# Victoria's bushfire emergency: Biodiversity response and recovery

Preliminary report - Version 1

23 January 2020



VICTORIA State Government | Environment, Land, Water and Planning

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# Contents

# Preamble

This report covers the 2019/2020 fires across the whole of Victoria, with a particular emphasis on Eastern Victoria due to the size and impact of these fires.

Eastern Victoria, in the south-east corner of mainland Australia, is renowned, domestically and internationally for its wildlife and plant diversity of global conservation significance. Often recognised as an example of a megadiverse region of Australia, there are four key ecological attributes that make Eastern Victoria so critical, particularly in a time of climate change.

**Three major bioregions in one:** The area is situated at the convergence of southern ancient cool temperate forests that are a living record of the former super-continent known as Gondwana, warm temperate rainforests and coastal heathlands extending up the eastern seaboard, and Australia's unique alpine ecosystems and species.

**Unique habitat continuity from summit to sea:** Approximately 83% of the land area remains in public ownership and extends from iconic alpine ecosystems through to marine national parks. Virtually all the area remains clothed in native vegetation. Limited land clearing, lower human population densities and complex topography combine to create both landscapes and water catchments that remain continuous. It is the only place on mainland Australia where such continuity of natural ecosystems still exists and provides for unparalleled habitat continuity, major wildlife corridors and capacity for climate change animal migrations and adaptations.

**When it comes to climate change, south is best:** A major feature of climate change is the poleward migration of plants and animals, migrating away from increasing heat and drought. For Australia's native plants and animals, southerly animal emigrations have the best chance of survival at the cooler/wetter end of historical distributions. As such, protected nature areas at the southern end of species ranges are the highest priority candidates for climate change refuges and adaptation.

**Diversity counts:** Approximately 3000 plant species grow here, and there are nearly 500 species of terrestrial vertebrate animals, several hundred species of fish in the rivers, lakes and estuaries, and a vast invertebrate fauna (as yet uncounted). Many of the species found in the area are suffering extreme conservation impacts elsewhere, such as koalas, platypuses, bandicoots, large owls, carnivorous marsupials (like quolls), flying foxes and gliding possums. For some threatened species, this region encompasses the majority of the world-wide distribution, such as for the Long-footed Potoroo, many native fish species, unique burrowing crayfishes and extremely localised flowering plants. The region also represents critical strongholds for wider-ranging species such as Glossy Black Cockatoos, Eastern Bristlebirds and the Ground Parrot.

# Introduction

The current fires are exceptional in size and impact. Existing Department of Environment, Land, Water and Planning fire management processes are well underway, including Bushfire Rapid Risk Assessments for all assets and biodiversity is an important part of this work. However, it is recognised that under climate change we are entering a new world in terms of the scale and complexity of managing fire impacts on biodiversity. Multiple large-scale active fires and the increasing proportion of areas that have been burnt multiple times since 2000, has expanded the context in which mitigation needs to be framed.  For example, there is a need to consider the status of species in neighbouring states and mitigation will increasingly include options beyond the fire areas.  Additionally, the long period of fire activity means there is the challenge of acting urgently in some parts of the fire ground as they are declared safe, while in other areas the fire continues to be active.  This report is the start of planning for biodiversity response and recovery, so sound and timely decisions on government priorities and investment can be made and conservation outcomes are maximised. Information used in the report will remain closely linked to the Bushfire Rapid Risk Assessments being done for individual Incident Management Teams.

Impacts are assessed using the proportions of species or vegetation types in the fire region that are currently or expected to be within the burnt area.  This will be regularly reassessed as the fire situation unfolds and fire extent and intensity mapping become available.  Existing data supplemented by expert opinion on the vulnerability of species to fire impacts is also used to prioritise responses.

Emergency Responses are being considered in terms of nested timeframes:

- immediate actions (while the fire is still active) - (not the subject of this report as they fall within the responsibility of the Incident Management Teams)
- immediate actions (as soon as able to operate in the fire area)
- short-term actions (up to 1 year)
- medium-term actions (1 – 3 years)
- long-term actions (beyond 3 years)

The initial focus will be on the "immediate actions - as soon as able to operate in the fire area" phase but all of the timeframes are part of the overall emergency response.  Planning for short-term and medium-term actions can commence as soon as feasible. The responsibility for delivering these actions must be undertaken by the relevant land managers with coordination of the response and recovery (including allocation of funding) and oversight through Department of Environment, Land, Water and Planning (DELWP).

Priorities are being assessed for each species of concern based on structured estimates of the level of relative impact, the level of relative improvement in regional persistence as a result of relevant actions and the cost and feasibility (technical and social) of actions.  Once governments have made initial investment portfolio decisions, more specific action planning will be undertaken as part of project development.

# Report development and methodology

This report is a living document and will continue to be updated as the bushfire situation in Victoria changes and as more data and information becomes available.

Multiple methods have been used to collect information, including a desktop analysis, consultation with key agencies and the first Biodiversity Bushfire Response Workshop.

The DELWP desktop analysis assessed the impact of the fires on Victoria's biodiversity as of 11th January 2020 and potential emergency responses. This included an assessment of the extent of impact to protected areas, biodiversity values and over one thousand species. The desktop analysis was completed using a range of data and decision support tools (see below), as well as consultation with experts and key partner agency staff.

The first Biodiversity Bushfire Response Workshop was held on the 10th January 2020 and brought together interagency, non-government organisation and University conservation experts and managers. The workshop participants identified high priority species and ecological communities and developed actions and conservation strategies required for their recovery. Further detail on the workshop methodology is included in Appendix Four. An internal DELWP workshop was also held with staff across Biodiversity, Arthur Rylah Institute and Forest Fire and Regions (including the Natural Environment Program) to provide further information and details on actions.

As the 2019/2020 fire season continues, information will continue to be gathered from key partner agencies, stakeholders and experts to supplement the initial findings of the desktop analysis and Workshop. This may result in the inclusion of additional information and data, which will be treated in the same way as those through the initial desktop analysis and workshop.

## Data used in this report

### *Current and projected fire extent*

The current and projected fire extent was used to assess the impact of the Victorian bushfires on biodiversity.

The analyses in this report have been conducted using the current fire extent, which is the state-wide extent of the Victorian bushfires as of 11 January 2020. Improved mapping as smoke clears may cause some of the burn extent area to change, as will any additional spreads of fire throughout the fire season. The fires will have varied in terms of severity and this will be incorporated as severity mapping becomes available.

The projected impact area is based on current forecast weather conditions and fire modelling as of 11th January 2020. This will also be updated as additional detail becomes available.

### *Strategic Biodiversity Values*

Strategic Biodiversity Values (SBV v4) is one of DELWP Biodiversity Division's decision-support products. It combines information on areas important for threatened flora and fauna, and vegetation types and condition to provide a view of relative biodiversity importance of all parts of the Victorian landscape. This integrated information is important because decision-makers need access to an objective, comprehensive and spatially explicit view of the rank of biodiversity assets to enable comparison of locations across Victoria. For more information on the methodology used to develop Strategic Biodiversity Values, read the DELWP fact sheet.

### *Habitat Distribution Models*

DELWP currently has Habitat Distribution Models (HDMs) for over 4,400 taxa that predict the distribution and relative likelihood of suitable habitat for each species across Victoria. This covers all terrestrial vertebrate fauna and most vascular plants. HDMs are built using species occurrence records from the Victorian Biodiversity Atlas (VBA) and relating that data to environmental variables, such as soil, prevailing climate and topography to make predictions about the likely distribution of habitat for individual species across Victoria. For more information on how DELWP's HDMs are built, read the fact sheet. For a subset of species that

DELWP does not have continuous modelled distributions for, polygons of expert delineated habitat extent are used (e.g. Galaxiids, Crayfish).

## Decision-support tools and metrics

Outlined below are decision-support tools and metrics that have been used to conduct this initial desktop analysis or will be employed in the future to further refine priorities.

### *The Genetic Risk Index*

This Genetic Risk Index is a new metric that has been developed for Victoria that can provide a preliminary assessment of the genetic risk of impacted species. The Index combines available genetic and demographic metrics that have the potential to contribute to or influence overall genetic risk for a given species and is communicated as "Very High", "High", "Medium" or "Low" risk. Currently, 1,100 species of flora and fauna found in Victoria have been assessed for their genetic risk, although some have limited data or information available for them, so are classified as "Uncertain". Species that have not yet been assessed using the process have been marked as "currently unknown". This report includes the current genetic risk rating, however these will be reviewed and updated to reflect the impact of the bushfires on species.

### *Strategic Management Prospects*

Strategic Management Prospects (SMP) integrates and simultaneously compares information on biodiversity values, threats, effectiveness of management actions and indicative costs of management actions for biodiversity across Victoria using a spatially-explicit approach to prioritise conservation actions state-wide. It is the key decision-support tool used by the Victorian government to guide investment in on-ground actions for biodiversity. For more information, read the fact sheet.

