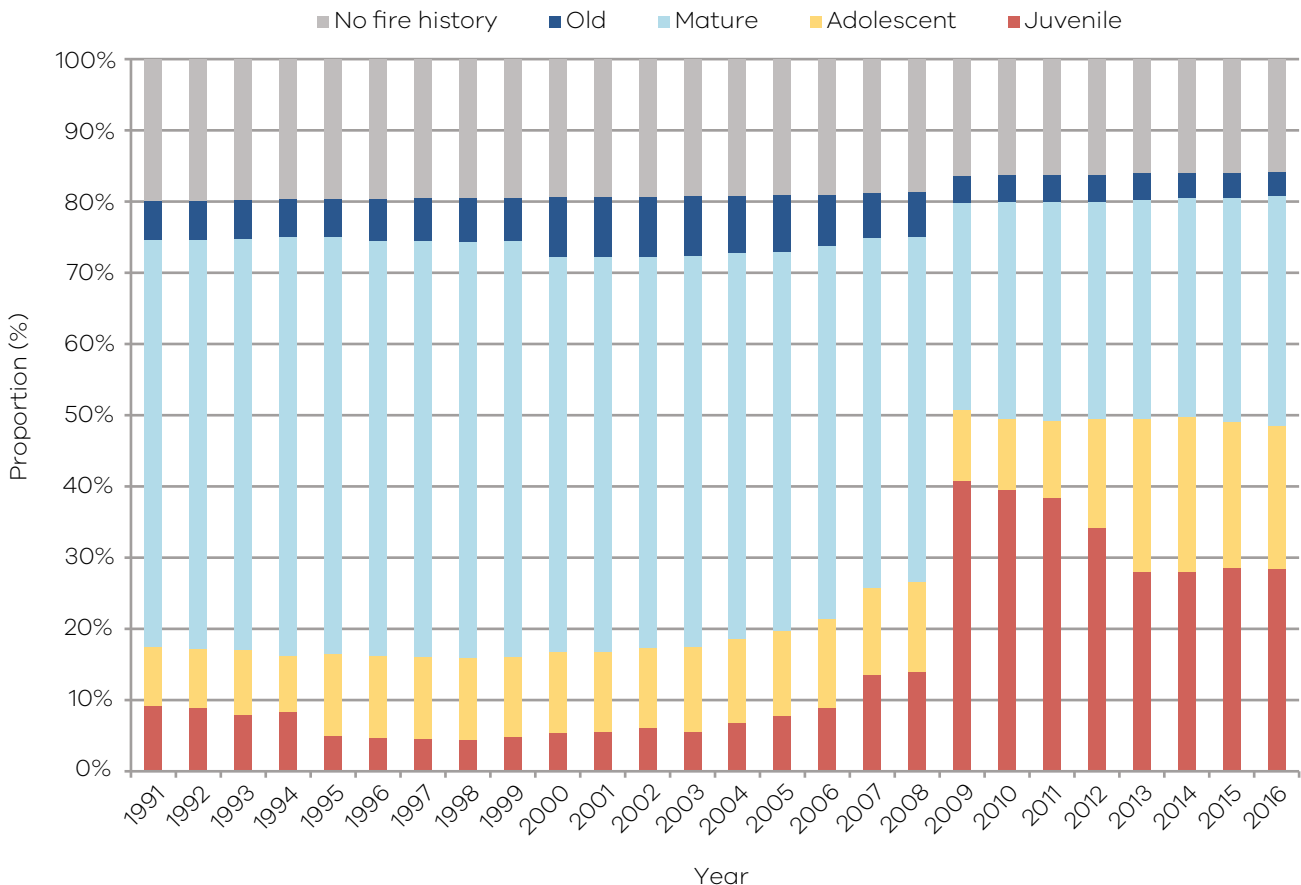


Figure 21: TFI status of public land vegetation, East Central BRL, 1991–2016

Phoenix modelling of a possible fire scenario and activities and discussion to build the community's capacity to plan and respond to bushfires. In collaboration with the Yarra Ranges Council, the Southern Ranges Environmental Alliance, PV and CFA, the team ran a community bushfire risk forum at Montrose for agencies, the public and university staff to share their knowledge and experience of bushfire.

Monitoring, evaluation and reporting

In June 2015, the first East Central MER plan was approved. It outlines KEQs and priority monitoring activities for the five years 2015–20. We began implementing the plan in January 2016, with DELWP and PV monitoring the effectiveness of fuel management activities in reducing risk to life and property. We expect in coming years to expand monitoring activities to understand how fuel management activities maintain and improve ecosystem resilience.

During the year, we:

- conducted post-fire severity mapping of autumn planned burning using geographic-information-system data, aerial photography and on-ground assessments; we captured and mapped 25 burns over about 17,900 ha with aerial photography
- conducted, for the autumn planned burning season, 35 pre-burn fuel hazard assessments and 19 post-burn assessments
- completed fuel hazard assessments for a retrospective study at 394 sites: 94 sites in 2015 and 300 sites in 2016: the study will validate how fuel accumulates over time in three priority fuel types in our landscape
- trialled a smart device app for staff to collect data and take photos in the field and upload them to a central database, making data collection easier and more efficient, and trained DELWP and PV staff from Metro, Yarra, La Trobe and Murrindindi districts to conduct fuel hazard assessments using the app and the *Overall Fuel Hazard Guide*
- conducted a strategic bushfire risk analysis for one population of Leadbeater's possum in the Central Highlands, which identified areas for planned burning that would be likely to reduce the bushfire risk for this population
- validated areas of unburnt/undisturbed habitat with high ecological value that we will exclude from the FOP.



Mallee and Murray Goulburn

Residual risk

Figure 22 shows the residual risk profile for the Mallee and Murray Goulburn BRL for 1980–2019. It shows:

- residual risk in the landscape for 2015-16 was about 90%: most of the remaining risk arises from private farming land and small parcels of vegetation, where it is more difficult to manage fuel with planned burning
- before 2010, the percentage of residual in the landscape was fairly stable
- since 2010, residual risk has fallen sharply due to more planned burning around larger communities that are at high risk from bushfires (such as Inglewood, Wedderburn, Tarnagulla and Rushworth): in these high-risk areas, we cannot treat fuel again for about ten years, so it will accumulate and we expect a slight increase in residual risk, but we will stage planned burning to minimise these fluctuations in residual risk
- if conditions allow us to do all the planned burning scheduled in the FOP for the next three years, we project residual risk will decrease to about 86% by 2019: without planned burning, residual risk would be above 95% by 2019.

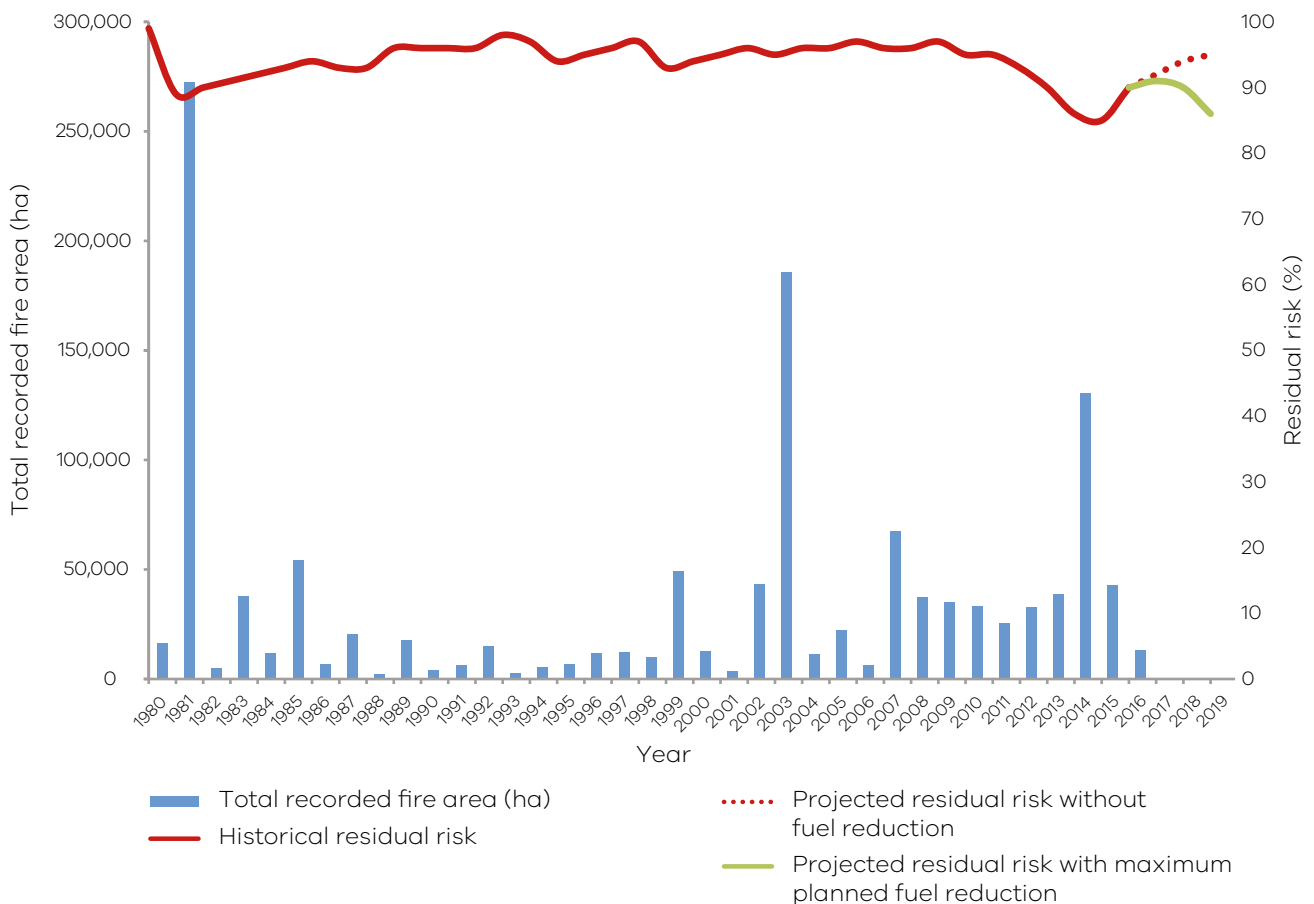


Figure 22: Residual risk profile, Mallee and Murray Goulburn BRL, 1980–2019

Ecosystem resilience

Figure 23 shows the TFI status and Figure 24 the GSS status of the vegetation on public land in the Mallee and Murray Goulburn BRL for 1991–2016. The figures show:

- the amount of the vegetation below minimum TFI has steadily increased over the past decade from about 24% to about 32% due to bushfires and increased planned burning: large fires are a major influence on the Mallee’s ecology and about 80% of the total area burnt by bushfires in the last decade can be attributed to just five events
- in 2015–16, less than 1% of the vegetation was burnt by bushfire or planned burning while below minimum TFI, in the LMZ or BMZ

- the proportion of the landscape in the juvenile or adolescent growth stages has fallen over the last five years from about 22% to about 17%; the proportion of mature vegetation has correspondingly risen from about 30% to about 38%.

