

Case study – Strategic bushfire management in the Barwon Otway landscape

The Otways Pilot Project has developed a bushfire risk profile to help inform strategic bushfire management planning in the Barwon Otway bushfire landscape.

The residual risk profile for the Barwon Otway landscape indicates the effectiveness of bushfire fuel management actions (see Figure 8).

In general, the analysis suggests that bushfire management in the landscape is achieving very good results in reducing bushfire risk. From the relatively high level of residual risk (near 80 per cent) observed in 2007 before this approach was first applied, the residual risk has steadily fallen to its current level of around 60 per cent, which is the lowest calculated value of residual risk for the landscape in more than 20 years.

DEPI's fire behaviour modelling shows that the planned burns outlined in the Fire Operations Plans for 2013–14 to 2015–16 will reduce the residual risk further to around 50 per cent.

The results provide strong support for the effectiveness of risk-based strategic bushfire management planning. The risk-based approach is now being applied to strategic bushfire management planning in the rest of the state and will be reported on in subsequent Fuel Management Reports.

The Barwon Otway Strategic Bushfire Planning Team has also used tolerable fire intervals as part of their risk-based strategic bushfire management planning. An initial 40 year fuel management strategy was developed which sought to minimise the area burnt below minimum tolerable fire interval in certain areas of the bushfire landscape.

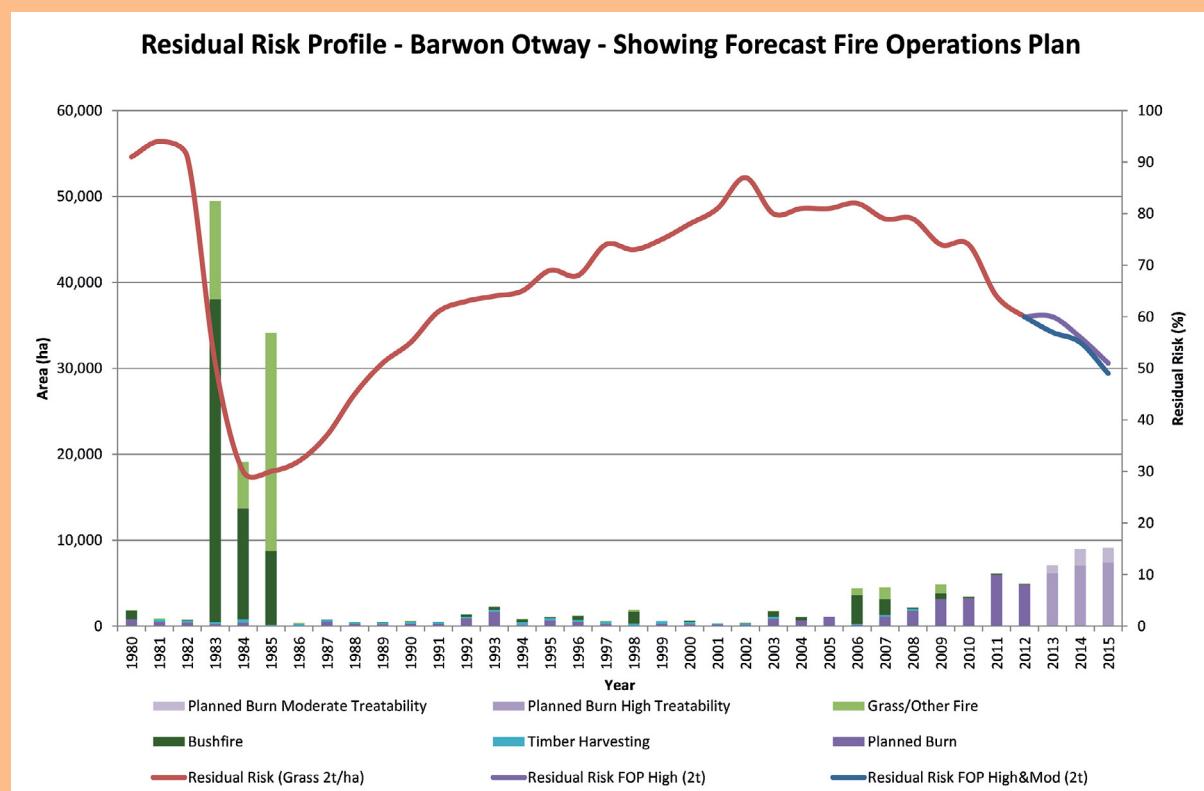


Figure 8: Residual risk profile for the Barwon Otway landscape for historical records of fire since 1980 (red line) and forecast FOP burns for 2013–2015 (blue and purple lines). The blue line represents projected risk under more favourable (drier) burning conditions, while the purple line represents projected risk under less favourable (wetter) burning conditions. Also shown for each year is the area burnt by bushfire, grass fire, planned burning and timber harvesting operations (bar charts).

Monitoring ecosystem resilience – progress towards *Code of Practice for Bushfire Management on Public Land* objective 2

DEPI is developing an improved Monitoring Evaluation and Reporting Framework for bushfire management on public land.

This framework is bringing together many of the concepts being investigated through the monitoring and research programs for ecosystem resilience. It will also help DEPI meet its obligations under the Code and address Recommendations 57 and 58 of the Victorian Bushfires Royal Commission.

DEPI is developing tools for defining metrics of ecosystem resilience to guide fire planning and the prioritisation and implementation of monitoring and research.

Understanding ecological outcomes

Predicting the response of flora and fauna to fire regimes is a key part of DEPI's fuel management program. A fire regime collectively includes fire frequency, intensity, season and spatial distribution across the landscape.

Species' responses can vary significantly to different fire regimes and can occur over long periods. Many of Victoria's flora and fauna are adapted to, or even dependent on, fire while others may face difficulties.

To protect biodiversity, DEPI is adopting a risk-based approach which will:

- predict the response of species and vegetation communities to different fire regimes (including planned burning)
- assess fire regime options against the two primary objectives under the Code and then create strategies for managing species and ecological communities
- implement these strategies
- monitor strategy implementation, the performance of models and metrics and ecological outcomes over the long-term.

The development of robust ecological models and metrics of ecosystem resilience is integral to this process. DEPI's research and monitoring program is developing and testing the following three measures of ecosystem resilience, which can potentially be used to understand the impact of planned burning on biodiversity.

Tolerable fire interval (TFI) – This represents the minimum or maximum recommended time intervals between successive fire events for a particular vegetation type. The time interval is derived from the critical features of plant species' life history characteristics such as growth patterns, reproduction method and life history transition stages and critical fauna habitat elements of the vegetation community.



Photo taken a few months after a low intensity planned burn was conducted in the River Red Gum forests in Barmah National Park. The burn successfully reduced the dominant mass of Rush-Sedge in the understorey and led to a greater diversity of wetland species.

Geometric mean abundance of species in a community

This is defined as the relative abundance of all known species in an ecological community, and provides a robust index of biodiversity associated with community viability.

Vegetation growth stage structure – Vegetation communities develop through defined growth stages that have distinguishing structural features. Different species show different preferences for these growth stages. Growth stage analysis assumes that maintaining a diversity of vegetation growth stages and habitats across the landscape, and therefore a diversity of species, is positively correlated with ecosystem resilience. A desired growth stage structure for a vegetation type across a landscape can be derived based on analyses that maximise the relative abundances of all species in that vegetation type. The desired structure will vary depending on the number of species that prefer particular growth stages and the relative abundances of those species in the different growth stages.