### *Fire Analysis Module for Ecological values (FAME)*

FAME has been developed by DELWP to predict the impact of individual fires and fire history on the relative abundance of a range of vertebrate fauna. It uses a combination of HDMs, tolerable fire intervals for vegetation, expert judgment and field data on species' response to fire.

### *Specific Needs Assessments*

Specific Needs Assessments is the approach used by the Victorian government to assess the relative cost-effectiveness of conservation actions that have not been modelled spatially and incorporated in the full Strategic Management Prospects analysis. It builds on the Project Prioritisation Protocol approach to simultaneously consider the cost-effectiveness of actions between species' populations and across a range of species. For more information visit the website.

### *Change in Suitable Habitat*

Change in Suitable Habitat (CSH) is the spatially explicit, species-specific measure that the Victorian government uses to quantify the benefit of conservation actions using local-scale estimates of species persistence under action and no-action scenarios. It is based on a large dataset of expert judgement of species' response to management actions and then modelled spatially to create maps of the relative benefit of management actions. The measure can be interrogated at the species-level but also summed across a collection of species (e.g. a particular taxon group, or all biodiversity). For more information visit the website.

### *Relative Benefit of Knowledge*

A prioritisation approach can be used to identify and prioritise knowledge gaps across management actions/ interventions, environments and systems. The Relative Benefit of Knowledge index enables the comparison of knowledge gaps in proposals to assess the benefit of resolving knowledge gaps. The index is calculated

as the expected gain from resolving uncertain elements against the proportional reduction in uncertainty from resolving targeted elements. For more information visit the website.

## Analyses methods

**Overall Biodiversity Impact**

To calculate the broad impacts on Victoria's biodiversity values, we calculated the proportion of the state-wide extent of each biodiversity class that had been impacted by fire.

**General Species Impacts**

To understand the current and projected impacts of the 2019/2020 fires on Victorian species, we calculated the percentage of each individual species state-wide modelled distribution that:

- Has been impacted state-wide within the current fire extent; and
- May be impacted according to the projected impact area within eastern Victoria.

The modelled distribution for each species was determined using DELWP's HDMs. This provides an indication of the level of impact of the fire on each species. The number of FFG, EPBC and DELWP Advisory listed species for each taxon group that have had at least 20%, 50% or 95% of their Victorian distribution impacted by fire was then calculated.

To supplement estimates of the impacts of species' modelled habitat distribution, the predicted impacts of the eastern Victorian fires on the relative abundance of a subset of species was also calculated. The predicted per cent decline in species abundance was modelled using the Fire Analysis Module for Ecological values (FAME), which calculates the predicted impact of individual fires on the relative abundance for a range of fauna species.

These preliminary analyses will be improved and more targeted as fire severity information becomes available.

**Identification of flora and fauna of most immediate concern**

Species of immediate concern have been initially identified based on the per cent of their modelled habitat distribution in Victoria within the current fire extent (above 40%) or the projected impact area (above 70%), and on the predicted per cent decline in species abundance (over 25%). Note the estimates were only possible for species with HDMs, meaning some species do not have percentage of modelled habitat in current and projected fire extent. This includes invertebrates, for which extent of impact is currently unknown and assessment is needed.

For fauna species of most immediate concern, the list has been amended based on conservation expert and managers' advice collected at first Biodiversity Bushfire Response Workshop 2020 and the internal DELWP workshop. These additional species may either have a burnt or projected burnt extent below the above criteria, or they may not have been assessed for extent burnt due to limited data. The fauna species of most immediate concern will be refined as information becomes available and additional criteria will be added as needed (for example to include conservation status or where there are no individuals in captivity).

For flora species of most immediate concern, many species fit the criteria above 40% modelled habitat within the current fire extent or above 70% modelled habitat in the projected impact area (Table 6 & 7). Therefore, the current list has been compiled using a combination of extent habitat burnt, as well as previous information regarding their life history response to fire and previous impact of fire. In addition, this list has been refined using the genetic risk index. It should be noted that this is an initial assessment of flora species of most immediate concern, based on past impact and life history data, so will likely be refined as further information becomes available and following consultation with experts.

**Impact on vegetation communities**

The impact of the 2019/2020 Victorian bushfires on vegetation communities has been assessed through analyses of the current and projected impact on EPBC listed communities, FFG listed communities and Ecological Vegetation Classes. This included assessing the area of each community or vegetation class within the current fire extent, and the projected impact area.

Multiple repeat fires within a short time period can have significant impacts on some ecosystems, resulting in regeneration failure. Analysis was conducted to determine the state-wide area (in ha) which had been burnt multiple (two, three or four) times since 2000 prior to and following the Victorian 2019/2020 fires.

**Identification of immediate emergency response actions**

At the first Biodiversity Bushfire Response Workshop conservation experts and managers were brought together to identify high priority species and develop actions and conservation strategies required for the recovery of these species and ecological communities following the 2019/2020 Victorian fire season.

Experts initially considered the current and projected fire extent, as at 9:00am, 10th January 2020. This expected impact area was then split into two broad regions:

> a)    North East (comprising the Corryong and Alps fires); and
>
> b)    East Gippsland (comprising the Mallacoota, Buchan and Snowy River complex fires).

Using a structured expert elicitation approach, in groups based on taxonomic expertise (arboreal mammals, other mammals, birds, reptiles, amphibians, freshwater species, rainforest flora, and other flora), experts were asked to identify the actions and species that required immediate attention (i.e. in the first 6 months post-fire).

This work was supplemented using species attribute databases already available within DELWP to identify the species that are vulnerable to fire and the subsequent outcomes of large fires (e.g. loss of critical habitat, loss of food source, predation by foxes and cats in the post-fire landscape) and the actions that are most urgent.

# Impacts on biodiversity as of 11<sup>th</sup> January 2020

This draft report is based on the current fire extent as of 11 January 2020. The report will be updated as:

- spatial mapping is updated to reflect any additional burnt area and the severity of the fire
- further information is provided by species experts and managers on vulnerability and potential impacts on important species populations or locations
- outputs become available from workshops held to support the biodiversity bushfire response and recovery.

## Current fire extent and projected impact area

There is approximately 1,300,000 ha within the current fire extent including approximately 1,250,000 ha in eastern Victoria (hashed area in Figure 1). This area may be refined, and the level of impact changed once fire severity mapping is available.

The projected impact area has been calculated, based on current forecast weather conditions and fire modelling. This area is approximately 2,700,000 ha and biodiversity in the area may be impacted through the spread of fire, or suppression activities that occur in areas adjacent to the current fire extent.
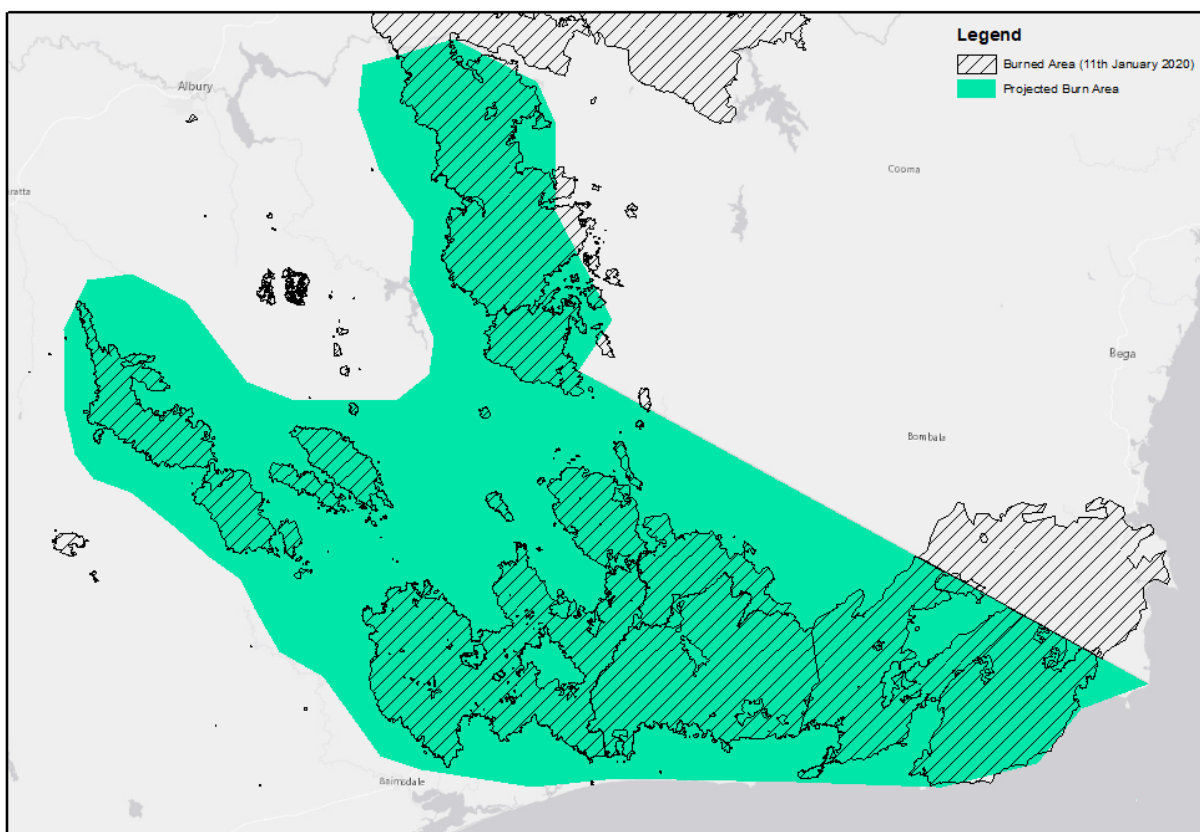