A large proportion of this landscape has no recorded fire history. It should not be assumed that these areas are above minimum TFI or in an older growth stage.

Our MER program aims to understand and calculate how effectively strategic firebreaks reduce the impact of major bushfires on ecosystem values. This better understanding will allow us to account for natural fires when modelling TFI and GSS, which will improve the accuracy of the information we use for bushfire management planning.

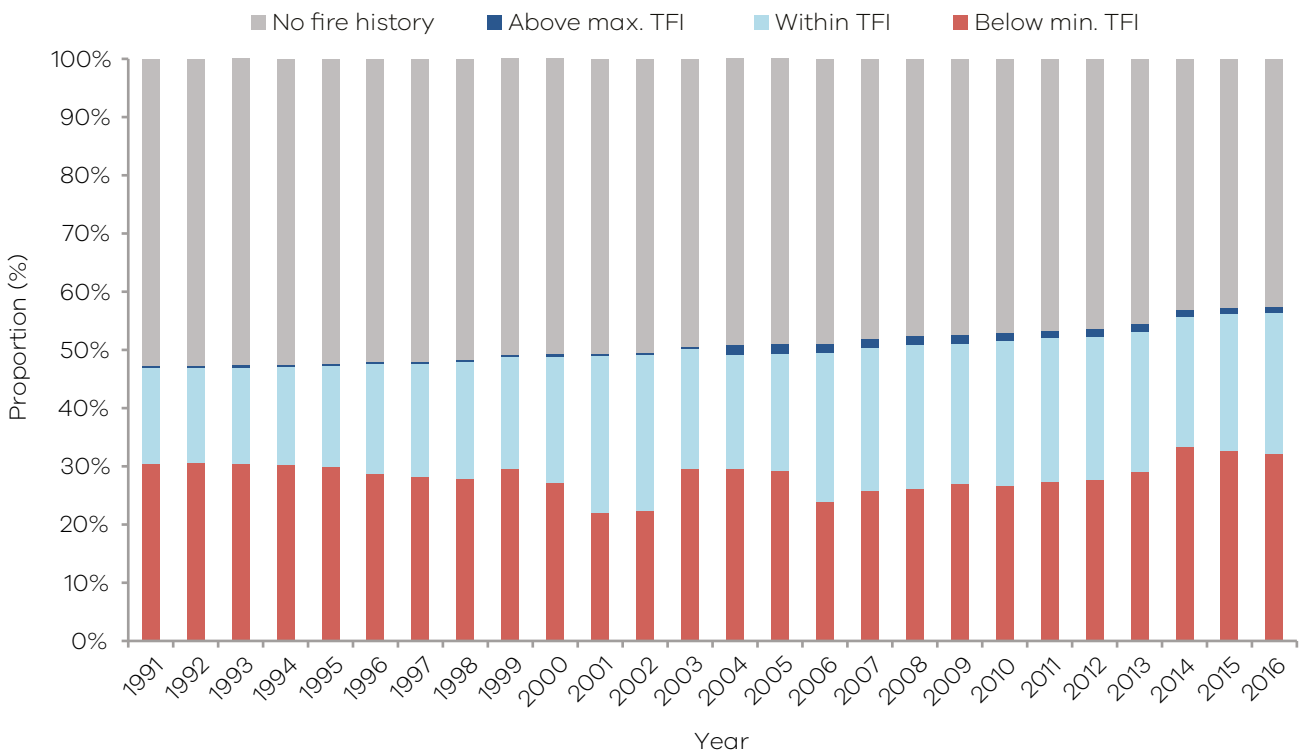


Figure 23: TFI status of public land vegetation, Mallee and Murray Goulburn BRL, 1991–2016



Community engagement

The Mallee Fire Advisory Committee is an example of *Safer Together* in action. Established in 2014, it is a regional, stakeholder-based committee that gives the Mallee community a voice in fire management decisions. Its members are local landholders, apiarists, environmentalists, CFA members and government employees, all with different backgrounds and values. They are well-respected in the Mallee community and work collaboratively to make consensual decisions. The committee's contribution gives us confidence fire management decisions reflect the values and ideas of the Mallee community.

In 2015-16, the committee considered what fuel management strategies we should implement in the Hattah-Kulkyne National Park. The park provides habitat for the threatened Mallee emu-wren, an endangered species. The committee asked us to delay planned burning until further bird surveys were completed. The committee's advocacy was a big help in securing funding for surveys, which started in

spring. We also discussed with the committee the proposed mechanical edge-break treatments listed in our strategic bushfire management plan for high-priority areas at risk from fires exiting the park, and how best to implement *Safer Together* in the Mallee.

We held a workshop in Wedderburn for DELWP, CFA and Loddon Shire Council staff to talk with members of the public about bushfire risk, bushfire survival plans, heatwaves, neighbourhood safer places and preparedness for summer. The workshop improved the community's understanding of risk. Our landscape team also supported the Big Desert / Wyperfeld and Little Desert fire conferences. These are great pre-season networking events and nearly 100 participants attended from DELWP, CFA, Victoria Police, Victoria State Emergency Service, local governments, Department of Health and Human Services and Ambulance Victoria. The team used the forum to discuss risk in the landscape and to build relationships.

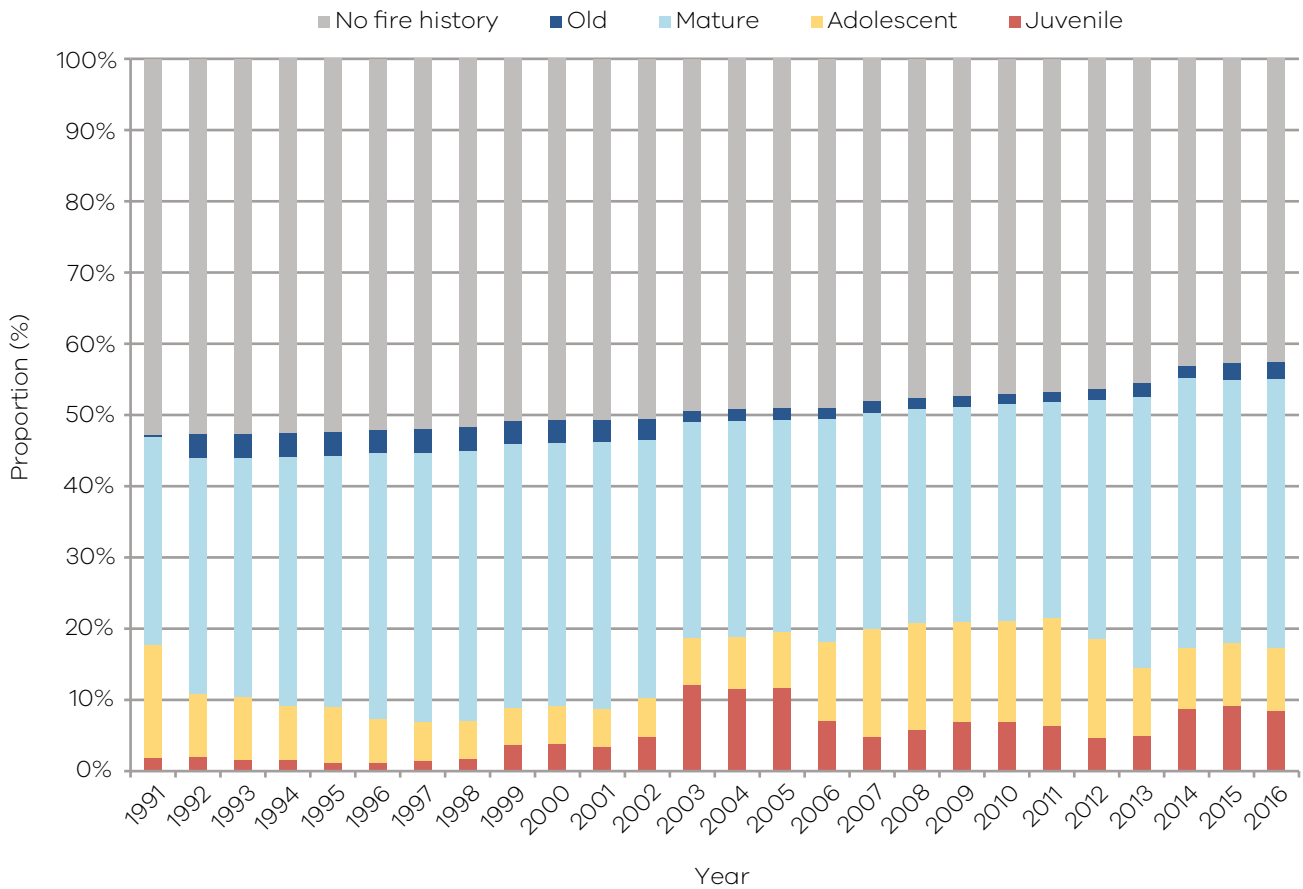


Figure 24: GSS status of public land vegetation, Mallee and Murray Goulburn BRL, 1991–2016

Monitoring, evaluation and reporting

During 2015-16, we developed our five-year MER plan to review implementation of our strategic bushfire management plan. We developed the plan in conjunction with PV, fire district operational staff and La Trobe University fire ecologists. We started implementing the plan, by monitoring planned burning outcomes.