TFI is currently the best documented and researched measure and is being implemented as a partial indicator of resilience. TFI is a poor measure on its own because it is unable to account for fauna distribution and abundance and does not incorporate fire severity, patchiness and frequency data. It provides little insight into the composition and functioning of an ecosystem and TFI should be regarded as a proxy measure (Keeney and Gregory 2005). DEPI is exploring the application of TFI in conjunction with other metrics (such as geometric mean abundance of species in a community and vegetation growth stage structure) in order to create a better measure of the state of ecosystems.

While vegetation growth stage structure and geometric mean abundance could provide more natural measures of ecosystem resilience, more research is required. DEPI is currently working with the University of Melbourne to develop tools so that these measures can be integrated into a risk-based approach to bushfire management planning.

Planned burning can be used to manage a landscape so that overall, it is moving toward a desired growth stage structure and distribution. While the landscape can never be managed so that it is constantly at or near an optimal age class distribution, it can be managed so that it approaches this goal. This helps in ensuring persistence of all species.

Old growth vegetation can be quickly converted to juvenile by a single bushfire. However, it takes much longer (i.e. decades) to convert juvenile vegetation to old growth. Thus, strategic bushfire management is important to help minimise the risk of landscape-scale bushfires on older age classes.

The approach to managing ecological risks associated with planned burning is balanced with the need to manage risk to human life and property, which is the top priority under the Code.

Case study – Raymond Island

A pilot program of mechanical fuel reduction on Raymond Island has shown the benefits of using a case-by-case approach to fuel management.

Raymond Island, a small island located in the Gippsland Lakes in eastern Victoria, is home to around 500 people and hundreds of koalas. Koalas were introduced to the island in 1953, and Raymond Island has since become renowned for its abundant koala population.

Typical of the East Gippsland landscape, Raymond Island is covered in beautiful but highly flammable native vegetation. This vegetation poses a significant bushfire risk to human life and wildlife.

DEPI and Parks Victoria are responsible for managing large areas of public land on the island. This includes managing forest fuels and reducing bushfire risk. A variety of methods are used to reduce fuels, such as planned burning, candling, slashing and mowing.

Many local people are interested in ensuring the health of the koala population and the environment while supporting fuel management to make the island safer from bushfire.

In 2013, as part of the annual bushfire management planning process, DEPI and Parks Victoria assessed the value and suitability of fuel management activities for Raymond Island.

The team decided to embark on a pilot program of mechanical fuel reduction, using methods such as slashing and mowing to create patches of land with reduced fuel. One of the objectives of this pilot program was to effectively reduce hazardous fuels while having minimal impact on the local koala population.

Works began early in 2013 and DEPI and Parks Victoria worked closely with local residents and the contractors to minimise disruption to nearby properties and koala habitat.

The pilot areas are being monitored for impacts and local staff have continued to keep the community informed. The community has provided positive feedback on this pilot.

The work on Raymond Island demonstrates there is no ‘one size fits all’ approach for fuel management. DEPI considers fuel management planning on a case-by-case basis to find the most effective and balanced approach.

Delivery of DEPI Fuel Management Program 2012–13

The target of 250,000 hectares for 2012–13 represented DEPI's largest annual fuel reduction target. Over the year, 678 planned burns were carried out treating 255,226 hectares of public land – 58,077 hectares more than the previous year. This was achieved despite a prolonged bushfire season.

Fire Operations Plans

The 2012–13 fuel reduction program was based on Fire Operations Plans (FOPs) drawn up in consultation with key stakeholders and communities across Victoria.

The draft FOPs were open to community consultation and provided opportunity for input of local knowledge, as well as consideration of proposed timing. This helped to reduce the impact of planned burns on local communities and industries while still delivering the program.

Case study – Cape Conran

A 78 hectare planned burn was successfully carried out at Cape Conran Coastal Park in Gippsland in March 2013. DEPI and Parks Victoria had earmarked the burn in the local Fire Operations Plan three years before the conditions became suitable to safely conduct it.

The main objective for the burn was to protect the park from the impacts of bushfire, including visitor areas, cabins, camping grounds and walking tracks – all particularly popular to visitors in summer – as well as nearby private property.

The burn also aimed to reduce the park's over-mature tea tree population which posed a risk to ecosystem resilience.

The vegetation within the burn site made safe burning a complex task. Heath, a volatile fuel, was located near the park's visitor centre; the site also had banksia woodlands which can burn either very hot or very cold.

Tea trees are difficult to burn as they have no understory. To prepare the site, machine rolling of the tea trees ensured there was fuel to light off to help get the fire up into the crowns of the trees. Wind conditions had to be just right as there was the risk of spotting from the tree tops if it was too windy.

Not only was this a complex burn to deliver in terms of requiring the right weather conditions, but there were a number of other challenges, such as traffic management and minimising the impact on tourism and recreation in the area.

Community comment was requested through local advertising, media announcements and notifying interested people. Other opportunities for community engagement included community forums, industry days, smoke health forums, meetings and facilitated discussions with individuals and interested groups.

DEPI has also supported several local communities to establish ongoing 'strategic conversations', which in part help local community members to better understand the function of planned burning and understand their bushfire risk.

For example, the local surf school could not access their usual surf location, but they were assisted by staff to access a different part of the beach.

Some local roads and tracks had to be closed for the duration of the burn and afterwards to ensure public safety, but many were intentionally kept open. Although this required extra effort and investment in traffic management control, it allowed various user groups to continue to access key coastal points, including the boat ramp and beaches.

A funeral service was also factored into the burn delivery. The optimal method for lighting the burn was with an aerial drip torch – an ignition machine slung below a helicopter – and the helicopter passing overhead was timed to ensure the noise did not affect the service. The helicopter was employed not only for ignition, but also to check that no visitors were in the area.

Crews completed the burn over two days with support from local CFA brigades, successfully burning around 80 per cent of the planned area. As well as reducing bushfire risk to Cape Conran, the burn will improve future habitat for the local animals and plants. It is hoped that the dominance of tall tea tree populations will decrease and follow-up burns in coming years should continue this trend.

Challenges experienced during 2012–13

Weather impacts

The successful delivery of the 2012–13 program was primarily the result of two significant weather windows. Favourable conditions in winter and early spring, with below average rainfall in western Victoria, allowed more than 46,000 hectares to be treated with planned burning in the first half of the financial year. This was almost twice the spring average. Spring burning opportunities in central and eastern Victoria were minimal due to localised flooding events.

A lack of widespread spring rain led to an early start to the bushfire season, with significant fires occurring from mid-November in western Victoria. Dry conditions continued throughout summer, resulting in a number of major, long-running forest fires.

The presence of underlying dry conditions delayed the start of autumn planned burn activities in many areas. However, eastern Victoria received a strong rainfall break in mid-March, which enabled a significant increase in planned burning activities. These unseasonal autumn conditions persisted through to May, providing enough suitable opportunities for the full program to be carried out.

Managing impacts to communities

The impacts of planned burning on communities can include the health effects of smoke, reduced air quality, reduced access to parks and forests, road closures and economic impacts associated with various industries. While these impacts are less damaging than those resulting from a major bushfire, DEPI endeavours to minimise these impacts as much as possible by working with communities and industries to better understand how they are affected. At the same time DEPI aims to take advantage of every suitable opportunity to carry out planned burning.

Bushfires and planned burning produce smoke which can impact individuals, communities and industries such as wine makers, apiarists and tourism. DEPI and Parks Victoria are continuing to work with the Victorian Departments of Health and Human Services, Tourism Victoria, VicRoads, Victoria Police and the Environment Protection Authority to minimise the impacts of smoke on communities and economies.

DEPI also works with the Bureau of Meteorology to try to broadly predict where smoke from planned burns may travel and settle so that relevant communities and industries can be given as much notice of potential impacts as possible. The close partnership between bushfire behaviour analysts from DEPI, the Bureau of Meteorology and Parks Victoria has helped to raise the alert of potential smoke exposure situations.