**Figure 1: Map of North East and East Gippsland current fire extent area (hashed) and projected impact area in eastern Victoria (green)**

## Impacts on areas within the CAR Reserve System

The bushfires have impacted on large part of the Comprehensive, Adequate and Representative (CAR) Reserve System in eastern Victoria. This includes 42 national parks and conservation reserves that have between 90-100% of their land within the current fire extent (Table 1 and Table 2). Key affected national parks in the current fire extent include:

- Alfred National Park - 100%
- Burrowa - Pine Mountain National Park - 100%
- Lind National Park - 100%
- Mt Mitta Mitta Regional Park - 100%
- Tara Range Park - 99%
- Mt Elizabeth Nature Conservation Reserve - 97%
- Snowy River National Park - 74%
- Croajingolong National Park - 69%
- Crawford River Regional Park - 58%
- Errinundra National Park - 50%

**Table 1: Impacts on the CAR Reserve System**

| | Percent of park in current fire extent | | | |
|---|---|---|---|---|
| | **40 – 60%** | **61 – 80%** | **81-90%** | **91-100%** |
| **National parks and nature conservation reserves** | 7 reserves | 3 reserves | 6 reserves | 20 reserves |
| **Other conservation reserves** | 0 reserves | 1 reserve | 1 reserve | 22 reserves |

**Table 2: Impacts on the CAR Reserve System by type of protection**

| | Hectares in current fire extent | Hectares in projected impact area |
|---|---|---|
| National parks and nature conservation reserves | 369,932 ha | 494,674 ha |
| Permanent protection on private land | 194 ha | 3,139 ha |
| Immediate protection areas | 38,112 ha | 10,126 ha |
| Special protection zone areas | 177,333 ha | 157,972 ha |
| Prescriptions – species | 162,774 ha | 149,075 ha |
| Prescriptions – modelled old growth | 18,932 ha | 15,559 ha |

## Impacts on Heritage listed areas

There are two heritage listed reserves within the current fire extent: Budj Bim Cultural Landscape and Australian Alps National Parks and Reserves (Table 3). Recently listed World Heritage (and National Heritage) area, Budj Bim Cultural Landscape, has been significantly impacted with over 60% of the northern component in the current fire extent. In addition, 21% (185,538 Ha) of the Victorian extent of the Australian Alps National Parks and Reserves National Heritage area is in the current fire extent.

**Table 3: Heritage listed areas**

| | | Hectares in current fire extent | Per cent of listed area within current fire extent |
|---|---|---|---|
| **World heritage listing** | Budj Bim Cultural Landscape (Budj Bim Northern Component) (also on the National Heritage List). | 5,179 Ha | 64% |
| **National Heritage listing** | Victorian extent of the Australian Alps National Parks and Reserves | 185,538 Ha | 21% |

## Impacts on Indigenous Protected Areas

The Lake Condah Indigenous Protected Area (IPA), part of the World Heritage Budj Bim Cultural Landscape has been significantly affected by the bushfires. Over 80% of the IPA has been burnt (Table 4).

**Table 4: Indigenous protected areas**

| | Hectares in current fire extent | Per cent of listed area within current fire extent |
|---|---|---|
| Lake Condah Indigenous Protected Area | 1,389 ha | 81% |

## Overall impacts on biodiversity values

To date the fire has burnt in mostly high biodiversity value areas (Figure 2), impacting 10% of the state's highest three Strategic Biodiversity Value (SBV) classes (Class 1, 2 & 3), and 7% of the next highest SBV classes (Table 5).

**Table 5: Overall impacts on Strategic Biodiversity Values (SBV) classes**

| SBV class | Class ranking | Hectares in current fire extent | Proportion of state-wide area of SBV class within the current fire extent |
|---|---|---|---|
| Class 1 | 90-100 | 224,856 | 10% |
| Class 2 | 80-90 | 216,826 | 10% |
| Class 3 | 60-80 | 475,981 | 10% |
| Class 4 | 40-60 | 333,937 | 7% |
| Class 5 | 20-40 | 35,462 | 1% |
| Class 6 | 1-20 | 6,328 | 0% |
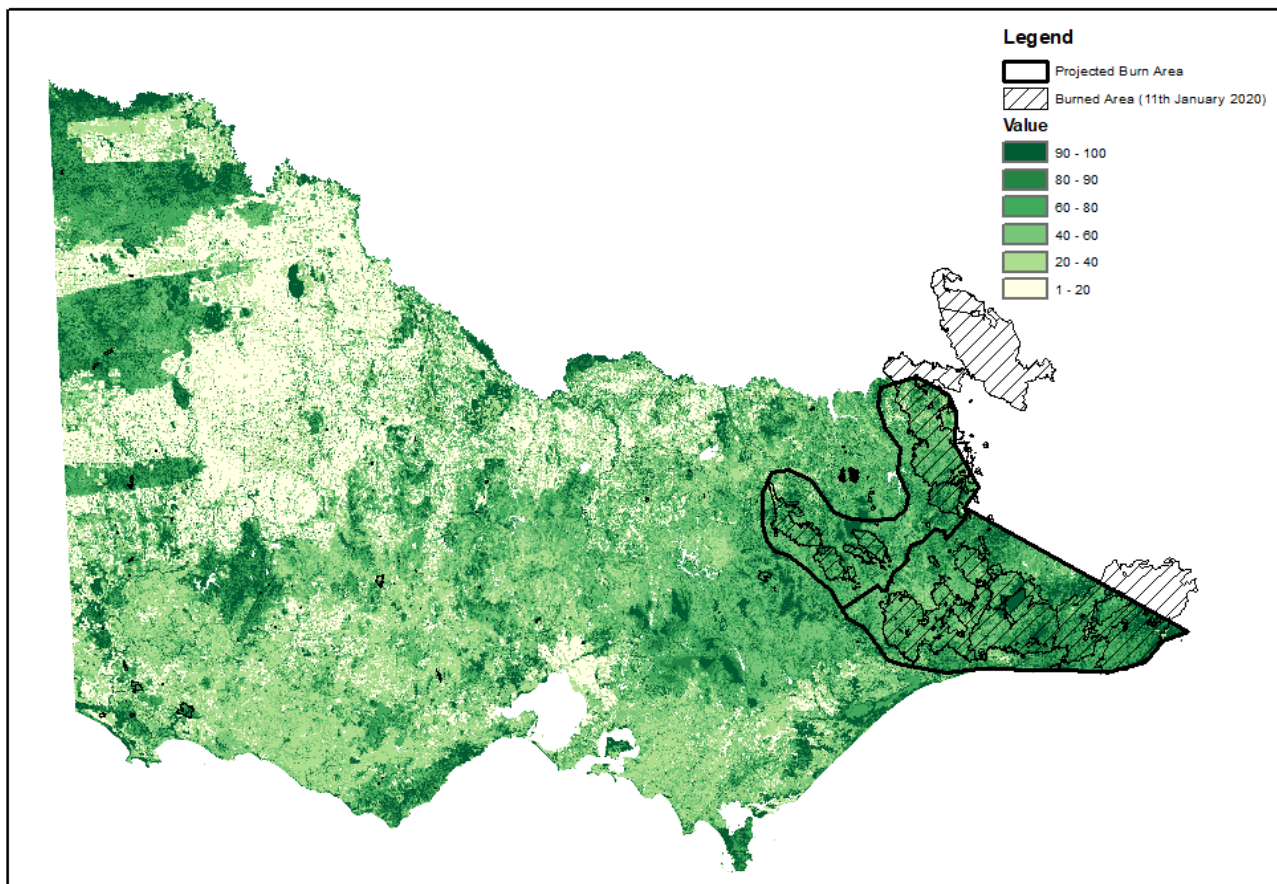
**Figure 2: Map of Strategic Biodiversity Values (SBV 4) across eastern Victoria with current fire extent as at 11th January 2020**

## General species impacts

The number of fauna and flora with over 95%, 50% or more and 20% or more of their state-wide modelled distribution within the current fire extent are shown in Table 6. Further detail of the impact on each taxon group is provided in Appendix One.