We completed a review of fire history mapping since 1972 to 2015. The west side of Victoria — from Little Desert in the south to the River Murray in the north — is now mapped to the same high-resolution standard. During the review, we identified several previously unmapped fires that occurred in the 1970s and 80s. The review also substantially changed the shape and extent of some other fires.

We commissioned Deakin University to study the response of native and introduced mammals to fire-induced habitat modifications. The study used camera traps at 158 sites over a two-year period to detect the presence of these mammals in Lowan

Mallee and heathland sands (desert) vegetation at differing times since fire. Of the seven mammal species recorded, only one — Mitchell's hopping mouse — preferred vegetation of a specific fire-age class. The study also examined the importance of scrub pine stands as mammal habitat and found Mitchell's hopping mouse frequently used it, as did Silky mouse to a lesser extent.

In spring, we engaged La Trobe University to do a three-year investigation of the fire ecology of the nationally endangered Mallee emu-wren to determine the minimum size of a habitat patch needed to sustain viable subpopulations of this species.

We also conducted pre- and post-burn plant assessments at six box-ironbark forest sites around Inglewood.



South Western

Residual risk

Figure 25 shows the residual risk profile for the South Western BRL for 1980–2019. It shows:

- residual risk in the landscape for 2015-16 was about 79%

- residual risk fell sharply to about 82% after the 2006 Mt Lubra bushfire in the Grampians and has continued to gradually fall due to planned burning and more-recent bushfires in the Grampians
- if conditions allow us to do all the planned burning scheduled in the FOP for the next three years, we project residual risk will continue to decrease to about 73% by 2019: without planned burning, residual risk would return to about 84% by 2019.

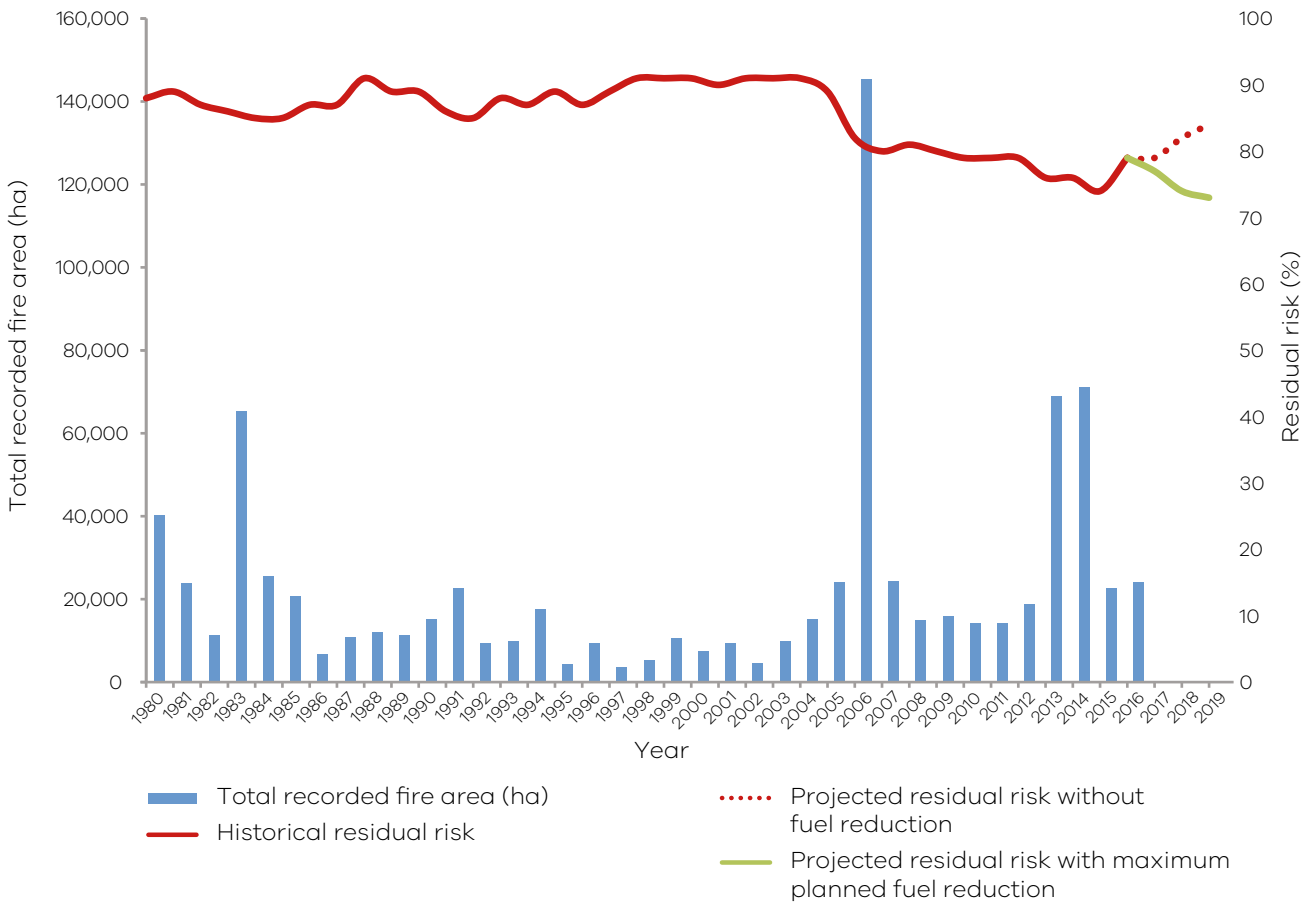


Figure 25: Residual risk profile, South Western BRL, 1980–2019

Ecosystem resilience

Figure 26 shows the TFI status and Figure 27 the GSS status of the vegetation on public land in the South Western BRL for 1991–2016. The figures show:

- in 2015–16 about 34% of the vegetation was below minimum TFI
- over the decade to 2015, the proportion of the vegetation below minimum TFI increased from about 14% to about 38% as a result of major bushfires in the Grampians in 2006, 2013 and 2014 and in the west of the landscape in 2006 and 2012
- in 2016, less than 1% of the vegetation was burnt by bushfires or planned burning while below minimum TFI and most of it by planned burning the BMZ

- over the past decade, major bushfires has increased the amount of vegetation classed as mature to younger growth stages: the proportion of the vegetation in the juvenile and adolescent growth stages increased from about 12% in 2005 to about 38% in 2014 and in recent years some of this vegetation has started to move into the mature growth stage.

Due to the large bushfires in the Grampians National Park, there are large stands of single-age woodland and forest. Burning by another large bushfire of these stands while they are still below minimum TFI could alter the ecology of the area. Therefore, we are carefully introducing planned burning to these areas to create a mosaic of fire ages and to reduce the risk of large bushfires.

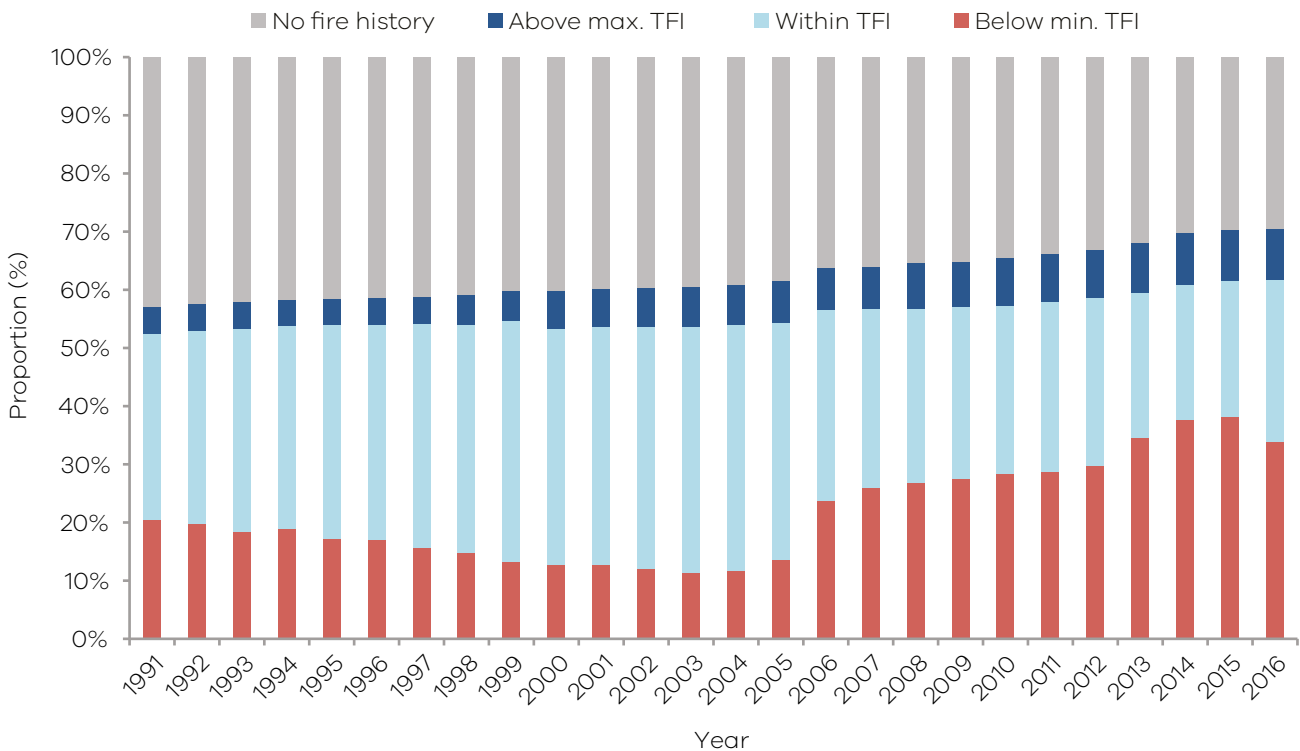


Figure 26: TFI status of public land vegetation, South Western BRL, 1991–2016

Community engagement

In 2015-16, the inaugural Glenelg Fire Emergency Management Conference and the Grampians Fire Conference brought staff, other agency representatives and the public together to examine local risks and identify possible responses.