DEPI has made a range of improvements to systems and procedures to ensure that stakeholder and community impacts and concerns are a key consideration in fuel management planning and operations. DEPI has made changes to many aspects of burns based on advice from and issues raised by stakeholders.

DEPI is committed to providing timely and informative notifications of planned burns to the community and stakeholders in a variety of ways. This has been a strong focus in recent years, as DEPI acknowledges that timely advice allows local people and groups to better plan activities.

DEPI's communication campaign, which uses traditional media and digital communication channels, along with roadside signage, has also resulted in increased awareness of planned burning.



Case study – Community involvement in planned burning

Eagle Rise is a short distance east of Yarra Junction and contains a mix of forested and cleared private property adjoining public land. Much of the terrain is steep and the area has long been regarded by many as a bushfire risk to the community. This was highlighted in 2006 when a bushfire in nearby Milliners Hill threatened homes, causing major disruption and anxiety in the community. This has contributed to local interest groups becoming more active in relation to land management.

In response to requests from residents and the local CFA, a burn that comprised 90 per cent private property was included in the 2012–13 Fire Operations Plan. An intensive effort was then carried out with property owners and stakeholders to develop a plan for this high-risk location. On-site meetings were held with landholders, the CFA and Yarra Ranges Shire Council to hear concerns and explain the objectives of the planned burn and how it would be delivered.

All landowners gave permission for the planned burn to go ahead on their land, relevant approvals were obtained and the burn was fully planned, prepared ready for ignition.

Unfortunately the right weather conditions did not eventuate and the planned burn did not go ahead in 2012–13. However, this is an example of how DEPI and stakeholders can work through a complex situation together to develop an agreed outcome.

This planned burn has been identified as a high priority for 2013–14.

Bushfire impacts

Dry conditions over much of the state, particularly in the west, led to an early and prolonged bushfire season from November to April.

DEPI personnel attended 866 fires (a total area of 201,630 hectares) including six major bushfires that required attention over several weeks before being controlled. DEPI worked closely with the Fire Services Commissioner, CFA and other emergency agencies.

Several DEPI and Networked Emergency Organisation staff were deployed to Tasmania and New South Wales during January to assist with bushfires.

Given the extended period of planned burning and bushfire response during 2012–13, high levels of staff fatigue needed to be carefully managed.

Three DEPI firefighters died while on active duty in Victoria and interstate. DEPI and its staff were deeply saddened by these deaths and are participating in internal and external safety reviews towards improved safety for its firefighters.

Planned burns breaching contingency areas

Across the state, three out of 678 planned burns breached contingency areas (equivalent to less than 0.5 per cent of all planned burns in 2012–13). These burns were investigated because they could not be contained within 30 minutes and/or impacted private land. Of these, two burns caused damage to private assets.

The three planned burns investigated were:

Hallston – Hallston Road (South Gippsland District)

40 hectare ecological burn ignited on 25 March 2013 which breached contingency areas the following afternoon. It burnt approximately 562 hectares of both public and private land causing damage to blue gum and pine plantations, private fencing, pasture and sheds.

Terrick Terrick National Park – O'Neill's Paddock

(Murray Goldfields District)

139 hectare ecological burn breached contingency areas on 19 April 2013. It burnt 194 hectares of both public and private land including pasture and causing damage to fences.

Loch Sport – Walkers Point (Heyfield District)

367 hectare fuel reduction burn ignited on 30 April 2013. It was reignited on 3 May 2013 and breached contingency areas on 8 May 2013, burning 50 hectares of public land.

Statewide fuel management activities

This section rates DEPI's achievements in:

- fuel management
- planning for fuel management
- preparation for fuel management
- monitoring.

The fuel reduction target is confirmed through the State Budget process each year. The 2012–13 fuel reduction target was 250,000 hectares. The overall area where fuel was reduced was 275,192 hectares.

The accounting framework for bushfire fuel management treatments is included in [Appendix 1](#).

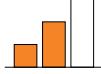
Fuel management activities

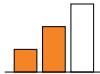
| Activity | Rating | Total hectares | Hectares contributing to target | Description |
|---|--------|----------------|---------------------------------|--|
| Area treated by planned burning | | 255,226 | 255,226 | |
| Area treated by other fuel management treatments | N/A | 6757 | N/A | This includes: <ul style="list-style-type: none">• mechanical• chemical• grazing |
| Area suitable for planned burning affected by bushfires | N/A | 151,552 | N/A | Areas within the Asset Protection Zone, Bushfire Moderation Zone or Landscape Moderation Zone as defined in the <i>Code of Practice for Bushfire Management on Public Land (2012)</i> which were affected by bushfire. |
| Area identified on a current, approved Fire Operations Plan (FOP) affected by bushfires | N/A | 19,966 | 19,966 | This figure is a subset of <i>Area suitable for planned burning affected by bushfires</i> . These are areas pre-planned for planned burning that were affected by bushfire. |
| Overall area where fuel has been reduced | | 413,535 | 275,192 | Includes area treated by planned burning and area pre-planned for planned burning (as identified on the FOP) affected by bushfire. |

Table does not include burns breaching contingency areas/containment lines.