**Table 6: General species impacts in the current fire extent**

| % of modelled habitat in the current fire extent | Total species | Listed under the EPBC Act*^ | Listed under the FFG Act* | Listed as Victorian Rare or Threatened species* |
|---|---|---|---|---|
| **Fauna** | | | | |
| **Over 95%** | 1 species | 1 species | 1 species | 1 species |
| **50% or more** | 17 species | 3 species | 8 species | 11 species |
| **20% or more** | 87 species | 13 species | 26 species | 35 species |
| **Flora** | | | | |
| **Over 95%** | 4 species | 0 species | 1 species | 4 species |
| **50% or more** | 168 species | 10 species | 18 species | 162 species |
| **20% or more** | 689 species | 19 species | 48 species | 397 species |

\* the same species may be included under one or more of these statutory listing processes

^ this list includes species currently under assessment

Within the potential impact area (current fire extent + projected impact area in eastern Victoria) there are a considerable number of species that could be impacted or the extent of the impact on them could increase as the fire season continues (Table 7). The table shows number of fauna and flora with over 95%, 50% or more and 20% or more of their state-wide modelled distribution within the potential impact area. Further detail of the impact on each taxon group is provided in Appendix Two.

**Table 7: General species impacts in the potential impact area**

| % of modelled habitat in the potential impact area | Total species | Listed under the EPBC Act* | Listed under the FFG Act* | Listed as Victorian Rare or Threatened species* |
|---|---|---|---|---|
| **Fauna** | | | | |
| **Over 95%** | 12 species | 4 species | 9 species | 10 species |
| **50% or more** | 48 species | 12 species | 21 species | 27 species |
| **20% or more** | 175 species | 20 species | 38 species | 53 species |
| **Flora** | | | | |
| **Over 95%** | 235 species | 16 species | 34 species | 234 species |
| **50% or more** | 796 species | 24 species | 62 species | 516 species |
| **20% or more** | 1,489 species | 30 species | 78 species | 640 species |

\* a species may be listed under each of these processes

## Fauna species of most immediate concern

There is a high risk of immediate mortality and impact of short-term threats (e.g. predation) for fauna species. Therefore, fauna species are likely to be a strong focus for immediate response. Listed below are 80 fauna species, split via taxa, that are of most immediate concern due to the impact of the 2019/2020 Victorian Bushfires (Table 8).

This includes species such as EPBC listed Brush-tailed Rock Wallaby and Long-footed Potoroo (see Figures 3 and 4 for the modelled distribution of these species overlaid with current fire extent). Initial advice from regional staff suggests the key Brush-tailed Rock-wallaby sites have not been impacted yet but remain at risk from fire. For some species, the Victorian populations are at the edge of their range, with the majority of the range in NSW or South Australia.

Biodiversity Bushfire Response Workshop participants considered the outlook for a subset of species of most immediate concern. Using a structured expert elicitation approach, expert groups were asked to estimate a species' probability of persistence in 10 years if no immediate action is undertaken. These estimates were as low as 1% for some of the species listed below.

**Figure 3: Modelled distribution of Brush-tailed Rock-wallaby for south eastern Australia and current fire extent as at 11th January 2020. At least 49% of the Victorian modelled distribution of Brush-tailed Rock-wallaby has been burnt.**
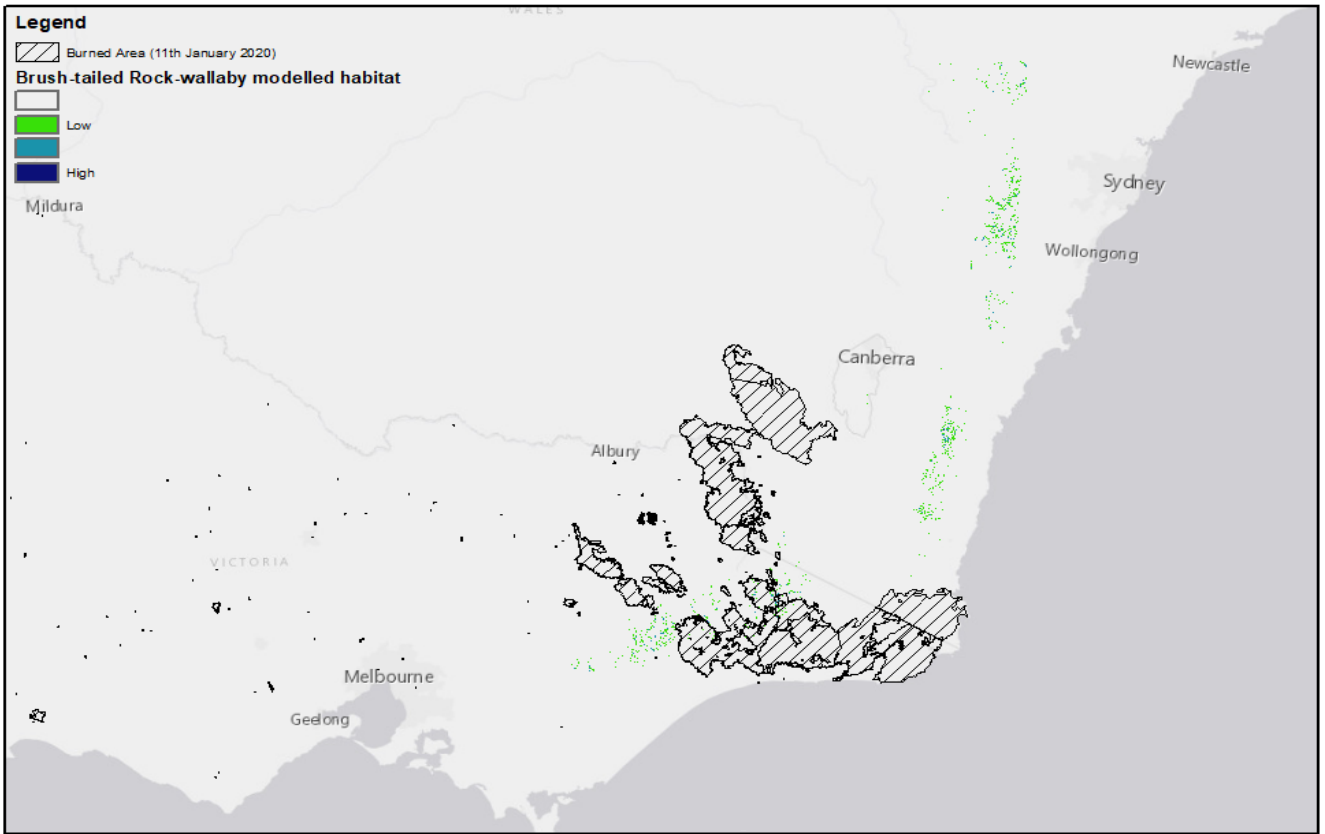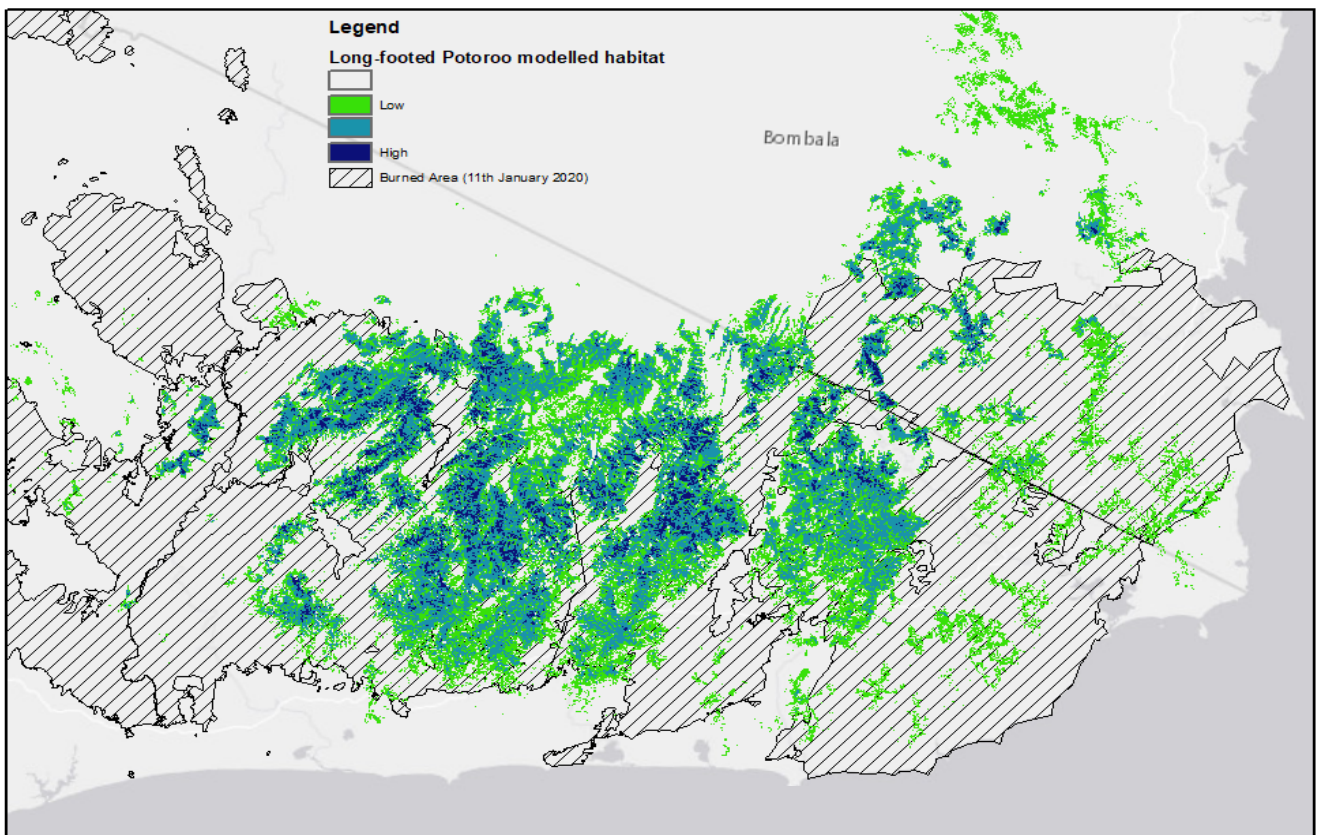