We held open houses and other events about planned burning, cross-tenure fuel management and local fire issues in Dunkeld, Gorae West and Heathmere. These events helped people to better understand the work that we do with CFA in their area and to plan what they should do to reduce risk in the event of a bushfire.

Far South West fire district staff worked with local governments to disseminate smoke management

messages for planned burning, which is important because smoke can result in major roads being closed.

The Greater Grampians Roundtable continued to provide useful expertise and local input into fire management in the area. The roundtable undertook a process to envisage its ongoing purpose and successes.

The Western Border Stakeholder Reference Group was created. Taking in South-eastern red-tailed black-cockatoo habitat and the area up to the South Australian border, the group brings together many interest groups, members of the public, industry groups, local governments and agencies. The group examined risk in the area and how DELWP assesses impacts.

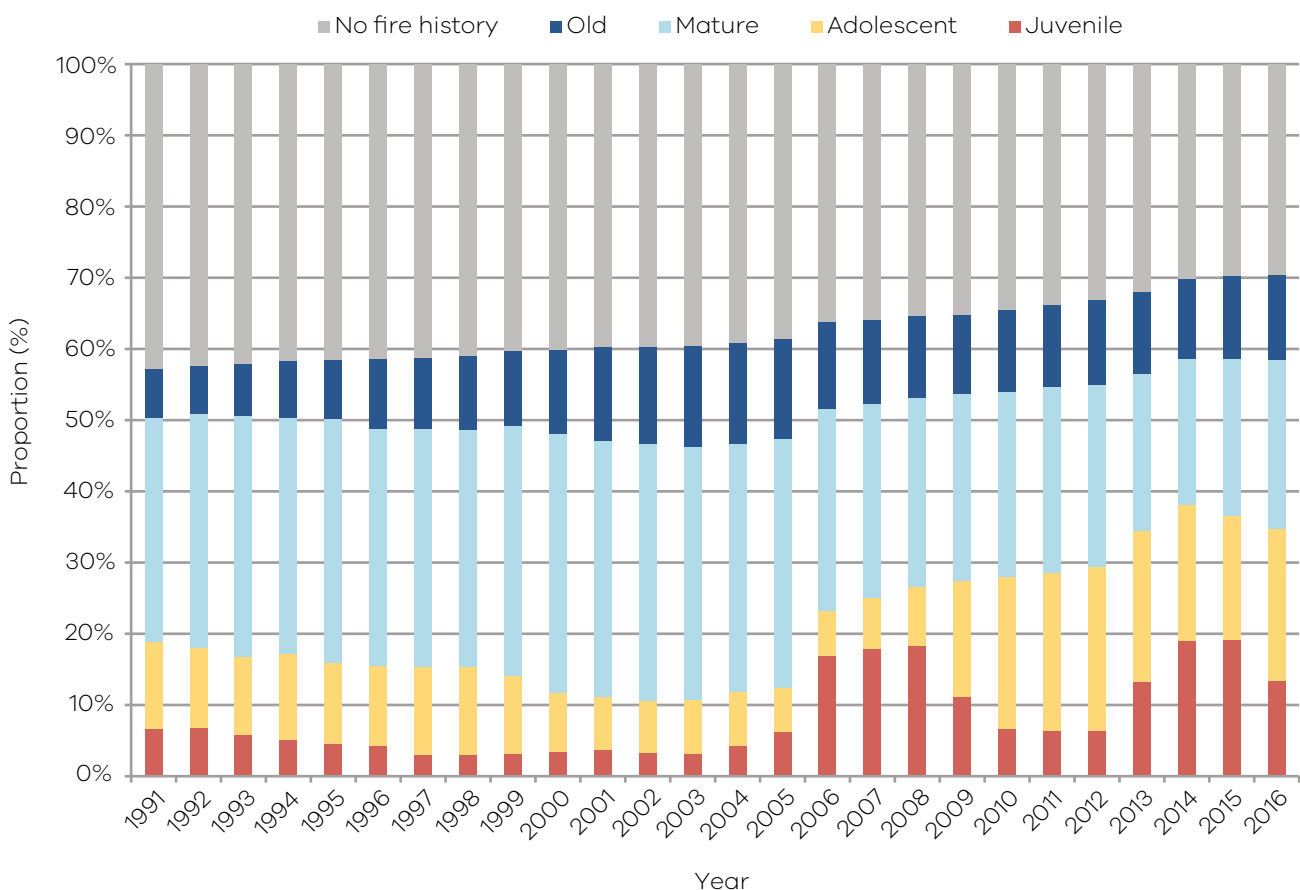


Figure 27: GSS status of public land vegetation, South Western BRL, 1991–2016

Monitoring, evaluation and reporting

During the year and in consultation with PV and fire district operational staff, we continued developing a five-year MER plan for our BRL. The plan identifies gaps in our knowledge and the information we need to achieve our fuel management and ecological resilience goals. The plan was endorsed in November of 2016.

PV commissioned a project to improve burn planning for the Serra Range in the Grampians National Park. Fuel management in the Serra Range is important for reducing risk to life, property and ecological assets but it is hard to treat fuel in the ranges

because of the complex fuel types and because the range does not have hard boundaries (such as tracks and roads).

Fuel management further, a growth stage optimisation report by Melbourne University, was finalised for the Greater Grampians area. The report gives the optimal growth stages for different vegetation types that suit a range of birds, mammals and reptiles. The report found the diversity of birds, mammals and reptiles was greatest in areas dominated by mature and late-growth-stage vegetation (from 10 to more than 150 years post-fire, depending on the type of vegetation).



West Central

Residual risk

Figure 28 shows the residual risk profile for the West Central BRL for 1980–2019. It shows:

- residual risk in the landscape for 2015–16 was about 77%
- residual risk peaked in 2002 and steadily fell, due to an increased planned burning program, until 2015

- large bushfires in the landscape in 2014 and 2016, mostly in agricultural areas, diverted resources to fire suppression and recovery activities which reduced planned burning in high-risk areas in these years: the subsequent, sharp increase in residual risk shows how quickly forest fuel can return in this landscape
- if conditions allow us to do all the planned burning scheduled in the FOP for the next three years, we project residual risk will decrease to about 66% by 2019: without planned burning, residual risk would rise to about 86% by 2019.

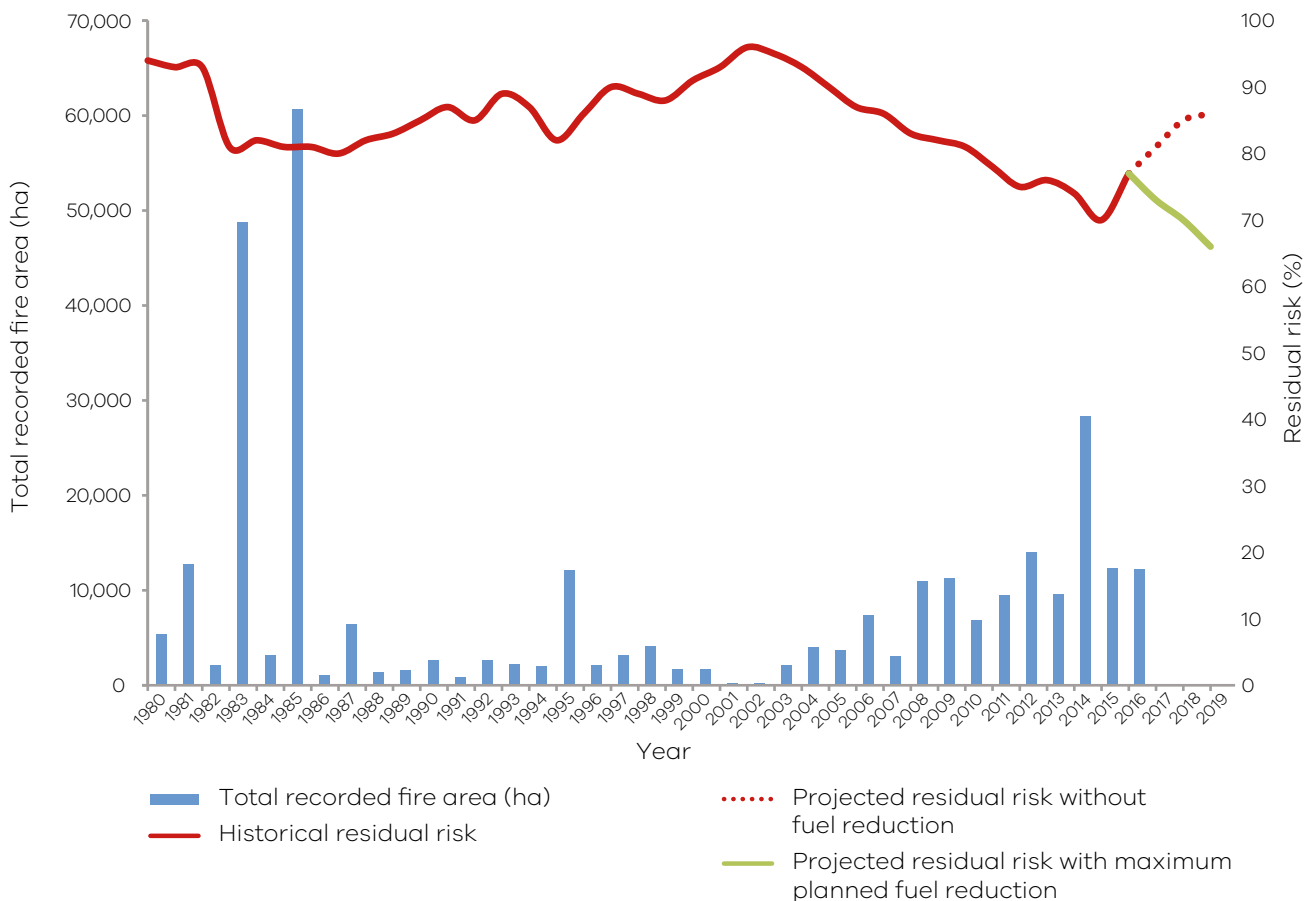


Figure 28: Residual risk profile, West Central BRL, 1980–2019

Ecosystem resilience

Figure 29 shows the TFI status and Figure 30 the GSS status of the vegetation on public land in the West Central BRL for 1991–2016. The figures show:

- in 2015–16 about 25% of the vegetation in the landscape was below minimum TFI
- in 2015–16, a small (about 286 ha) area of the vegetation was burnt by bushfires or planned burning while below minimum TFI
- from 1991–2009, the proportion of the landscape below minimum TFI fell from about 21% to about 13%, partly because there were very few bushfires in this period

- the proportion of the vegetation below minimum TFI has increased from about 14% in 2010 to about 25% in 2016 while the proportion of the vegetation in either the juvenile or adolescent growth stages has also increased, from about 15% to about 27%: the rise in the proportion of younger vegetation is due to more planned burning, particularly in 2011, 2014 and 2015.