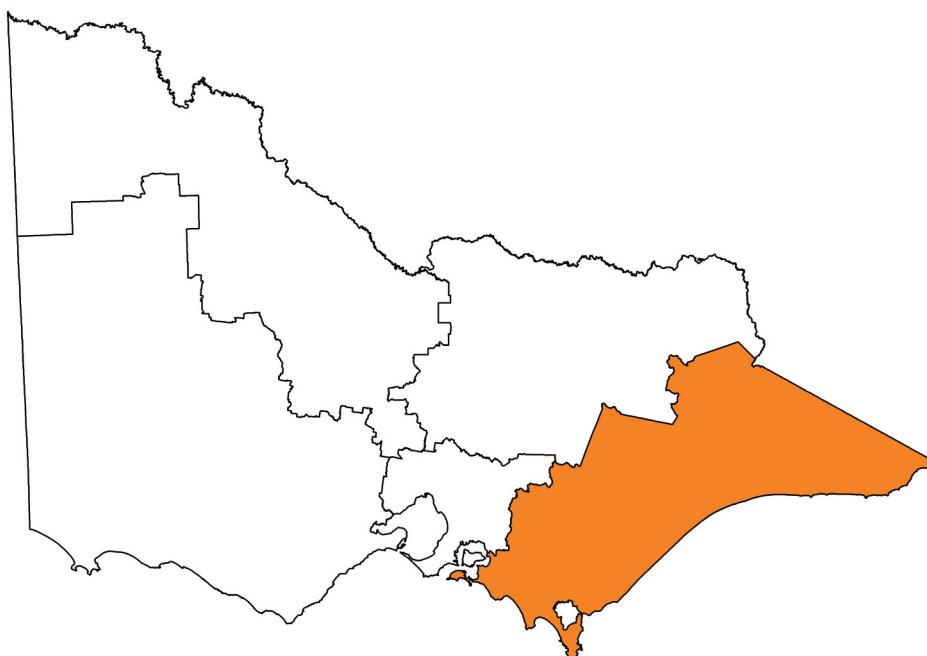
Other activities

| Performance indicator | Rating | Description |
|--|--------|---|
| Activity 1: Planning and preparation for fuel management activities | | |
| Burn plans completed for 165 per cent of intended planned burn program | | To enable planned burning to be carried out, where and when conditions were suitable, burn plans were completed for 579,200 hectares across the state (232 per cent of intended planned burn program). Burn plans were completed for burns across the three years of the FOP to provide operational flexibility in scheduling burns. This enabled burns to be brought forward in areas where weather conditions were more suitable or to reschedule burns to better suit operational and community needs. Regions carried out site preparation for 483,130 hectares (193 per cent of intended planned burn program) to ensure that sufficient burns would be available if weather conditions were suitable. |
| Activity 2: Community engagement | | |
| Communities have been engaged during the planned burning program process | | DEPI has provided a broad range of opportunities for stakeholders and communities across Victoria to be involved in and better understand planned burning. During 2012–13 these included: <ul style="list-style-type: none">• community forums• industry days• smoke and health forums• six regional stakeholder roundtable meetings• four statewide peak body stakeholder roundtable meetings• facilitated discussions with many interested individuals and stakeholder groups. Stakeholders engaged included: <ul style="list-style-type: none">• wine industry• apiarists• health industry• agriculture industry• tourism industry• conservation groups. An external evaluation of planned burning engagement from 2010–2012 (undertaken in June 2013) showed that key stakeholder groups increased their understanding of planned burning as a result of engagement with DEPI during 2012–13. The evaluation included an activity review and interviews with internal and external stakeholders. Engagement undertaken across the state was evaluated against three key criteria and rated DEPI as “good” in ensuring that key stakeholders received accurate and timely information about planned burns, and “just good enough” in the transparency and defensibility of engagement processes. This evaluation will be undertaken every two to three years in the future to help inform DEPI’s engagement planning. In 2012–13 DEPI continued to work on improving relationships with key stakeholders, particularly with conservation and biodiversity focused groups. Throughout 2012–13 communities and stakeholders were consulted during the development of the framework for this report, the first annual report on DEPI’s fuel management program. This engagement occurred between October 2012 and January 2013, and a significant amount of feedback from stakeholders was considered in the development of the report. |

| Performance indicator | Rating | Description |
|---|---|---|
| Activity 2: Community engagement (continued) | | |
| | | <p>For each of DEPI's regions a regional engagement plan was developed based on a statewide plan for community engagement about planned burning. Through these plans, DEPI consistently facilitated input to the Fire Operations Planning process, notified communities and stakeholders about planned burns and continued dialogue with a broad range of key stakeholder groups to further develop relationships.</p> <p>DEPI continued to notify communities about the location and timing of planned burns through the media, as well as the potential impacts of planned burning activities.</p> |
| Activity 3: Monitoring | | |
| Monitoring programs relating to risk and biodiversity assessment undertaken |  | <p>The activities of the monitoring program for 2012–13:</p> <ul style="list-style-type: none"> A monitoring and research sites database was developed to allow sites to be viewed in map form. The database is in the testing phase and will be released on the DEPI Biodiversity Interactive Mapper in 2013–14. <p>Observations of the monitoring program for 2012–13 include:</p> <ul style="list-style-type: none"> Re-assessment of monitoring sites in large mosaic burns in the Otways and Upper Thompson, two years after planned burning, to monitor the response of flora, fauna, habitat structure and fuels to mosaic burning. Pre-fire surveys of 1575 hollow-bearing trees across 36 planned burns in Gippsland, including repeats visits to 18 sites for audit/data quality assurance. Post-fire surveys will be conducted after spring planned burning in 2013. <p>Flora assessment:</p> <ul style="list-style-type: none"> 1381 plots were assessed for flora species with over 230 species recorded. Methods used included the All Species Assessment and Indicator Species Assessment from the <i>Flora monitoring protocols for planned burning: a user's guide</i> (Cawson and Muir, 2008) and a frequency of occurrence assessment across 1x1 metre quadrats. <p>Fauna assessment:</p> <ul style="list-style-type: none"> 771 remote cameras were deployed to assess fauna with 21 native mammal species, 10 feral mammal species, 44 bird species and four reptile species. 77 habitat structure assessments were conducted using the <i>Guide to Monitoring Habitat Structure – Standard Method</i>. 83 species of bird were recorded across 158 two hectare, 20 minute standard bird surveys. Seven native species and one feral species of mammal recorded through trapping. <p>Fuels and fire severity:</p> <ul style="list-style-type: none"> 102 fuel hazard surveys were conducted using the <i>Overall Fuel Hazard Assessment Guide</i>, 4th Edition. Over 3400 fire severity assessments were conducted using a fire severity ground truthing assessment developed by the DEPI Fire Management Policy Division. <p>EVCs/EVDs:</p> <ul style="list-style-type: none"> 17 Ecological Vegetation Divisions were sampled. 33 Ecological Vegetation Classes were sampled. |

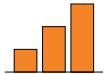
| Performance indicator | Rating | Description |
|---|---|--|
| Activity 4: Total output costs <i>Planned burning program was sufficient and implemented in an efficient manner</i> | | |
| Funds allocated (\$m) |  | <p>Total budget allocated to DEPI in the Victorian Budget 2012–13 was \$353.2 million for “Effective management of fire”. This represented an increase on the 2011–12 budget as a result of additional investment in expanding the planned burning program.</p> <p>Some of the fuel management activities covered in the budget included:</p> <ul style="list-style-type: none"> improved community engagement through roundtables and other forums recruitment of additional field staff increased involvement and mobility of staff (stand-by and overtime, training, medicals, moving taskforces around the state) additional equipment and vehicles to support increased level of staff involvement extending availability and flying hours for aircraft for ignition and patrol of planned burns. <p>Work is currently underway to develop an improved costing system so that the actual costs of each planned burn undertaken can be assessed. Future reports will provide more detailed information on this.</p> <p>In 2012–13, CFA assisted DEPI with approximately 96 planned burns on public land across the state.</p> |

Gippsland region fuel management activities overview

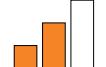


- Six fire districts, from east to west:
 - Orbost
 - Swifts Creek
 - Bairnsdale
 - Heyfield
 - South Gippsland
 - Baw Baw
- Topography includes riverine plains, foothills and mountains, which results in a widely varied climate. Annual average rainfall varies from 600mm to 1950mm throughout the region.
- Alpine areas receive snow throughout winter, however climatic conditions across the region are best described as 'Mediterranean', generally with a wet winter and a hot, dry summer.
- Contains approximately 70 Ecological Vegetation Classes ranging from wet heathland to shrubby dry forest and sub-alpine woodland.
- Home to a diverse array of fauna, including some of the state's threatened species.