**Figure 4: Modelled distribution of Long-footed Potoroo for south eastern Australia and current fire extent as at 11th January 2020. At least 63% of the Victorian modelled distribution of Long-footed Potoroo has been burnt.**

**Table 8: Fauna species of most immediate concern. Includes % of modelled habitat in current and projected fire extent, as well as genetic risk rating. Green shading is EPBC and italics is Victorian Rare or Threatened (Advisory List) (a species listed on both lists is bold and italics). Species marked with an asterisk (\*) are Priority Species under the Australian Government's Threatened Species Strategy. Species marked with a caret (^) are currently being reviewed under the EPBC Act. Species marked with a hash (#) are migratory species with a smaller impact in their Victorian extent, but which have had their habitat impacted in other states.**

| Taxon | Common Name | Scientific Name | % of modelled habitat in Victoria within the current fire extent | % of modelled habitat in Victoria within the projected impact area | Genetic Risk |
|---|---|---|---|---|---|
| Amphibians | ***Alpine Tree Frog*** | *Litoria verreauxii alpina* | 23% | 98% | Currently unknown |
| | Blue Mountains Tree Frog | *Litoria citropa* | 67% | 98% | Uncertain |
| | ***Booroolong Tree Frog^*** | *Litoria booroolongensis* | 21% | 37% | Uncertain |
| | *Dendy's Toadlet* | *Pseudophryne dendyi* | 51% | 89% | Uncertain |
| | ***Giant Burrowing Frog^*** | *Heleioporus australiacus* | 64% | 96% | Uncertain |
| | ***Green and Golden Bell Frog*** | *Litoria aurea* | 35% | 71% | High |
| | *Keferstein's Tree Frog* | *Litoria dentata* | 74% | 98% | Uncertain |
| | ***Large Brown Tree Frog^*** | *Litoria littlejohni* | 58% | 81% | Very high |
| | Leaf Green Tree Frog | *Litoria nudidigita* | 54% | 74% | Uncertain |
| | *Martin's Toadlet* | *Uperoleia martini* | 21% | 47% | Very high |
| | ***Southern Barred Frog*** | *Mixophyes balbus* | Currently unknown | Currently unknown | Very high |
| | ***Spotted Tree Frog^*** | *Litoria spenceri* | 15% | 40% | Very high |
| Aquatic Fauna | *Alpine Spiny Crayfish* | *Euastacus crassus* | Currently unknown | Currently unknown | Uncertain |
| | Arte Spiny Crayfish | *Euastacus sp. 1* | Currently unknown | Currently unknown | Currently unknown |
| | Austral Mussel | *Hyridella (Hyridella) australis* | Currently unknown | Currently unknown | Currently unknown |
| | ***Australian Grayling^*** | *Prototroctes maraena* | Currently unknown | Currently unknown | Low |
| | ***Barred Galaxias*** | *Galaxias fuscus* | 0% | Currently unknown | Very high |
| | *Burrunan Dolphin* | *Tursiops australis* | Currently unknown | Currently unknown | Moderate |
| | 'Cann' Galaxias | *Galaxias sp. 17* | Currently unknown | Currently unknown | Currently unknown |
| | Cann Spiny Crayfish | *Euastacus sp. 2* | Currently unknown | Currently unknown | Currently unknown |
| | *Dargo Galaxias^* | *Galaxias mungadhan* | 14% | At least 7% | Uncertain |

| Taxon | Common Name | Scientific Name | % of modelled habitat in Victoria within the current fire extent | % of modelled habitat in Victoria within the projected impact area | Genetic Risk |
|---|---|---|---|---|---|
| | Depressed Mussel | *Hyridella (Hyridella) depressa* | Currently unknown | Currently unknown | Currently unknown |
| | *East Gippsland Galaxias^* | *Galaxias aequipinnis* | 100% | 100% | Uncertain |
| | *East Gippsland Spiny Crayfish* | *Euastacus bidawalus* | Currently unknown | Currently unknown | Currently unknown |
| | **Flatheaded Galaxias** | *Galaxias rostratus* | Currently unknown | Currently unknown | Uncertain |
| | Galaxis olidus complex | *Galaxis olidus complex* | Currently unknown | Currently unknown | Moderate |
| | Gippsland Blackfish | *Gadopsis marmoratus* | Currently unknown | Currently unknown | High |
| | **Glenelg Freshwater Mussel** | *Hyridella glenelgensis* | Currently unknown | Currently unknown | High |
| | **Macquarie Perch** | *Macquaria australasica* | Currently unknown | Currently unknown | High |
| | *Mallacoota Burrowing Crayfish* | *Engaeus mallacoota* | Currently unknown | Currently unknown | Uncertain |
| | *McDowall's Galaxias^* | *Galaxias mcdowalli* | 54% | Currently unknown | Uncertain |
| | 'Moroka' Galaxias | *Climacteris erythrops* | Currently unknown | Currently unknown | Currently unknown |
| | Mountain Galaxias | *Galaxias olidus* | Currently unknown | Currently unknown | Moderate |
| | *Orbost Spiny Crayfish* | *Euastacus diversus* | Currently unknown | Currently unknown | Uncertain |
| | River Blackfish | *Gadopsis marmoratus* | Currently unknown | Currently unknown | Very high |
| | *Roundsnout Galaxias* | *Galaxias terenasus* | 38% | At least 38% | Uncertain |
| | *Shaw Galaxias^* | *Galaxias gunaikurnai* | 0% | Currently unknown | Uncertain |
| | South-west Victorian Blackfish | *Gadopsis marmoratus* | Currently unknown | Currently unknown | Currently unknown |
| | *Variable Spiny Crayfish* | *Euastacus yanga* | Currently unknown | Currently unknown | Currently unknown |
| | West Snowy Spiny Crayfish | *Euastacus sp. 3* | Currently unknown | Currently unknown | Currently unknown |
| | 'Yalmy' Galaxias | *Galaxias sp. 14* | 95% | At least 95% | Currently unknown |
| Birds | Brown Gerygone | *Gerygone mouki* | 56% | 82% | Uncertain |
| | **Eastern Bristlebird*** | *Dasyornis brachypterus* | 42% | 83% | Very high |
| | *Glossy Black-Cockatoo* | *Calyptorhynchus lathami* | 63% | 99% | Moderate |
| | *Ground Parrot* | *Pezoporus wallicus* | 21% | 39% | High |