A large proportion of this landscape has no recorded fire history. It should not be assumed that these areas are above minimum TFI or in an older growth stage. The long, significant history of disturbance in these areas (including during the Gold Rush and by forestry) means many of these areas are still regenerating.

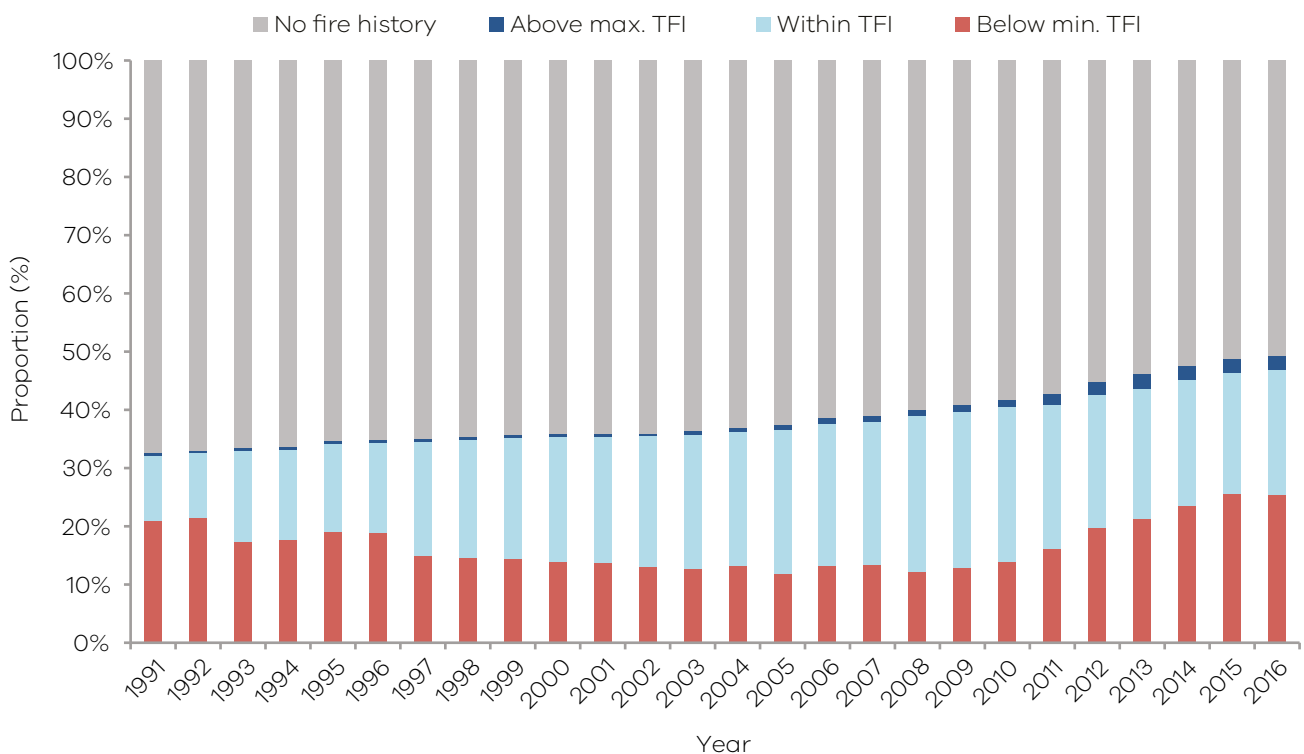


Figure 29: TFI status of public land vegetation, West Central BRL, 1991–2016



Community engagement

In February 2016, the team held a workshop to gather community input into DELWP's *Community Charter*.

The landscape team together with CFA, PV and Hepburn Shire Council held a community event at Doctors Gully, a 4.2 ha site north of Daylesford. Visitors were shown through the site and discussed future fuel-reduction burns, the FOP and strategies for reducing bushfire risk. Doctors Gully runs through the suburban area of Daylesford where smoke from a burn can have major impacts on tourism and health. The community told us Doctors Gully has significant cultural and natural values and we need to manage it to protect these values while ensuring the build-up of fuel that could spread a bushfire does not compromise community safety.

In light of the community feedback, DELWP and PV staff reviewed fuel treatment options and developed new strategies to treat fuel hazards at Doctors Gully. To reduce smoke impacts from planned burning, we

agreed to remove fuel mechanically with brush cutters and a grooming machine. The Dja Dja Wurrung, as Traditional Owners, will help lead this process.

Our Doctors Gully experience shows that by working with the community we can learn from each other and share ideas and information in a way that helps ensure we all look after our special places.

Monitoring, evaluation and reporting

In 2015-16, we developed our MER plan and our assistant chief fire officers approved it. The plan identifies monitoring questions about risk to life and property and continues some legacy monitoring projects. We started implementing the MER plan by creating monitoring implementation plans for the Murray Goldfields and Midlands fire districts, working with neighbouring BRL teams.

We continued to gather data about overall fuel hazard (OFH) levels in the landscape in the Heathcote, Graytown and Rushworth forests and

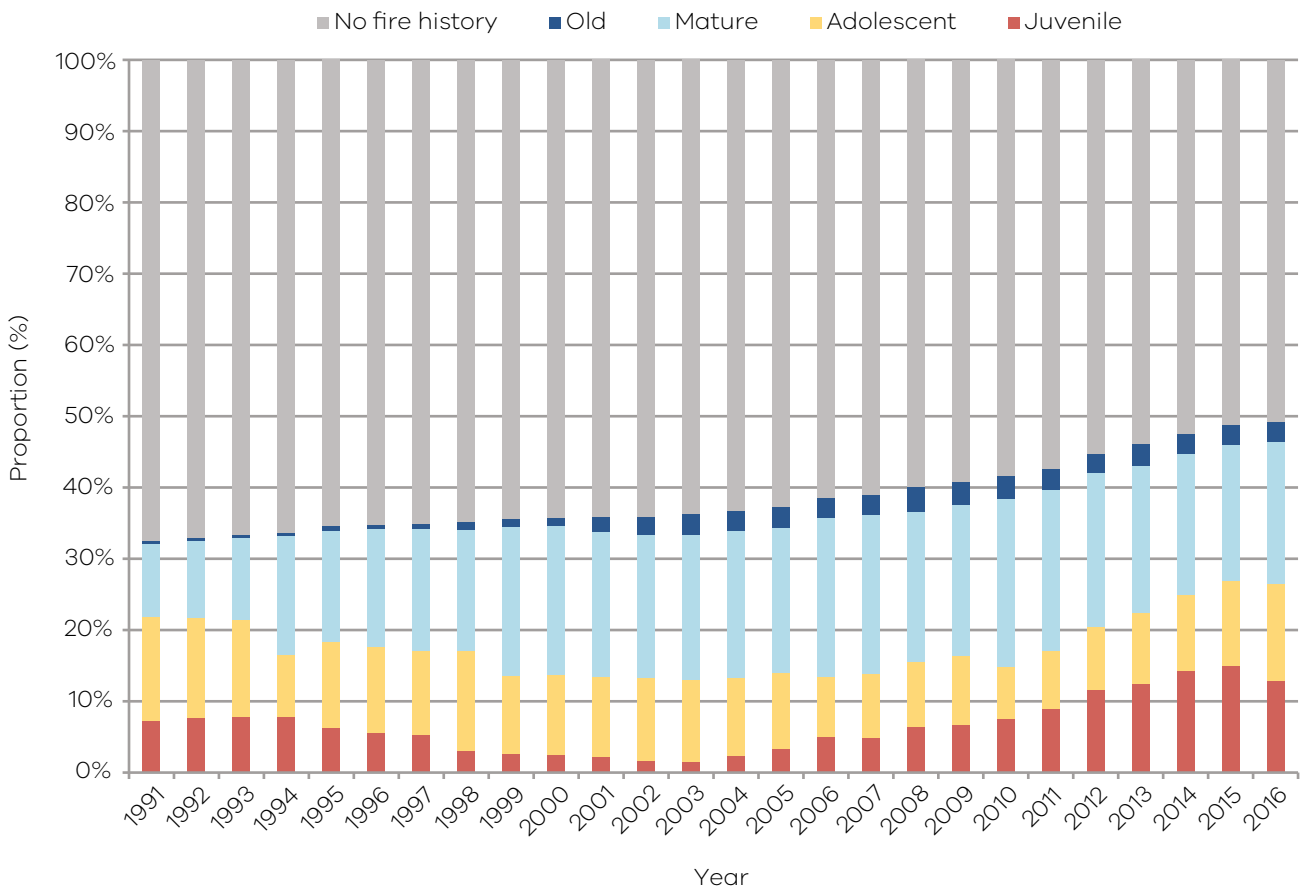


Figure 30: GSS status of public land vegetation, West Central BRL, 1991–2016

used it for the Box-Ironbark Experimental Mosaic Burning Project. This data gives us a good picture of how OFH changes over time after burning box-ironbark forest. We also collected data about OFH levels in box-ironbark forest at a particular time since the last fire, which we will use to improve our modelling of box-ironbark forest fuel levels.

During the year, we compiled all planned burning and bushfire event records for the landscape and obtained more information from the field to update our fire history layer. Fire history is a key input for modelling software, so having accurate data is important. After the spring planned burning season we mapped the severity, extent and residual OFH of 14 burns in the Murray Goldfields fire district using transects, aerial photography and RapidEye satellite imagery. This work keeps the fire history layer accurate and up-to-date and allows us to evaluate individual burns. We used evaluation findings to improve burn objectives and burn unit mapping and are learning to improve our OFH assessment process and burn severity mapping.