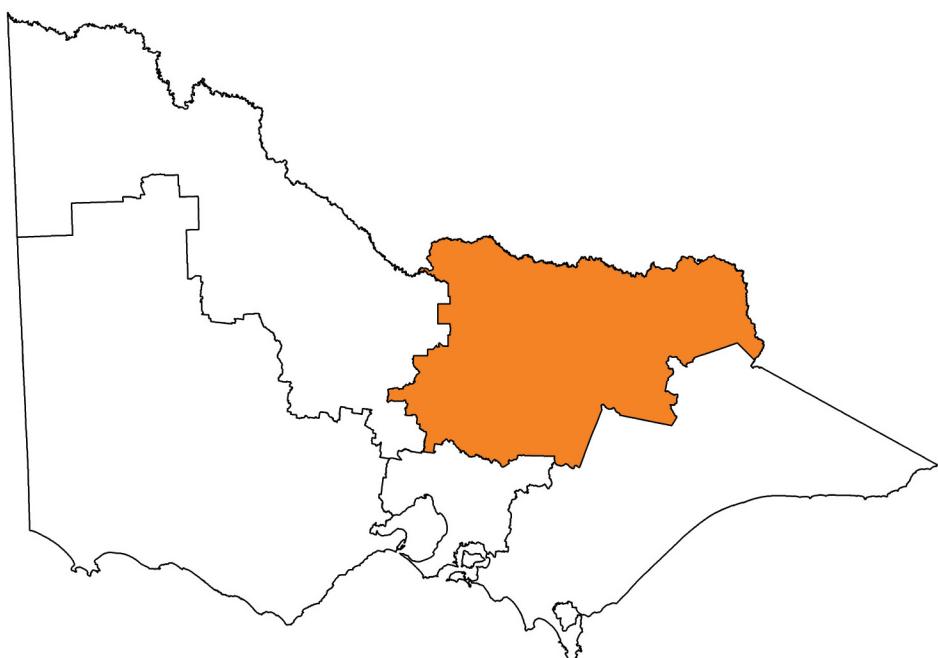
Fuel management activities

| Activity | Rating | Total hectares | Hectares contributing to target | Description |
|---|---|----------------|---------------------------------|---|
| Area treated by planned burning |  | 114,942 | 114,942 | <p>The Gippsland Region allocated planned burning program for 2012–13 was 97,760 hectares.</p> <p>The Gippsland Region treated 114,942 hectares (244 burns) which equates to 118 per cent of its planned program.</p> <p>Gippsland exceeded the allocated number hectares to be treated. The spring burning season provided limited opportunities with the majority of the burning program completed in autumn.</p> <p>In previous years the autumn program has been completed during the month of April, however unseasonal dry weather in 2013 provided opportunities well into the month of May.</p> |
| Area treated by other fuel management treatments | N/A | 645 | N/A | <p>This includes:</p> <ul style="list-style-type: none"> • mechanical • chemical • grazing. |
| Area suitable for planned burning affected by bushfires | N/A | 76,235 | N/A | Areas within the Asset Protection Zone, Bushfire Moderation Zone or Landscape Moderation Zone as defined in the <i>Code of Practice for Bushfire Management on Public Land</i> which were affected by bushfires. |
| Area identified on current, approved Fire Operations Plan (FOP) affected by bushfires | N/A | 3447 | 3447 | This figure is a subset of <i>Area suitable for planned burning affected by bushfires</i> . These are areas pre-planned for planned burning that were affected by bushfire. |
| Overall area where fuel has been reduced |  | 191,822 | 118,389 | Includes area treated by planned burning and area pre-planned for planned burning (as identified on the FOP) affected by bushfire. |

Other activities

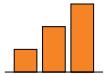
| Performance indicator | Rating | Description |
|---|---|--|
| Activity 1: Planning and preparing for fuel management activities | | |
| Total area planned and prepared for planned burning |  | <ul style="list-style-type: none"> Gippsland's allocated planned burning program for 2012–13 was 97,760 hectares. Burn plans were prepared for 224,101 hectares (229 per cent of program area) and site preparation completed for 189,417 hectares (194 per cent of the program area). Performance indicators were set early in the season which allowed districts to start both burn plans and site preparation early. Gippsland staff had an extremely busy summer with extensive bushfire response, however early planning allowed a large number of sites to be prepped by external contractors. Having burn plans and area prepped in excess of the hectare target allowed for a greater choice of burns to be ignited when the weather was right. |
| Activity 2: Monitoring | | |
| Monitoring programs relating to risk and biodiversity assessment undertaken |  | <ul style="list-style-type: none"> 816 plots were assessed for flora species with 186 species of flora recorded Gippsland focal flora – to determine if Key Fire Response Species respond to inter-fire interval in the manner predicted by their vital attributes (Gippsland). 60 habitat structure assessments were conducted using the <i>Guide to Monitoring Habitat Structure – Standard Method</i>. 540 remote cameras were deployed to assess fauna with 17 native mammal species, six feral mammal species, 24 bird species and two reptile species recorded. 72 species of bird were recorded across 20 minute two hectare standard bird surveys. Pre-fire surveys of 1575 hollow-bearing trees were completed across 36 planned burns in Gippsland, including repeat visits to 18 sites for audit/data quality assurance. 60 fuel hazard surveys were conducted using the <i>Overall Fuel Hazard Assessment Guide</i>, 4th Edition. 1093 fire severity assessments were conducted using a fire severity ground truthing assessment developed by Fire Management Policy Division. 10 Ecological Vegetation Divisions sampled. 20 Ecological Vegetation Classes sampled. |

North East region fuel management activities overview

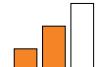


- Four fire districts, from east to west:
 - Upper Murray
 - Ovens
 - Goulburn
 - Murrindindi
- Consists of river red gum forested corridors along the Murray, Goulburn and Ovens rivers, cleared farming lands of the northern plains, dry forested foothills and mountainous terrain.
- Climate varies across the region with annual rainfall ranging from 425mm on the plains to more than 1200mm on the Alps.
- Home to myriad flora and fauna, including River Red gums and Murray Cod and a number of threatened species including Leadbeater's and Mountain Pygmy Possums, Spotted Tree Frogs and Regent Honeyeaters.

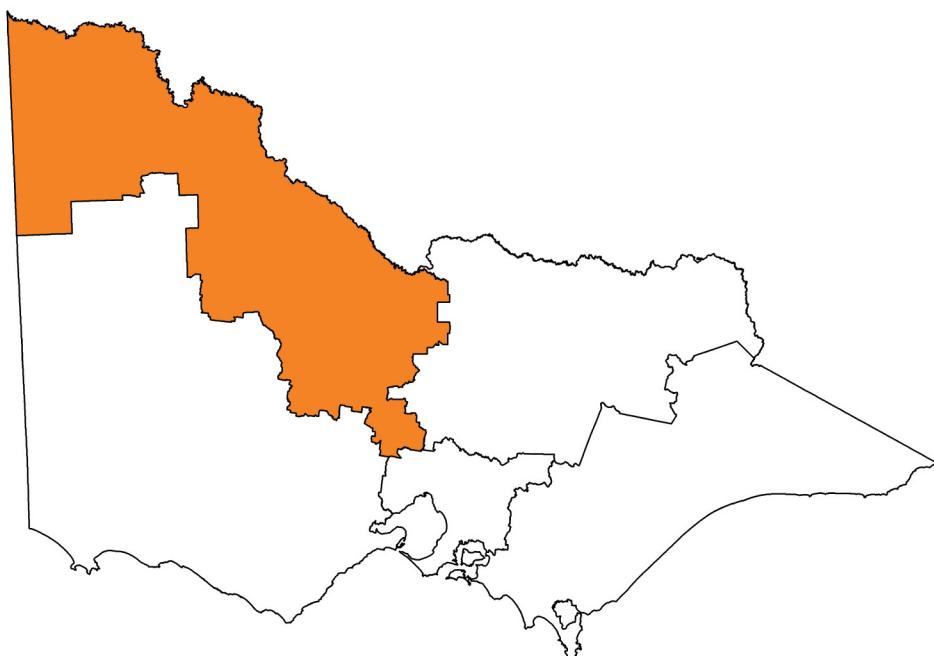
Fuel management activities

| Activity | Rating | Total hectares | Hectares contributing to target | Description |
|---|---|----------------|---------------------------------|--|
| Area treated by planned burning |  | 72,767 | 72,767 | <p>The North East Region allocated planned burning program for 2012–13 was 67,708 hectares.</p> <p>The North East Region treated 72,767 hectares (165 burns) which equates to 107 per cent of its program.</p> <p>North East was also able to support the planning, preparation and delivery of burns across the state in the lead up to conditions becoming suitable for burns locally.</p> <p>The additional planning and preparation across the region provided flexibility in the program which enabled it to direct resources to assist districts with priority burns and move resources in response to weather and stakeholder variables. The North East program was exceeded with minimal stakeholder/community issues as a result of good planning and stakeholder engagement.</p> |
| Area treated by other fuel management treatments | N/A | 766 | N/A | <p>This includes:</p> <ul style="list-style-type: none"> • mechanical • chemical • grazing. |
| Area suitable for planned burning affected by bushfires | N/A | 26,191 | N/A | Areas within the Asset Protection Zone, Bushfire Moderation Zone or Landscape Moderation Zone as defined in the <i>Code of Practice for Bushfire Management on Public Land</i> which were affected by bushfire. |
| Area identified on current, approved Fire Operations Plan (FOP) affected by bushfires | N/A | 843 | 843 | This figure is a subset of <i>Area suitable for planned burning affected by bushfires</i> . These are areas pre-planned for planned burning that were affected by bushfire. |
| Total area where fuel has been reduced |  | 99,724 | 73,610 | Includes area treated by planned burning and area pre-planned for planned burning (as identified on the FOP) affected by bushfire. |