| Taxon | Common Name | Scientific Name | % of modelled habitat in Victoria within the current fire extent | % of modelled habitat in Victoria within the projected impact area | Genetic Risk |
|---|---|---|---|---|---|
| | Lewin's Honeyeater | *Meliphaga lewinii* | 35% | 51% | Moderate |
| | *Masked Owl* | *Tyto novaehollandiae* | 25% | 39% | Moderate |
| | *Powerful Owl* | *Ninox strenua* | 23% | 35% | Moderate |
| | Red-browed Treecreeper | *Climacteris erythrops* | 27% | 49% | High |
| | **Regent Honeyeater #** | *Anthochaera phrygia* | <1% | <1% | Very High |
| | *Sooty Owl* | *Tyto tenebricosa* | 41% | 59% | Moderate |
| | ***Swift Parrot #*** | *Lathamus discolor* | <1% | <1% | High |
| | ***Broad-toothed Rat*** | *Mastacomys fuscus mordicus* | 18% | 52% | High |
| | ***Brush-tailed Rock-wallaby\**** | *Petrogale penicillata* | 47% | 100% | Very high |
| | *Eastern Bent-wing Bat* | *Miniopterus schreibersii oceanensis* | 18% | 38% | Uncertain |
| | Eastern False Pipistrelle | *Falsistrellus tasmaniensis* | 23% | 42% | Low |
| | *Eastern Horseshoe Bat* | *Rhinolophus megaphyllus megaphyllus* | 35% | 56% | Uncertain |
| | *Eastern Pygmy-possum* | *Cercartetus nanus* | 20% | 39% | Moderate |
| | Feathertail Glider | *Acrobates pygmaeus* | 18% | 35% | High |
| | ***Greater Glider*** | *Petauroides volans* | 26% | 47% | High |
| Mammals | ***Grey-headed Flying-fox*** | *Pteropus poliocephalus* | 15% | 28% | Low |
| | Koala | *Phascolarctos cinereus* | 7% | 12% | Moderate |
| | ***Long-footed Potoroo^*** | *Potorous longipes* | 63% | 97% | High |
| | Long-nosed Bandicoot | *Perameles nasuta* | 54% | 77% | Moderate |
| | Long-nosed Potoroo | *Potorous tridactylus tridactylus* | 32% | 47% | Very high |
| | ***Mountain Pygmy-possum\**** | *Burramys parvus* | 7% | 66% | Very high |
| | ***New Holland Mouse^*** | *Pseudomys novaehollandiae* | 0% | Currently unknown | Very High |
| | Platypus | *Ornithorhynchus anatinus* | 12% | 23% | Moderate |
| | ***Smoky Mouse^*** | *Pseudomys fumeus* | 22% | 41% | Uncertain |

| Taxon | Common Name | Scientific Name | % of modelled habitat in Victoria within the current fire extent | % of modelled habitat in Victoria within the projected impact area | Genetic Risk |
|---|---|---|---|---|---|
| | *Southern Brown Bandicoot* | *Isoodon obesulus obesulus* | 25% | 37% | High |
| | *Spot-tailed Quoll^* | *Dasyurus maculatus maculatus* | 25% | 53% | High |
| | Water Rat | *Hydromys chrysogaster* | 4% | 10% | High |
| | *White-footed Dunnart* | *Sminthopsis leucopus* | 25% | 42% | High |
| | Yellow-bellied Glider | *Petaurus australis* | 30% | 40% | Moderate |
| Reptiles | *Alpine Bog Skink* | *Pseudomoia cryodroma* | 15% | 57% | Very high |
| | *Alpine She-oak Skink* | *Cyclodomorphus praealtus* | 4% | 66% | Very high |
| | *Alpine Water Skink* | *Eulamprus kosciuskoi* | 12% | 79% | Uncertain |
| | Copper-tailed Skink | *Ctenotus teniolatus* | 16% | 50% | Low |
| | *Diamond Python* | *Morelia spilota spilota* | 57% | 97% | Currently unknown |
| | *Eastern She-oak Skink* | *Cyclodomorphus michaeli* | 55% | 95% | Uncertain |
| | Gippsland Water Dragon | *Intellagama lesueurii howittii* | 39% | 77% | High |
| | *Guthega Skink* | *Liopholis guthega* | 0% | 57% | Uncertain |
| | *Lace Monitor* | *Varanus varius* | 15% | 25% | Moderate |
| | Red-throated Skink | *Acritoscincus platynotus* | 24% | 75% | High |
| | *Swamp Skink* | *Lissolepis coventryi* | 12% | 14% | High |
| | Yellow-bellied Water Skink | *Eulamprus heatwolei* | 31% | 58% | High |
| Invertebrates | | | Extent of impact currently unknown | | Assessment needed |

## Flora species of most immediate concern

Plant responses to fire are complex. Some species are fire killed. Of these, some reappear from soil-stored seed, while others rely on migration from unburnt populations. Many other plant species have the capacity to re-sprout following fire. Regardless of which survival strategy is used, most plants are very susceptible to drought stress and browsing by animals in the post-fire environment and mortality may be high in populations that survive fire. Long-term survival also depends on fire regimes, since repeated fires may exhaust seedbanks and rootstocks.

Table 9 outlines the top flora species of immediate concern based on initial criteria (see explanation in analyses methods). This is the top 38 species of most immediate concern (including six EPBC listed species; examples in Figure 5). However, there are a large number of flora species that have been impacted and could be vulnerable to fire, so this list will be added to and refined as more information becomes available.
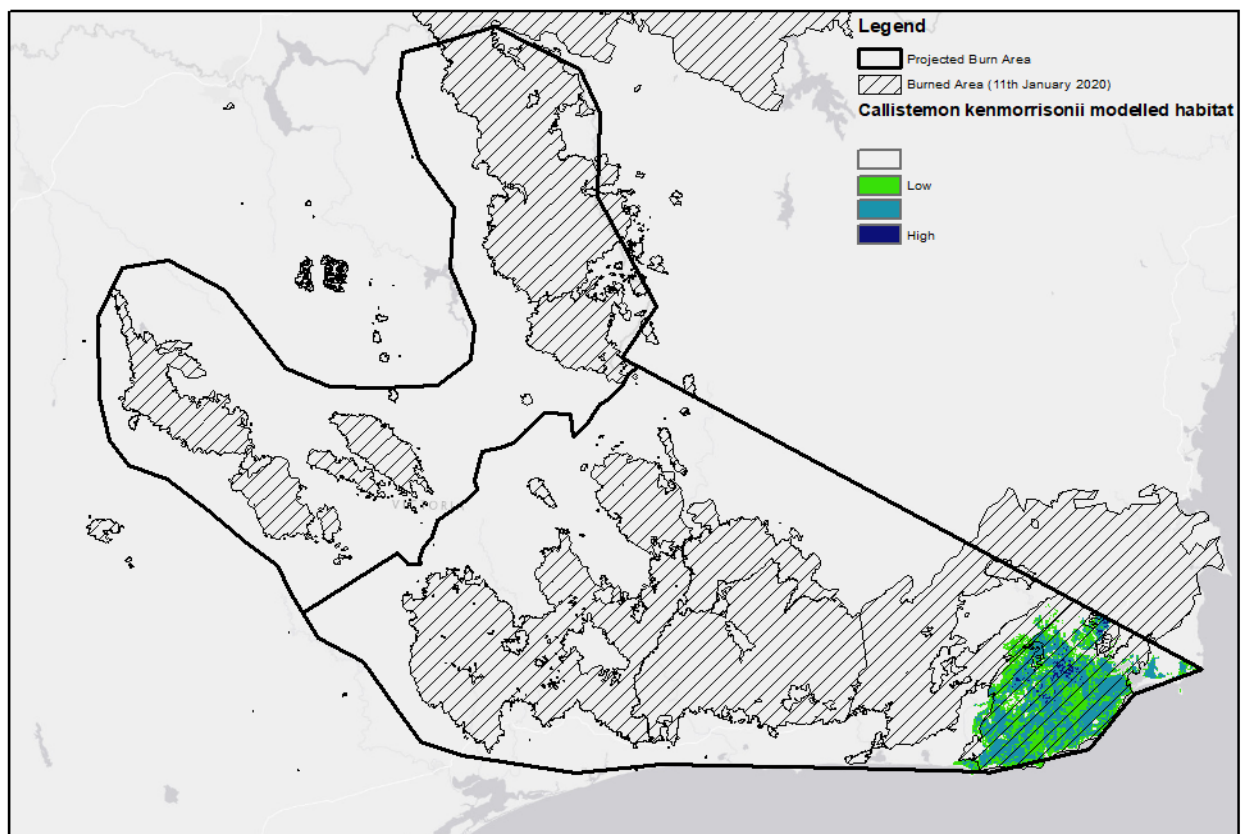


**Figure 5: Modelled habitat distribution of *Callistemon kenmorrisonii* in Victoria and the burn extent as at 11th January 2020. At least 91% of the Victorian modelled distribution of *Callistemon kenmorrisonii* has been burnt.**