Regional fuel management planning and activity

Barwon South West

Table 8: Burn planning, site preparation and fuel reduction, Barwon South West region, 2015–16

Measure		Ha	Ha toward TAFM	% of TAFM
Target area for fuel management (TAFM)		18,516		
Burn planning and site preparation				
Area for which burn plans were prepared (over the three-year FOP)	Target	30,551		165%
	Actual	24,768		134%
Area of sites made ready	Target	25,922		140%
	Actual	23,987		130%
Fuel reduction				
Area treated by planned burning:		458	458	2%
<ul style="list-style-type: none"> ecological burns 64 ha (2 burns) fuel-reduction burns 394 ha (4 burns) other burns <1 ha (2 burns) 				
Area treated by other fuel management methods		2,320	2,320	13%
Area suitable for planned burning burnt by bushfires		2,213		
(including area planned for burning on a current FOP)			1,930	10%
Actual fuel-reduced area (total)		4,991	4,708	25%

Table 8 shows 2015–16 burn planning, site preparation and fuel reduction achievements in the Barwon South West region. It shows we prepared burn plans for 24,768 ha, or 134% of the TAFM, below the target of 165% of TAFM. It also shows we prepared burn plans and made sites ready for 23,987 ha which, at 130% of TAFM, was also below the target of 140%.

The table shows we treated 2% of the TAFM target by planned burning and fuel-reduced only one-quarter of the TAFM. That is, the planned burning program was very limited, comprising eight planned burns for a total 458 ha. We also treated 13% of TAFM, or 2,320 ha, by other methods.

The limited program was mainly because of unfavourable weather. Dry conditions persisted up to the end of April 2016 and made the soil and fuel very dry. Rain in early- to mid-May moderated the dry

conditions but high winds and rain meant there were few burning windows available. We monitored opportunities regionwide, with detailed daily analysis of conditions in each district: these showed only small burning windows.

CFA provided on-ground, operational resources for three burns across the region during the year and also worked closely with us to engage the community for a group of burns (the Portland–Nelson Road group of burns) in the Far South West fire district.

Gippsland

Table 9: Burn planning, site preparation and fuel reduction, Gippsland region, 2015–16

Measure		Ha	Ha toward TAFM	% of TAFM
<u>Target area for fuel management (TAFM)</u>		115,625		
<i>Burn planning and site preparation</i>				
Area for which <u>burn plans</u> were prepared (over the three-year FOP)	Target	190,781		165%
	Actual	177,671		154%
<u>Area of sites made ready</u>	Target	161,875		140%
	Actual	165,937		144%
<i>Fuel reduction</i>				
<u>Area treated by planned burning:</u>		83,885	83,885	73%
<ul style="list-style-type: none"> <u>ecological burns</u> 32,331 ha (22 burns) <u>fuel-reduction burns</u> 50,344 ha (78 burns) <u>other burns</u> 1,210 ha (83 burns) 				
<u>Area treated by other fuel management methods</u>		2,455	2,455	2%
<u>Area suitable for planned burning burnt by bushfires</u>		460		
(including area planned for burning on a current FOP)			362	0.3%
Actual fuel-reduced area (total)		86,800	86,702	75%

Table 9 shows 2015–16 burn planning, site preparation and fuel reduction achievements in the Gippsland region. It shows we prepared burn plans for 177,671 ha, or 154% of the TAFM, slightly below the target of 165%. It also shows we prepared burn plans and made sites ready for 165,937 ha which, at 144% of TAFM, was slightly above the target of 140%. This made the region's districts well-prepared for the autumn burning season.

The table shows we treated 73% of the TAFM by planned burning: 100 planned burns plus 83 VicForests coupe burns. CFA helped DELWP with 32 of these, helping treat 86,702 ha.

The region had a slow start to the planned burning program, given the wet conditions, particularly in the east. Despite this, when conditions did improve in late autumn, districts were able to take advantage of their planning and preparation to complete a large amount of the program in a short time.



Grampians

Table 10: Burn planning, site preparation and fuel reduction, Grampians region, 2015–16

Measure		Ha	Ha toward TAFM	% of TAFM
Target area for fuel management (TAFM)		28,371		
Burn planning and site preparation				
Area for which burn plans were prepared (over the three-year FOP)	Target	46,812		165%
	Actual	48,234		170%
Area of sites made ready	Target	39,719		140%
	Actual	40,321		142%
Fuel reduction				
Area treated by planned burning:		4,436	4,436	16%
<ul style="list-style-type: none"> ecological burns 541 ha (4 burns) fuel-reduction burns 3,895 ha (16 burns) other burns 0 ha (4 burns) 				
Area treated by other fuel management methods		2,557	2,557	9%
Area suitable for planned burning burnt by bushfires		1,731		
(including area planned for burning on a current FOP)			148	0.5%
Actual fuel-reduced area (total)		8,724	7,141	25%

Table 10 shows 2015–16 burn planning, site preparation and fuel reduction achievements in the Grampians region. It shows we prepared burn plans for 48,234 ha, or 170% of the TAFM, exceeding the target by about 1,600 ha. It also shows we prepared burn plans and made sites ready for 40,321 ha which, at 142% of TAFM, was also above the target of 140%. To better manage our budget, we prepared burn plans and made sites ready for areas scheduled for planned burning in 2016–17.

The table shows we treated 16% of the TAFM by planned burning and a further 9% by other methods. We conducted 24 planned burns. CFA helped us with two of these, helping treat 139 ha.

The region's planned burning program was limited to 4,436 ha. This partly resulted from dry conditions in spring and autumn. Winter saw below-average rainfall and the spring was mild. Because of the severe underlying dryness and low fuel moisture

throughout the region, no planned burning was possible after early October 2015: this was much earlier than in previous years. Further, the fire season started early, with days of very high to extreme fire danger in November. This meant there was a very small window for burning in spring.

Dry conditions persisted through autumn. Despite being well-prepared and strongly committed to the autumn planned burning program, we could not start burning safely until May 2016. Autumn saw a series of fronts bringing cool, moist weather and dry periods with strong winds. There was only one further burning opportunity in the east of the region and a few in the west. Winter burning was possible in some areas in the west of the region, most of which will be accounted for in 2016–17.

Hume

Table 11: Burn planning, site preparation and fuel reduction, Hume region, 2015–16

Measure		Ha	Ha toward TAFM	% of TAFM
Target area for fuel management (TAFM)		58,974		
Burn planning and site preparation				
Area for which burn plans were prepared (over the three-year FOP)	Target	97,307		165%
	Actual	125,619		213%
Area of sites made ready	Target	82,564		140%
	Actual	109,089		185%
Fuel reduction				
Area treated by planned burning:		72,957	72,957	124%
<ul style="list-style-type: none"> ecological burns 168 ha (3 burns) fuel-reduction burns 71,824 ha (67 burns) other burns 965 ha (75 burns) 				
Area treated by other fuel management methods		1,128	1,128	2%
Area suitable for planned burning burnt by bushfires		1,585		
(including area planned for burning on a current FOP)			75	0.1%
Actual fuel-reduced area (total)		75,670	74,160	126%

Table 11 shows 2015–16 burn planning, site preparation and fuel reduction achievements in the Hume region. It shows we prepared burn plans for 125,619 ha, or more than double (213%) the TAFM. It also shows we prepared burn plans and made sites ready for 109,089 ha, which was almost double the TAFM. All four districts in the region met or exceeded their targets for preparing burn plans and making sites ready.

The table shows we treated almost one-quarter more area than the TAFM by planned burning. All districts in the region exceeded their target. The planned burning program also included 68 VicForest coupe burns covering 955 ha. In the last six years, we have conducted a total of 848 planned burns, with 398,819 ha fuel-reduced.

The region had a drier-than-average winter and a hot, dry spring followed by unseasonal rainfall in January and early February 2016. These circumstances tempered the summer fire season and set things up for another early start to the autumn planned burning program. Conditions remained suitable for planned burning from the

second week in March until the second week in May when the regular pattern of rainfall began. This provided flexibility for planned burning and we conducted burns from the high-elevation back country to closer-in APZs and BMZs. However, wet conditions from mid-May into June 2016 prevented any further burning, including intended planned burning in the river red gum floodplain forests.

For the second year in a row, all four districts exceeded their targets. The region has now exceeded its target for the fifth time in six years and the actual fuel-reduced area as a rolling average over the last six years was 107% of TAFM at the end of 2015–16.

We achieved the year's good results while providing support for the planning and delivery of other regions' planned burning programs during the hot, dry spring. We also met our emergency response obligations in the region and deployed staff interstate and overseas. It was another very busy year.

Loddon Mallee

Table 12: Burn planning, site preparation and fuel reduction, Loddon Mallee region, 2015–16

Measure		Ha	Ha toward TAFM	% of TAFM
Target area for fuel management (TAFM)		49,212		
Burn planning and site preparation				
Area for which burn plans were prepared (over the three-year FOP)	Target	81,200		165%
	Actual	79,129		161%
Area of sites made ready	Target	68,897		140%
	Actual	75,692		154%
Fuel reduction				
Area treated by planned burning:		18,877	18,877	38%
<ul style="list-style-type: none"> ecological burns 7,660 ha (3 burns) fuel-reduction burns 11,216 ha (38 burns) other burns 1 ha (9 burns) 				
Area treated by other fuel management methods		3,780	3,780	8%
Area suitable for planned burning burnt by bushfires		981		
(including area planned for burning on a current FOP)			269	0.9%
Actual fuel-reduced area (total)		23,638	22,926	47%

Table 12 shows 2015–16 burn planning, site preparation and fuel reduction achievements in the Loddon Mallee region. It shows we prepared burn plans for 79,129 ha, or 161% of the TAFM, which was just 4% short of the target. The shortfall was due to the need to review and update burn plan standards. Also, we removed several burns from the FOP for public consultation. The table also shows we prepared burn plans and made sites ready for 75,692 ha, which was 14% above the target.