Other activities

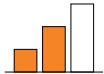
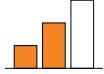
| Performance indicator | Rating | Description |
|---|---|--|
| Activity 1: Planning and preparing for fuel management activities | | |
| Total area planned and prepared for planned burning |  | <ul style="list-style-type: none">North East's allocated planned burning program for 2012–13 was 67,708 hectares.Burn plans were prepared for 165,412 hectares (244 per cent of program area) and site preparation completed for 146,213 hectares (216 per cent of the program area).The dry spring leading into a hot dry summer in north-eastern Victoria limited opportunities to conduct planned burns at the start of the financial year.The autumn program was not able to get underway until April, following a long dry summer and extended bushfire season in the region.Small amounts of periodic rainfall did provide a number of good burning windows leading into May, enabling the North East to carry out an extensive program. |
| Activity 2: Monitoring | | |
| Monitoring programs relating to risk and biodiversity assessment undertaken |  | <ul style="list-style-type: none">22 sites were assessed for two to 12 week post-burn habitat structure, fuel hazard and fire severity near Corryong.22 sites were assessed for fauna using remote cameras near Corryong.13 native mammal species, 11 bird species, three reptile species and five species of feral animal were identified by remote camera surveys.Five Ecological Vegetation Divisions sampled.Six Ecological Vegetation Classes sampled. |

Loddon Mallee region fuel management activities overview

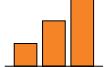
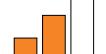


- Two districts, from east to west:
 - Murray Goldfields
 - Mallee
- Consists of River Red Gum forest corridors of the Murray River, cleared dry farmland, and large tracts of Mallee and Heath on sandy soils. Southern part also features isolated patches of Box Iron Bark Forest and mixed species foothill forests.
- Climate varies significantly across the region but is generally characterised by hot summers and mild winters in the west, and hot summers with wet and cold winters in the east. Annual average rainfall ranges from 250mm to 700mm across the region.
- Diverse range of public land including grasslands at Terrick Terrick listed under the *Environment Protection and Biodiversity Conservation Act 1999* and internationally-significant wetlands at Hattah and Kerang.
- Home to 175 threatened fauna species and 533 threatened flora species, including numerous rare and threatened orchids which DEPI is helping conserve.

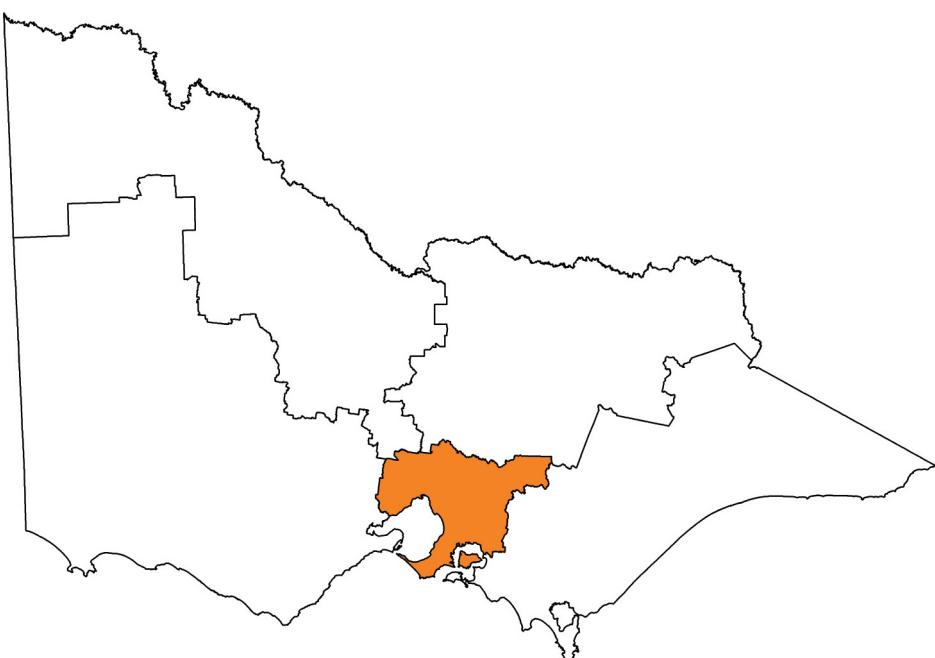
Fuel management activities

| Activity | Rating | Total hectares | Hectares contributing to target | Description |
|---|---|----------------|---------------------------------|---|
| Area treated by planned burning |  | 43,198 | 43,198 | <ul style="list-style-type: none"> The North West Region allocated planned burning program for 2012–13 was 44,795 hectares. The North West Region treated 43,198 hectares (84 burns), or 96 per cent of its program. North West carried out a significant burn program completing 97 burns over a season that provided restricted burning opportunities in autumn. The region also supported the delivery of burn programs in other regions over the autumn period that contributed to DEPI meeting the state wide target. |
| Area treated by other fuel management treatments | N/A | 1306 | N/A | <p>This includes:</p> <ul style="list-style-type: none"> mechanical chemical grazing |
| Area suitable for planned burning affected by bushfires | N/A | 27 | N/A | Areas within the Asset Protection Zone, Bushfire Moderation Zone or Landscape Moderation Zone as defined in the <i>Code of Practice for Bushfire Management on Public Land</i> which were affected by bushfire. |
| Area identified on current, approved Fire Operations Plan (FOP) affected by bushfires | N/A | 0 | 0 | This figure is a subset of <i>Area suitable for planned burning affected by bushfires</i> . These are areas pre-planned for planned burning that were affected by bushfire. |
| Overall area where fuel has been reduced |  | 44,531 | 43,198 | Includes area treated by planned burning and area pre-planned for planned burning (as identified on the FOP) affected by bushfire. |