**Table 9: Flora species of most immediate concern. Includes % of modelled habitat in current and projected fire extent, as well as genetic risk. Green shading is EPBC and all species on the list are Victorian Rare or Threatened (Advisory List). Note: this table will be updated as new analyses and advice arises.**

| Taxon | Scientific name | Common name | % of modelled habitat in Victoria within the current fire extent | % of modelled habitat in Victoria within the projected impact area | Genetic Risk |
|---|---|---|---|---|---|
| Conifers | *Podocarpus aff. lawrencei (Goonmirk Rocks)* | Errinundra Plum-pine | 4% | 100% | Currently unknown |
| Dicotyledons | *Allocasuarina nana* | Stunted Sheoak | 35% | 100% | Currently unknown |
| | *Banksia croajingolensis* | Gippsland Banksia | 56% | 88% | Very high |
| | ***Callistemon forresterae*** | **Forrester's Bottlebrush** | **73%** | **99%** | **Currently unknown** |
| | ***Callistemon kenmorrisonii*** | **Betka Bottlebrush** | **92%** | **99%** | **Very high** |
| | *Callistemon subulatus* | Dwarf Bottlebrush | 74% | 100% | Currently unknown |
| | *Cassinia maritima* | Coast Cassinia | 75% | 98% | Currently unknown |
| | *Cassinia venusta* | Elegant Cassinia | 65% | 91% | Currently unknown |
| | *Dendrophthoe vitellina* | Long-flower Mistletoe | 70% | 99% | Currently unknown |
| | *Eucryphia moorei* | Eastern Leatherwood | 42% | 99% | Currently unknown |
| | *Ficus coronata* | Sandpaper Fig | 71% | 100% | Currently unknown |
| | ***Grevillea celata*** | **Colquhoun Grevillea** | **56%** | **100%** | **Very high** |
| | *Hakea macraeana* | Willow Needlewood | 36% | 100% | Currently unknown |
| | *Muehlenbeckia gracillima* | Slender Lignum | 74% | 98% | Very high |
| | *Notothixos subaureus* | Golden Mistletoe | 83% | 98% | Currently unknown |
| | ***Olearia astroloba*** | **Marble Daisy-bush** | **20%** | **100%** | **Currently unknown** |
| | *Olearia iodochroa* | Violet Daisy-bush | 37% | 98% | Currently unknown |
| | *Olearia tomentosa* | Toothed Daisy-bush | 40% | 99% | Currently unknown |
| | *Ozothamnus adnatus* | Winged Everlasting | 24% | 100% | Currently unknown |
| | *Ozothamnus argophyllus* | Spicy Everlasting | 69% | 98% | Currently unknown |

| | | | | | |
|---|---|---|---|---|---|
| | *Persoonia brevifolia* | Short-leaf Geebung | 38% | 100% | Currently unknown |
| | *Persoonia levis* | Smooth Geebung | 78% | 100% | Currently unknown |
| | *Persoonia silvatica* | Forest Geebung | 39% | 100% | Moderate |
| | *Prostanthera incisa* | Cut-leaf Mint-bush | 62% | 100% | Currently unknown |
| | *Prostanthera monticola* | Buffalo Mint-bush | 19% | 100% | Currently unknown |
| | *Prostanthera walteri* | Monkey Mint-bush | 51% | 100% | Currently unknown |
| | *Santalum obtusifolium* | Blunt Sandalwood | 81% | 100% | Currently unknown |
| | ***Westringia cremnophila*** | **Snowy River Westringia** | **65%** | **100%** | **Very high** |
| | *Westringia glabra* | Violet Westringia | 52% | 100% | Currently unknown |
| **Fern and allies** | *Botrychium lunaria* | Grassy Moonwort | 32% | 100% | Very high |
| | *Polystichum formosum* | Broad Shield-fern | 55% | 91% | Currently unknown |
| | *Pteris vittata* | Chinese Brake | 78% | 100% | Currently unknown |
| | *Tmesipteris parva* | Small Fork-fern | 0% | 100% | Currently unknown |
| **Monocotyledons** | *Cryptostylis erecta* | Bonnet Orchid | 66% | 98% | Currently unknown |
| | ***Cryptostylis hunteriana*** | **Leafless Tongue-orchid** | **57%** | **99%** | **Currently unknown** |
| | *Dendrobium speciosum var. speciosum* | Rock Orchid | 79% | 100% | Currently unknown |
| | *Plectorrhiza tridentata* | Tangle Orchid | 81% | 100% | Currently unknown |
| | *Sarcochilus falcatus* | Orange-blossom Orchid | 46% | 100% | Currently unknown |

*This table will be updated as new analyses and advice arises

## Impacted vegetation communities

**EPBC listed communities**

There are five EPBC listed communities impacted by the fires (Table 10). Currently, there has been limited direct impact on these communities by the bushfires. Almost 100% of all five communities are within the projected impact area. The impact of bushfires on vegetation community will be somewhat dependent on the severity of bushfires experienced by individual stands, as well as on how recently and how often they have been burnt in the past.

In addition to the burnt extent, these sites are at high risk of the future indirect impacts of bushfire such as soil erosion, exposure and elevated levels of feral herbivore browsing.

**FFG listed communities**

There are seven FFG listed communities impacted by the fires (Table 11). Rainforest in Victoria develops in the long-term absence of severe disturbance such as fire, and there are significant areas of rainforest within the current fire extent. Almost 100% of each of the communities within East Gippsland are within the projected impact area (Figure 6). The impact of fire on these communities will be somewhat dependent on the intensity experienced by individual stands, and this will be analysed when severity information becomes available.

In addition to the burnt extent, these sites are at high risk of the future indirect impacts of bushfire such as soil erosion, exposure and elevated levels of feral herbivore browsing.
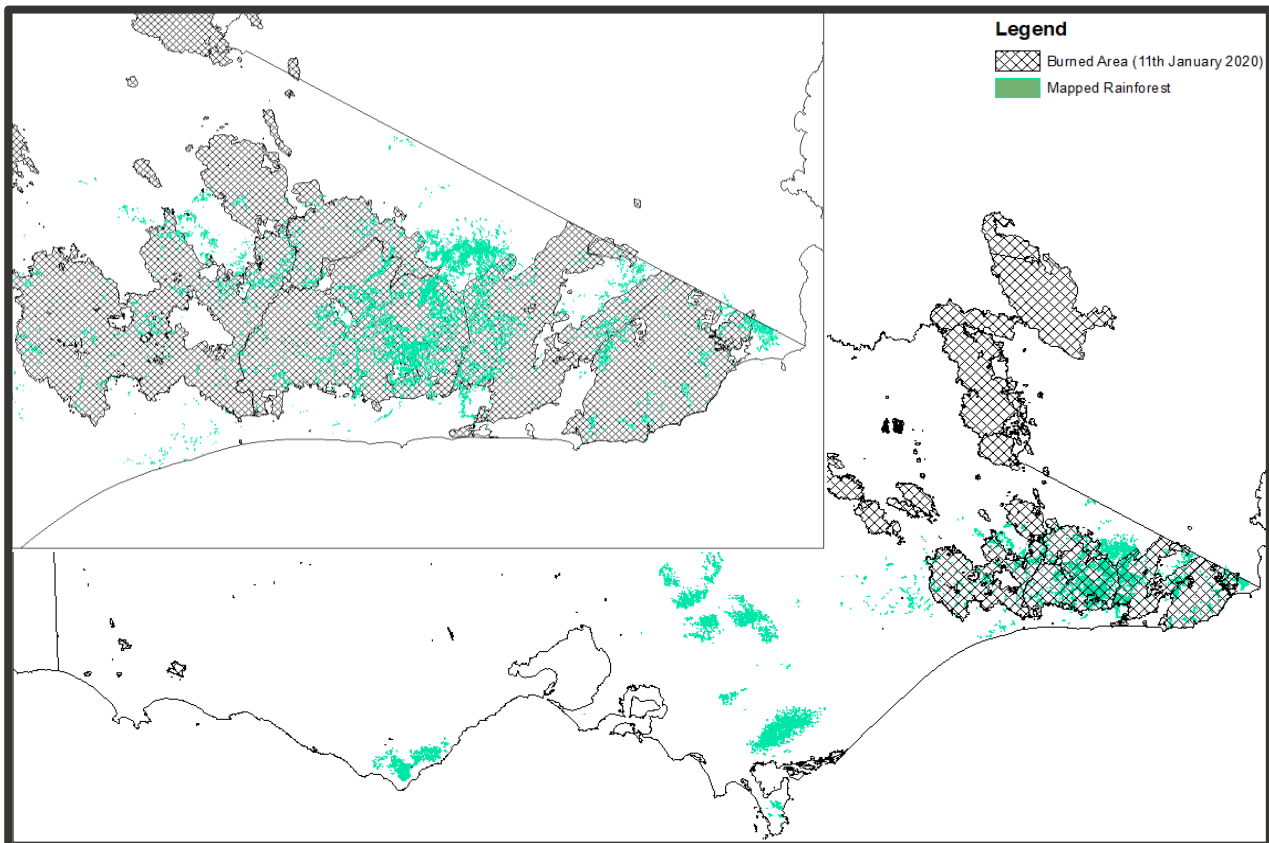


**Figure 6: Overlay of burn extent and mapped rainforest communities in Victoria. Note that there is a 0.05 pt border used on the rainforest extent map to aid visual interpretation.**