The table shows we treated 38% of the TAFM by planned burning. The region had below-average winter rainfall and a mild spring with frequent, persistent rain showers. In early spring, we conducted planned burns in strategic locations including along the boundary of the Wyperfeld and Murray-Sunset national parks and in Bendigo, Castlemaine and Heathcote. Due to the severe underlying dryness and low fuel moisture in the northern part of the region, we stopped planned

burning in mid-September 2015, somewhat earlier than in past years. The spring program quickly transitioned into an early fire season, with days of very high to extreme fire danger in October. This resulted in a narrow window for burning in spring. Dry conditions persisted through summer and into autumn. We could not start planned burning safely until May 2016 as fuel remained too dry and weather conditions unsuitable. When conditions allowed, we focused our efforts on the Pyrenees area due to an early harvest by winegrowers. Late autumnal conditions of cool, moist weather occurred soon after, reducing further burning opportunities.

During the year, we conducted 50 planned burns, treating 18,877 ha, and treated another 3,780 ha by methods other than planned burning. CFA and DELWP jointly delivered two planned burns, treating 167 ha.

Port Phillip

Table 13: Burn planning, site preparation and fuel reduction, Port Phillip region, 2015–16

Measure		Ha	Ha toward TAFM	% of TAFM
Target area for fuel management (TAFM)		4,302		
Burn planning and site preparation				
Area for which burn plans were prepared (over the three-year FOP)	Target	7,098		165%
	Actual	12,018		279%
Area of sites made ready	Target	6,023		140%
	Actual	10,244		238%
Fuel reduction				
Area treated by planned burning:		4,080	4,080	95%
<ul style="list-style-type: none"> ecological burns 157 ha (9 burns) fuel-reduction burns 3,862 ha (20 burns) other burns 61 ha (11 burns) 				
Area treated by other fuel management methods		1,007	1,007	23%
Area suitable for planned burning burnt by bushfires		5		
(including area planned for burning on a current FOP)			2	0%
Actual fuel-reduced area (total)		5,092	5,089	118%

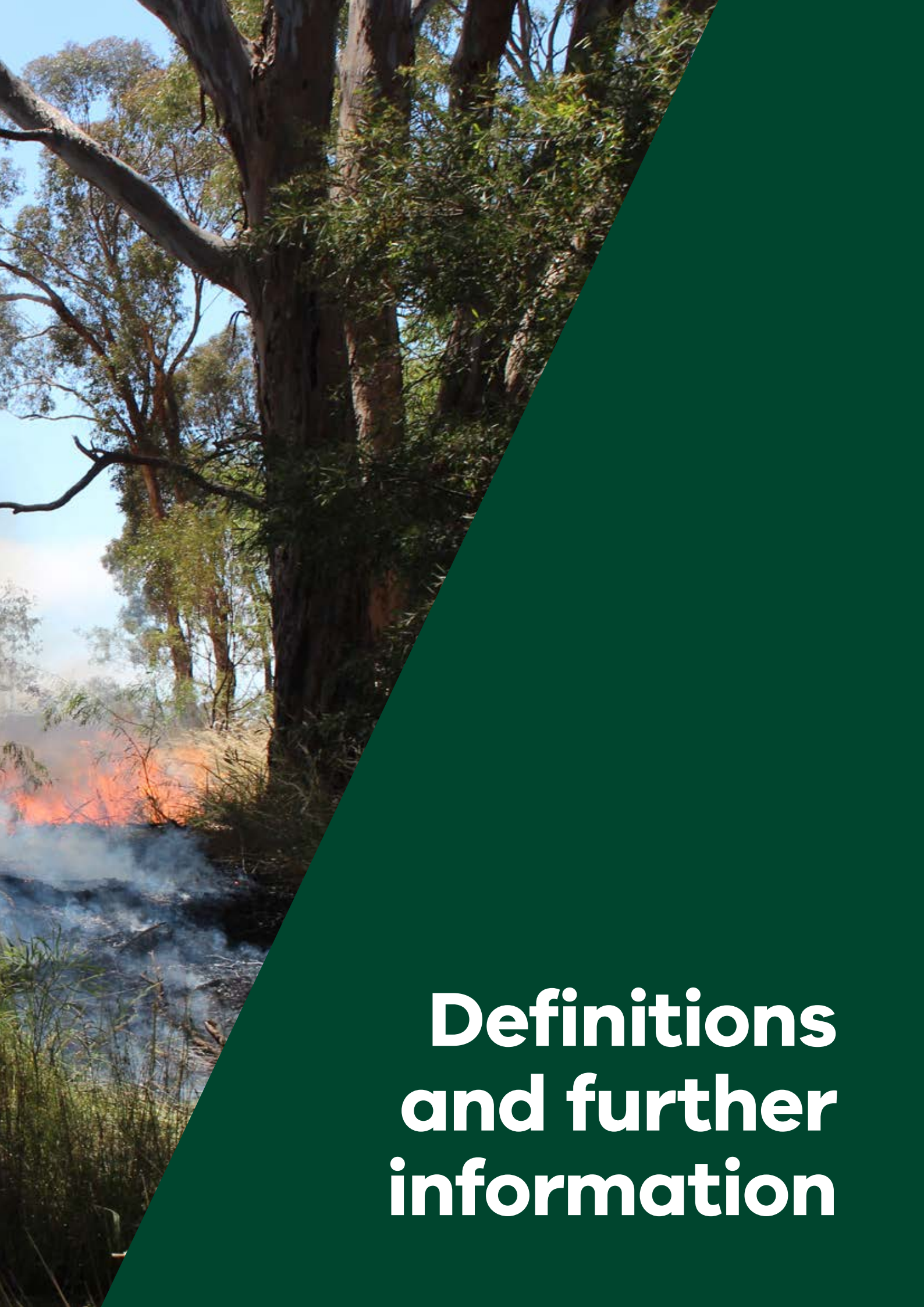
Table 13 shows 2015–16 burn planning, site preparation and fuel reduction achievements in the Port Phillip region. It shows we prepared burn plans for 12,018 ha, or 279% of TAFM. It also shows we prepared burn plans and made sites ready for 10,244 ha which was over double the target.

The table shows we treated 95% of the TAFM by planned burning and another 23% (or 1,007 ha) of the TAFM by other methods.

The region had a drier-than-average winter followed by a dry spring and there was no planned burning in spring. Rainfall in mid-to-late summer moderated the summer fire season which allowed us to start the planned burning program in early autumn in the

grasslands west of Melbourne. By late March 2016, we could burn in the elevated areas around Mount Dandenong and on the Mornington Peninsula, so we shifted the focus of the program to high-priority APZs and BMZs around Melbourne. In the Yarra Valley, planned burning of the wetter fuel in the catchments started in late March and continued as good burning opportunities arose. Both districts continued burning in dry, open, grassy woodland vegetation up until the first week of May when late autumnal conditions of cool, moist weather set in.





Definitions and further information

Area of sites made ready

The total area (in hectares) of sites which, having had a burn plan prepared, were also made ready for burning when conditions permit. Making a site ready for burning can include building a mineral earth break, slashing, applying foam or retardants, managing hazardous trees, removing cuttings from adjoining areas and within spotting distance, and burning adjoining areas.

We prepare burn plans and make sites ready for a much greater total area than the TAFM. This ensures we have enough sites ready to burn if weather conditions don't allow for burning at some sites.

Area suitable for planned burning burnt by bushfires

The total area (in hectares) in an APZ, BMZ or LMZ that was burnt by bushfires, including planned burning breaches turned into bushfires. The tables for each region show this total area in the hectare (Ha) column.

If, a part of this area was included on a current FOP: that is, we intended to conduct a planned burn on it over the life of the current FOP. We count this part toward TAFM (by including it in the 'Ha toward TAFM' column) because if bushfires had not reduced fuel in the area, we intended to do so. This part does not include planned burning breaches and escapes of areas not on a current FOP because although fuel was reduced in the area — by a bushfire — we did not intend it to be reduced.

Appendix 1 explains the accounting framework for bushfire fuel management treatments.

Area treated by other fuel management methods

The total area (in hectares) where we manage fuel other than by planned burning: by mowing, slashing, mulching and using herbicides. We do this mostly to establish and maintain a network of strategic fuel breaks: these are strips of land with less fuel available to burn during a bushfire and where we can back burn ahead of an approaching bushfire.

Area treated by planned burning

The total area (in hectares) we planned burnt during the year. Most fuel management is by planned burning — lighting and managing planned fires at times of lower bushfire risk, mostly in autumn and spring — to reduce the quantity of leaf litter, twigs, bark and undergrowth. We classify planned burning into three categories: ecological burns, fuel-reduction burns and other burns. Our [Planned burns for the next 10 days](#) web page has a map of all the

planned burns we intend to conduct over the next 10 days, weather permitting.

Burn plans

Each planned burn must have an approved burn plan, the requirements of which are specified in the *Code of Practice for Bushfire Management on Public Land 2012*. The plan includes the land management and burn objectives, the area of the burn, the type of fire management zone, how we will minimise impacts on particular values and how we will monitor and report achievement of the burn aims.

Ecological burns

These are planned burns to maintain and improve ecological resilience and help regenerate forests.

Fire operations plans (FOPs)

FOPs outline where and when we intend to carry out fuel management activities on public land over the next three years. Our [Approved fire operations plan](#) web page has an interactive map showing all activities in FOPs to 2018–19.

Fuel-reduction burns

These are planned burns to reduce the amount of fuel available to a bushfire, which can reduce its intensity and rate of spread and so improve opportunities for firefighters to suppress it.

Growth stage structure (GSS)

The vegetation GSS of an area is its mix of vegetation of different ages, from juvenile to old. Its GSS depends on when it was last burnt or otherwise disturbed. We assume that a diversity of GSSs and habitats across a landscape ensures a diversity of species, which helps maintain and improve ecosystem resilience. We manage fuel to ensure there is an acceptable mix of growth stages in the landscape, and to protect important areas of older growth stages.

The growth stages we use are:

- **juvenile:** from immediate post-fire renewal to establishment, including when species are reproductive
- **adolescent:** when the vegetation is relatively young and all species are reproductive but not at the rate characterising mature vegetation
- **mature:** including when the dominant species are fully reproductive through to stasis, when vegetation structure and reproductive capacity stabilise

- **old**: when reproduction of the dominant species is declining and propagule banks are decreasing; if left undisturbed, vegetation may become senescent and is then unlikely to be reconstituted after fire.