Other activities

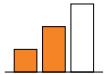
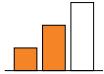
| Performance indicator | Rating | Description |
|---|---|---|
| Activity 1: Planning and preparing for fuel management activities | | |
| Total area planned and prepared for planned burning |  | <ul style="list-style-type: none"> North West's allocated planned burning program for 2012–13 was 44,795 hectares. Burn plans were prepared for 83,139 hectares (186 per cent of the program area) and site preparation completed for 72,223 hectares (161 per cent of the program area). Seasonal conditions experienced in 2012–13 were generally favourable for planned burning during spring. Opportunities were limited later in the season due to a very dry summer leading into a dry autumn. Extensive burn planning (186 per cent of program) and preparation (161 per cent of program) ensured a full range of burns were ready for ignition subject to suitable conditions. |
| Activity 2: Monitoring | | |
| Monitoring programs relating to risk and biodiversity assessment undertaken |  | <ul style="list-style-type: none"> 29 post burn assessments of flora species presence, cover abundance and life-stage were conducted using the All Species Assessment from the <i>Flora monitoring protocols for planned burning: a user's guide</i> (Cawson and Muir, 2008). Two post burn assessments of key fire response species density, cover and life-stage were conducted using the Indicator Species Assessment from the <i>Flora monitoring protocols for planned burning: a user's guide</i> (Cawson and Muir, 2008). Four Ecological Vegetation Divisions sampled. Seven Ecological Vegetation Classes sampled. Mallee hollows were assessed to determine the size at which hollows become useful for fauna and the time-since-fire to reach these hollow sizes. Fifty-eight sites were surveyed for hollow dependent fauna in 2012–13. Mallee herbivory were assessed to determine how introducing herbivores (kangaroos, goats, rabbits) post fire influences flora composition, vegetation structure and fire fuel characteristics. The third round of post-fire surveys of herbivore grazing impacts on vegetation recovery were conducted in the Mallee in March 2013. Mallee planned burn scenario mapping was carried out to develop 20 year projections of the effects of planned burning on biodiversity in the Murray Sunset Landscape Management Unit. A concerted effort was made to work closely with the community and environmental groups that provided information regarding particular species. Changes were made to several planned burns as a result of information received, including the exclusion of approximately eight hectares of native vegetation from a burn near Bendigo to help protect the habitat of the Eltham Copper Butterfly. DEPI also worked closely with the community to modify burns near Castlemaine to protect known Eltham Copper Butterfly habitat. Specific areas of habitat were excluded and DEPI rescheduled burns from spring to autumn to take into account the life-cycle of this rare butterfly. |

Port Phillip region fuel management activities overview

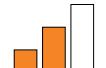


- Two districts:
 - Yarra District
 - East Metropolitan
- Landscape and climate varies greatly across the region ranging from coastal plains in the south east, to the sub-alpine peaks of the Yarra Ranges and the drier volcanic plains to Melbourne's west.
- Diversity of flora and fauna, with habitats including internationally significant Ramsar wetlands, the highly valued forests of the Dandenongs, grasslands in Melbourne's west and wet forests of the Yarra Ranges.
- These habitats support an array of species including Victoria's faunal emblems, the Leadbeater's Possum and the Helmeted Honey Eater.

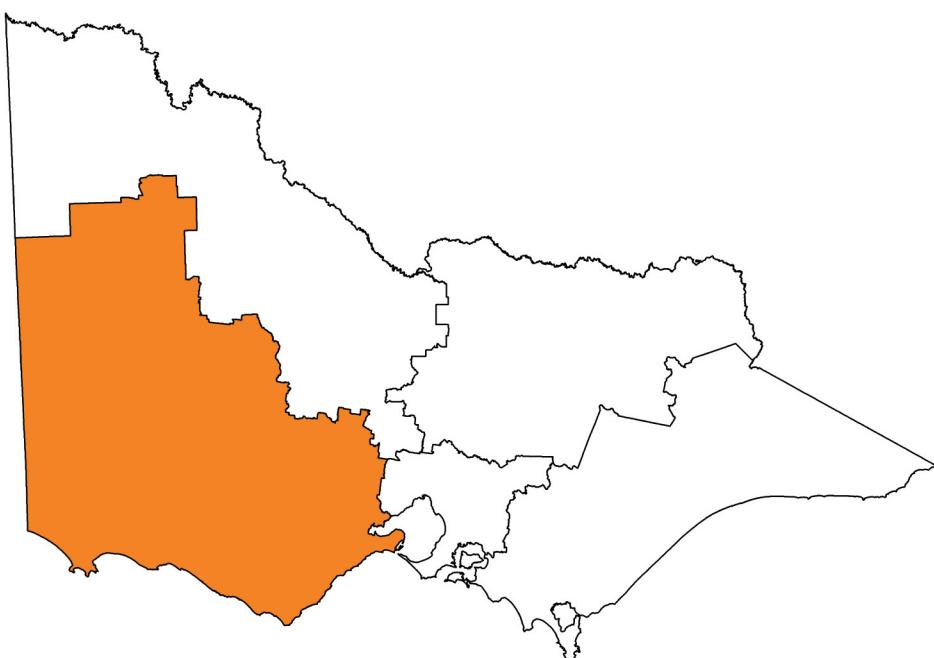
Fuel management activities

| Activity | Rating | Total hectares | Hectares contributing to target | Description |
|---|---|----------------|---------------------------------|--|
| Area treated by planned burning |  | 4072 | 4072 | <ul style="list-style-type: none"> The Port Phillip Region's allocated planned burning program for 2012–13 was 5606 hectares. Port Phillip treated 4072 hectares (97 burns), or 73 per cent of its planned program. Port Phillip carried out a significant burn program completing 97 burns over a season that provided restricted burning opportunities. The region also supported the delivery of burn programs in other regions over autumn. |
| Area treated by other fuel management treatments | N/A | 391 | N/A | <p>This includes:</p> <ul style="list-style-type: none"> mechanical chemical grazing. |
| Area suitable for planned burning affected by bushfires | N/A | 16 | N/A | Areas within the Asset Protection Zone, Bushfire Moderation Zone or Landscape Moderation Zone as defined in the <i>Code of Practice for Bushfire Management on Public Land</i> which were affected by bushfire. |
| Area identified on current, approved Fire Operations Plan (FOP) affected by bushfires | N/A | 12 | 12 | This figure is a subset of <i>Area suitable for planned burning affected by bushfires</i> . These are areas pre-planned for planned burning that were affected by bushfire. |
| Overall area where fuel has been reduced |  | 4479 | 4084 | Includes area treated by planned burning and area pre-planned for planned burning (as identified on the FOP) affected by bushfire. |

Other Activities

| Performance indicator | Rating | Description |
|---|---|---|
| Activity 1: Planning and preparing for fuel management activities | | |
| Total area planned and prepared for planned burning |  | <ul style="list-style-type: none"> Port Phillip's allocated planned burning program for 2012–13 was 5606 hectares. Burn plans were prepared for 9244 hectares (165 per cent of program area) and site preparation completed for 11,966 hectares (213 per cent of the program area). Seasonal conditions in 2012–13 were not generally favourable for planned burning. Major burn planning (165 per cent of program) and preparation (213 per cent of program) ensured a full range of burns were ready for ignition subject to suitable conditions. |
| Activity 2: Monitoring | | |
| Monitoring programs relating to risk and biodiversity assessment undertaken |  | <ul style="list-style-type: none"> 10 post burn assessments of flora species presence, cover abundance and life-stage were conducted using the All Species Assessment from the <i>Flora monitoring protocols for planned burning: a user's guide</i> (Cawson and Muir, 2008). Four post burn assessments of key fire response species density, cover and life-stage were conducted using the Indicator Species Assessment from the <i>Flora monitoring protocols for planned burning: a user's guide</i> (Cawson and Muir, 2008). Three Ecological Vegetation Divisions sampled. Three Ecological Vegetation Classes sampled. |

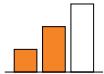
South West region fuel management activities overview



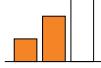
- The former South West Region (South West) comprised four districts:
 - Midlands
 - Wimmera
 - Otway
 - Far South West
- Vegetation communities are diverse, ranging from heathy woodlands along the coast and in the Wimmera deserts, to the Buloke woodlands on the fertile Wimmera plains, the temperate rainforest communities of the Otway mountain ranges and the grasslands of the volcanic plains.
- Threatened species include the south east subspecies of the red-tailed black cockatoo, mammals including bandicoots and phascogales and reptiles including earless dragons, swamp skinks and a range of snakes.

With the merge of the Department of Sustainability and Environment (DSE) and the Department of Primary Industries to create DEPI, changes were made to the regional structure. As a result, the South West Region was divided into two regions, Barwon South West Region and Grampians Region. The former DSE South West Region is referred to here for the purposes of reporting on activities in 2012–13.