There is more information about vegetation GSS on our [Healthy environments](#) web page.

Other burns

These are mainly regeneration burns after logging and the burning of heaps. We do many regeneration and heap burns each year but they contribute only a very small area to the total area treated by planned burning.

Residual risk

This is the amount of bushfire risk which remains after bushfires and fuel management activities reduce fuel. Our [Understanding risk](#) web page explains bushfire risk in more detail explains how DELWP uses Phoenix RapidFire bushfire simulation software to model bushfire risk.

Strategic bushfire management plans

Each of Victoria's BRLs has a strategic bushfire management plan. Each plan explains the fuel management strategy and other actions we will undertake in that landscape to minimise the impact of major bushfires on people, property, infrastructure and economic activity, and how we will maintain and improve the resilience of natural ecosystems. The plans explain how fuel will be managed within each fire management zone—APZ, BMZ, LMZ and PBEZ—on public land, using planned burning and other fuel management activities.

For fuel management purposes, Victoria is classified into four fire management zones:

- **Asset Protection Zone (APZ)**: an area around properties and infrastructure where we intensively manage fuel to provide localised protection to reduce radiant heat and ember attack on life and property in the event of a bushfire
- **Bushfire Moderation Zone (BMZ)**: an area around properties and infrastructure where we manage fuel to reduce the speed and intensity of bushfires and to protect nearby assets, particularly from ember attack in the event of a bushfire
- **Landscape Management Zone (LMZ)**: an area where we manage fuel to minimise the impact of major bushfires, to improve ecosystem resilience and for other purposes (such as to regenerate forests and protect water catchments)

- **Planned Burning Exclusion Zone (PBEZ)**: an area where we try to avoid planned burning, mainly because ecological assets in this zone cannot tolerate fire.

Target area for fuel management (TAFM)

In 2015–16, we had an annual target for the number of hectares to be fuel-managed. The state target was determined through the state Budget process and we allocated the hectares to each region for 2015–16 using risk analysis. We are transitioning from the hectare-based target for fuel management to a risk-reduction target.

Tolerable fire interval (TFI)

The ecosystem resilience in this report show the TFI status of vegetation on Victorian public land as below minimum TFI, within TFI, above maximum TFI and with no fire history.

The proportion of public land **below minimum TFI** is that percentage that was last burnt in less time than recommended for the vegetation on that land: for instance, it may have been last burnt 10 years after prior burning whereas its recommended minimum TFI is 15 years. The proportion of public land **above maximum TFI** is the opposite: it has remained unburnt longer than recommended.

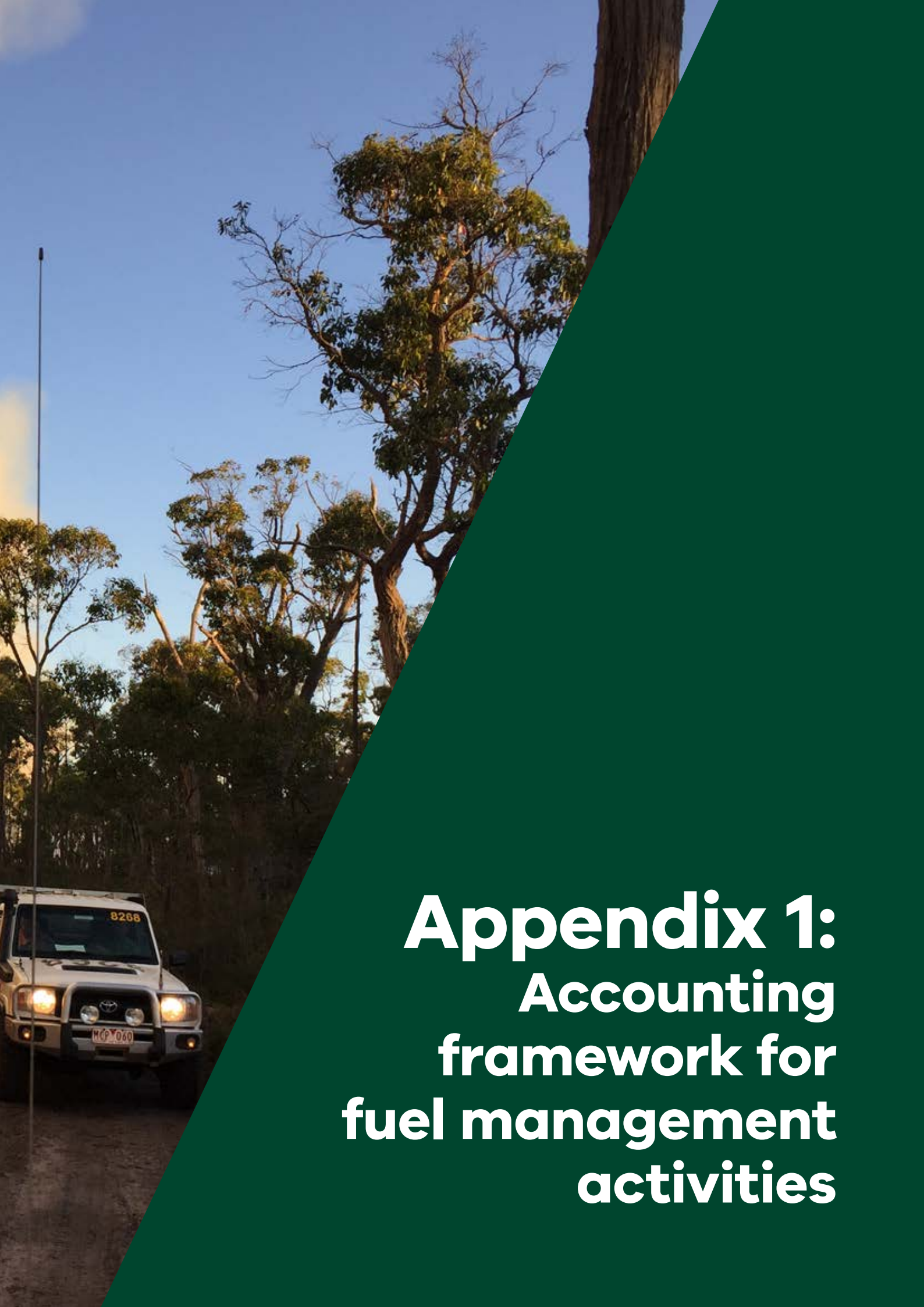
The proportion of public land **within TFI** is the percentage of Victorian public land that we currently record as having been last burnt by bushfire or planned burning within the recommended minimum and maximum TFIs for its ecological fire group (a group of ecological vegetation classes with common ecological requirements for fire and common fire behaviour characteristics). It is good for ecosystem resilience if vegetation is 'within TFI'.

The proportion of public land with **no fire history** is that percentage for which we do not have records or does not have recommended TFIs.

The larger the areas in a landscape below minimum TFI and above maximum TFI, the less resilient ecosystems are likely to be. Burning regularly outside above maximum TFI or below minimum TFI increases the risk of fundamental changes in the structure and functioning of vegetation. However, we sometimes decide to planned burn in particular areas below minimum TFI to manage bushfire risk to life and property and to reduce the potential damage to important ecosystems by major bushfires.

There is more information about TFI on our [Healthy environments](#) web page.





Appendix 1: Accounting framework for fuel management activities



Under the *Forests Act 1958*, the Secretary of DELWP is responsible for carrying out proper and sufficient work in state forests, national parks and on protected public land to prevent and suppress bushfires.

Fuel management is part of discharging this responsibility. In a forest or grassland, fuel is any material that can burn—that can be ignited and sustain a fire—including grass, leaf litter, bark, woody debris and live vegetation. Fuel management activities can be undertaken to modify the load, continuity and arrangement of fuel to reduce the risk of a major bushfire.

Planned burning is generally the most effective way of managing bushfire fuel over large areas. Other fuel management activities include slashing, mowing and constructing fuel breaks.

Policy

Accounting unit

The basic accounting unit for the amount of fuel management activities in Victoria is the 'treated area'.

The treated area is the area (in ha) of land identified on a FOP on which fuel management activities have been successfully undertaken to achieve a predefined fuel management objective.

Planned area

The planned area is a unit of land identified on a FOP.

Fuel management objective

A fuel management objective must be established for the planned area. The objective is set considering (but not limited to):

- the type and amount of fuel management required to help prevent and suppress a bushfire
- the height, cover and type of fuel on the planned area
- legislative requirements, the *Code of Practice for Bushfire Management on Public Land 2012* and other relevant policy
- the overall land management objectives.

The fuel management objective aims to be simple, measurable, achievable and realistic. It is approved before we undertake fuel management activities in the planned area.

A fuel treatment objective specifies:

- **fuel treatment coverage:** the portion of the planned area over which the intended fuel outcome is to be achieved, generally expressed as a percentage; the fuel outcomes are expressed in terms of overall fuel hazard¹ or other measures (such as height)
- **management timeframe / persistence:** the timeframe over which management activities will be undertaken (or persist) to achieve the treatment coverage.

Treated area

If for a planned area the fuel management coverage and timeframe are both met, the planned area is determined to be a treated area.

Fuel management activities

We determine the type of fuel management activities to be undertaken as part of the planning process, in line with legislative requirements (including any restrictions on the use of a particular type of fuel management activity), land management objectives, the fuel management objective and the height, cover and type of fuel present at the site.

The following fuel management activities are approved for accounting purposes (and each type of activity is accounted for separately):

- fire (including planned burning and bushfires where they occur in areas preplanned for fuel management)
- mechanical (such as mowing, slashing and mulching) where identified on a current FOP
- chemical (such as by using herbicide) where identified on a current FOP
- grazing by domestic stock (typically by cattle or sheep), but it can only be accounted for as a fuel management activity if it is specifically undertaken to manage bushfire fuel (by reducing and/or compacting the vegetation, most commonly grasses) and is identified on a current FOP
- other fuel management activities approved by the Secretary of DELWP.

¹ *Overall Fuel Hazard Assessment Guide*, 4th edition July 2010, Fire and adaptive management report no. 82, Fire Management Branch, Department of Sustainability and Environment, Melbourne.