Fuel management activities

| Activity | Rating | Total hectares | Hectares contributing to target | Description |
|---|---|----------------|---------------------------------|--|
| Area treated by planned burning |  | 20,247 | 20,247 | <ul style="list-style-type: none"> The South West Region's allocated planned burning program for 2012–13 was 34,268 hectares. South West treated 20,247 hectares (88 burns), or 59 per cent of its planned program. South West's planned burning program was hampered by underlying dryness across most of the region, periodical rain through the Otway Ranges, and resources being deployed throughout Victoria to capitalise on more favourable burning conditions elsewhere. The region was able to treat 20,247 hectares through innovative programming of significant burns during winter and early spring in the Wimmera and Far South West Districts, taking every opportunity to undertake burning when conditions allowed. |
| Area treated by other fuel management treatments | N/A | 3649 | N/A | <p>This includes:</p> <ul style="list-style-type: none"> mechanical chemical grazing. |
| Area suitable for planned burning affected by bushfires | N/A | 49,083 | N/A | Areas within the Asset Protection Zone, Bushfire Moderation Zone or Landscape Moderation Zone as defined in the <i>Code of Practice for Bushfire Management on Public Land</i> which were affected by bushfire. |
| Area identified on current, approved Fire Operations Plan (FOP) affected by bushfires | N/A | 15,664 | 15,664 | This figure is a subset of <i>Area suitable for planned burning affected by bushfires</i> . These are areas pre-planned for planned burning that were affected by bushfire. |
| Overall area where fuel has been reduced |  | 72,979 | 35,911 | Includes area treated by planned burning and area pre-planned for planned burning (as identified on the FOP) affected by bushfire. |

Other activities

| Performance indicator | Rating | Description |
|---|---|--|
| Activity 1: Planning and preparing for fuel management activities | | |
| Total area planned and prepared for planned burning |  | <ul style="list-style-type: none"> South West's allocated planned burning program for 2012–13 was 34,268 hectares. Burn plans were prepared for 97,309 hectares (284 per cent of program area) and site preparation completed for 63,312 hectares (185 per cent of program area). Significant effort was invested throughout the year in burn planning to allow more flexibility during autumn if suitable conditions presented. The treated area was limited due to marginal conditions locally and resource support provided to eastern Victoria. |
| Activity 2: Monitoring | | |
| Monitoring programs relating to risk and biodiversity assessment undertaken |  | <ul style="list-style-type: none"> 519 plots were assessed for flora species with 116 species of flora recorded. 17 habitat structure assessments were conducted using the <i>Guide to monitoring habitat structure – Standard Method</i>. 231 remote cameras were deployed to assess fauna with 15 native mammal species, seven feral mammal species, 33 bird species and one reptile species recorded. 55 species of bird were recorded across 20 minute two hectare standard bird surveys. Seven native species and one feral species of mammal were recorded through cage and Elliot trapping. 107 fuel hazard surveys were conducted using the <i>Overall Fuel Hazard Assessment Guide</i>, 4th Edition. 228 fire severity assessments were conducted using a fire severity ground truthing assessment developed by Fire Management Policy Division. 10 Ecological Vegetation Divisions sampled. 14 Ecological Vegetation Classes sampled. |

References

- Department of Sustainability and Environment (2012) *Code of Practice for Bushfire Management on Public Land*, Department of Sustainability and Environment, East Melbourne, Victoria, Australia.
- Department of Environment and Primary Industries (2013) *Victorian Bushfire Risk Profile Report*. Department of Environment and Primary Industries, East Melbourne, Victoria, Australia.
- Cawson J. G. and Muir A. (2008) *Flora monitoring protocols for planned burning: a user's guide*. Fire and Adaptive Management Report No. 74. Department of Sustainability and Environment, East Melbourne, Victoria, Australia.
- Hines F., Tolhurst K., Wilson A. A. G. and McCarthy G. J. (2010) *Overall fuel hazard assessment guide, 4th Edition*. Fire and Adaptive Management Report No. 82. Department of Sustainability and Environment.
- Keeney, R., & Gregory, R. (2005) 'Selecting attributes to measure the achievement of objectives.' *Operations Research*, 53, 1–11.
- Parliament of Victoria (2010) *2009 Victorian Bushfires Royal Commission - Final Report*. Parliament of Victoria.
- Treloar S. M. (2011) *Guide to Monitoring Habitat Structure*. Fire and Adaptive Management Report No. 85. Department of Sustainability and Environment, East Melbourne, Victoria, Australia.

Appendix 1: Accounting framework for bushfire fuel treatments

Introduction

Under the *Forests Act 1958*, the Secretary to the Department of Environment and Primary Industries (the Secretary) is responsible for carrying out proper and sufficient work in State forests, national parks and on protected public land to prevent and suppress bushfires. Bushfire fuel treatment contributes to meeting this outcome.

In a forest or grassland, bushfire fuel is any material that can burn (be ignited and sustain a fire) under certain conditions, including grass, leaf litter, bark, woody debris and live vegetation. Bushfire fuel treatments can be undertaken to modify the load, continuity and arrangement of fuels and reduce the risk of bushfire.

Planned burning is generally the most effective treatment for managing bushfire fuel over large areas. Other treatments (that can be applied at different scales) include slashing, mowing, fuel break construction.

This accounting framework does not apply to outcomes that are not related to bushfire fuel treatment. Land management and/or ecological outcomes are prescribed at the landscape or program level. DEPI will report on the achievement of ecological outcomes as a component of public accountability.

Policy

Accounting unit

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

The treated area is the area (in hectares) of land identified on a Fire Operations Plan on which a bushfire fuel treatment has been successfully undertaken to achieve a pre-defined bushfire fuel treatment objective.

Planned area

The ‘planned area’ is a unit of land identified on a Fire Operations Plan.

Bushfire fuel treatment objective

A bushfire fuel treatment objective must be established for the ‘planned area’. The objective should be set considering (but not limited to):

- the type and amount of bushfire fuel treatment required to assist in the prevention and suppression of bushfire
- the height, cover and type of bushfire fuel present at the site
- legislative requirements, the *Code of Practice for Bushfire Management on Public Land 2012* and other relevant policies, and the overall land management objectives.

The bushfire fuel treatment objective should be simple, measurable, achievable and realistic. It must be approved prior to undertaking the bushfire fuel treatment for the planned area.

A bushfire fuel treatment objective must specify:

- **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 will be expressed in terms of overall fuel hazard¹ or other measures such as height.
- **Treatment timeframe/persistence** – the timeframe over which the treatment is to be undertaken or persist to achieve the treatment coverage

Treated area

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

Bushfire fuel management treatments

The type of treatment to be applied should be determined as part of the planning process, and must consider legislative requirements (including any restrictions on the use of a particular treatment type), land management objectives, the bushfire fuel treatment objective and the height, cover and type of bushfire fuel present at the site

The following bushfire fuel treatments are approved for accounting purposes. Each treatment type must be accounted for separately.

- Treatment by fire including:
 - Planned burning
 - Bushfires where they occur in areas pre-planned for fuel treatments.
- Mechanical treatment (for example, mowing, slashing and mulching) where identified on an approved Fire Operations Plan.
- Chemical treatment, for example by using herbicide where identified on an approved Fire Operations Plan.
- Grazing by domestic stock where targeted, strategic grazing by domestic stock (typically cattle or sheep) can impact on bushfire fuel by physically removing and compacting vegetation (commonly grasses). Grazing by domestic stock may only be accounted for as a bushfire fuel treatment where it is specifically undertaken to manage bushfire fuel and has been identified in an approved Fire Operations Plan.
- Other treatments approved by the Secretary to the Department of Environment and Primary Industries.

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.



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