**Table 10: Impacts on EPBC listed communities**

| Community | Extent in Victoria | Impact of fire | Area within current fire extent (Ha) | Area within projected Impact Area (Ha) |
|---|---|---|---|---|
| Alpine Sphagnum Bogs and Associated Fens ecological community^ | Less than 4,300 hectares is extant in Victoria. | Direct and severe impacts to this community will be likely given the protracted period of low rainfall leading up to the fires.<br><br>In several places across the projected impact area, this community has been subject to repeat fires. Impacts included destruction associated with peat ignition, altered hydrology, and mass movement of soils and siltation. | 11% | 95% |
| Littoral Rainforest and Coastal Vine Thickets of Eastern Australia | The extent of this rainforest community in Victoria is limited – likely to be less than 100 hectares - and comprised of small fragmented remnants typically less than 1 hectare in size | The community is at risk of the future indirect impacts of bushfire such as soil erosion, exposure and feral herbivore browsing. | 10% | 100% |
| Natural Temperate Grassland of the South Eastern Highlands | Remnants in Victoria are very small in area likely to be less than 10,000 hectares and within the small extent of the Monaro Tablelands that extends into Victoria. | While the community is 'tolerant of fire', the Impact of hot summer fire combined with drought is unknown. | Not within current fire extent | 100% |
| Silurian Limestone Pomaderris Shrubland of the South East Corner and Australian Alps Bioregions | The only known population occurs at Marble Gully Nature Conservation Reserve, near Bindi in the Tambo valley north-east of Swifts Creek, East Gippsland. | This site was completely burnt in 2003 and is in recovery from this event.<br><br>The impact of repeated burning is potentially a problem for many of the constituent species whose fire response is relatively poorly known. | Not within current fire extent – site is within 2 km of the current fire boundary | 100% |
| White Box – Yellow Box – Blakely's Red Rum Grassy Woodland and Derived Grassland ecological community | Significant areas of this community are extant in the rain-shadow areas of the middle reaches of the Snowy River Catchment (~32,000 ha) | This community was severely impacted by the 2003 fires. There is a risk of the ongoing loss of the fire sensitive White Native Pine, a keystone species in this community. | 5% | 100% |

^Also listed under FFG Act

**Table 11: Impacts on FFG listed communities**

| Community | Extent | Area within projected Impact Area (Ha) |
|---|---|---|
| Cool Temperate Mixed Forest Community | Substantial areas of Cool Temperate Mixed Forest estimated to be in excess of > 10,000 hectares are within the currently mapped fire-ground largely within the Errinundra National Park and adjacent areas. | ~60% |
| Dry Rainforest (Limestone) | The extent of this rainforest community is extremely restricted and likely to be less than 100 hectares in area. | 95% |
| Limestone Grassy Woodland | Potentially up to 50,000 hectares of this community remain. | 100% |
| Warm Temperate Rainforest (Coastal East Gippsland) | Less than 7,500 hectares remain. | >90% |
| Warm Temperate Rainforest (East Gippsland Alluvial Terraces) | Less than 3,500 hectares remain. | 90% |
| Warm Temperate Rainforest (Far East Gippsland) | Less than 2,000 hectares remain. | 100% |
| Warm Temperate Rainforest (Cool Temperate Overlap, Howe Range) Community | Less than 5,500 hectares of this community remain in Victoria. | 100% |

## Ecological Vegetation Classes

Based on the current fire extent, four Ecological Vegetation Classes (EVC) groups have greater than 20% of their state-wide extent within the burnt area (Rainforest, Montane Grasslands, Shrublands or Woodlands, Wet or Damp Forests & Lowland Forests). Refer to Table 12 for a full list.

In terms of specific Ecological Vegetation Classes, the following are notable:

- Gallery Rainforest (83% extent burnt)
- Warm Temperate Rainforest (70% extent burnt)
- Banksia Woodland (55% extent burnt)
- Damp Forest (35% extent burnt)
- Littoral Rainforest (11% extent burnt)
- Cool Temperate Rainforest (7% extent burnt)

**Table 12: Ecological Vegetation Classes and the proportion of their extent impacted by fire or within the projected impact area**

| EVC Group | Area within current fire extent (Ha) | Area within projected Impact Area (Ha) | Outside Impact Zone (Ha) | Total Area (Ha) | % Burnt of total EVC area |
|---|---|---|---|---|---|
| Dry Forests | 423,614 | 510,906 | 1,857,802 | 2,792,323 | 15% |
| Wet or Damp Forests | 318,918 | 255,523 | 689,886 | 1,264,328 | 25% |
| Lowland Forests | 218,682 | 130,287 | 275,634 | 624,603 | 35% |
| Montane Grasslands, Shrublands or Woodlands | 100,480 | 192,581 | 118,903 | 411,965 | 24% |
| Rainforests | 31,888 | 15,688 | 54,859 | 102,435 | 31% |
| Riparian Scrubs or Swampy Scrubs and Woodlands | 27,531 | 36,905 | 219,528 | 283,964 | 10% |
| Sub-alpine Grasslands, Shrublands or Woodlands | 20,996 | 55,826 | 52,943 | 129,764 | 16% |
| Rocky Outcrop or Escarpment Scrubs | 11,210 | 10,370 | 52,796 | 74,376 | 15% |
| Box Ironbark Forests or dry/lower fertility Woodlands | 10,433 | 988 | 374,361 | 385,783 | 3% |
| Heathlands | 9,159 | 9,520 | 255,187 | 273,866 | 3% |
| Plains Woodlands or Forests | 7,166 | 1,944 | 961,322 | 970,432 | 1% |
| Lower Slopes or Hills Woodlands | 5,675 | 49,339 | 436,368 | 491,383 | 1% |
| Mallee | 2,747 | | 1,565,166 | 1,567,913 | 0% |
| Heathy Woodlands | 2,281 | 39 | 346,624 | 348,944 | 1% |
| Riverine Grassy Woodlands or Forests | 2,005 | 1,746 | 430,441 | 434,193 | 0% |
| Coastal Scrubs Grasslands and Woodlands | 814 | 3,956 | 51,141 | 55,911 | 1% |
| Wetlands | 379 | 2,667 | 206,111 | 209,158 | 0% |
| Herb-rich Woodlands | 247 | 465 | 197,439 | 198,151 | 0% |
| Plains Grasslands and Chenopod Shrublands | 173 | | 292,330 | 292,503 | 0% |
| Salt-tolerant and/or succulent Shrublands | 54 | 1,009 | 99,318 | 100,381 | 0% |

**Impact on vegetation communities from multiple burns since 2000**

In some ecosystems, multiple fires within a short time period (e.g. 20 years) can result in regeneration failure for obligate seeders. Multiple large-scale fires across Victoria over the last 20 years have resulted in an increasing proportion of area that has been burnt multiple times since 2000.

Preliminary analyses on the current fire extent has shown a large increase in the area of Victoria that has been burnt two, three and four times since 2000 as a result of this year's fire season (Figure 7). This is a particular problem in Alpine Ash (*Eucalyptus delegatensis*) forest (Figure 8 & 9).

These area figures will be subject to change as fire extent changes and severity mapping for the current fires becomes available.
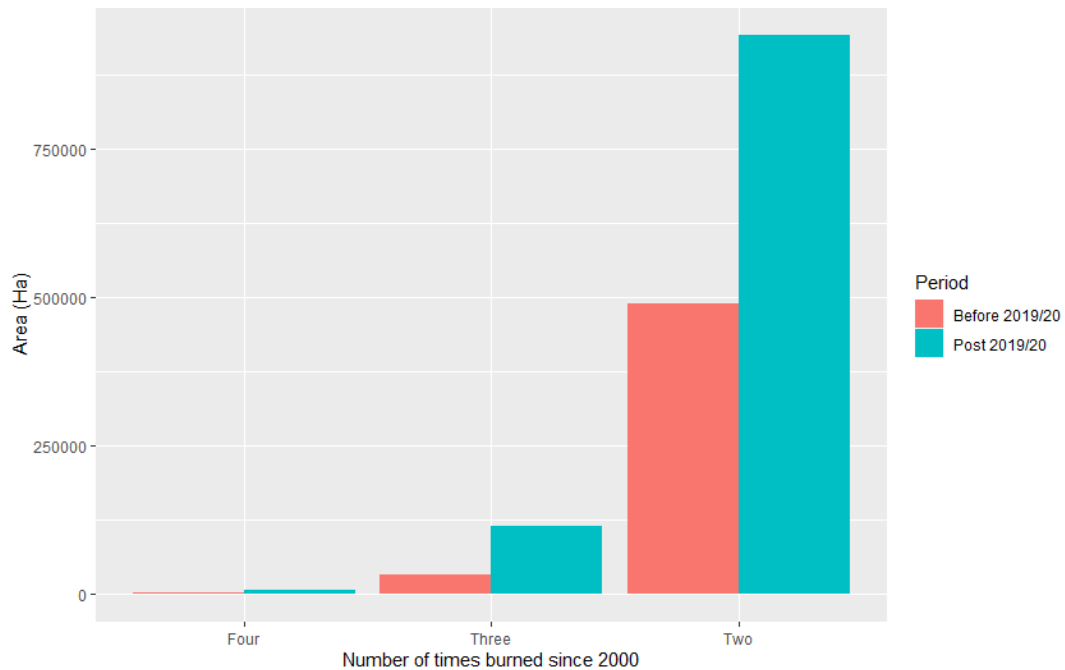


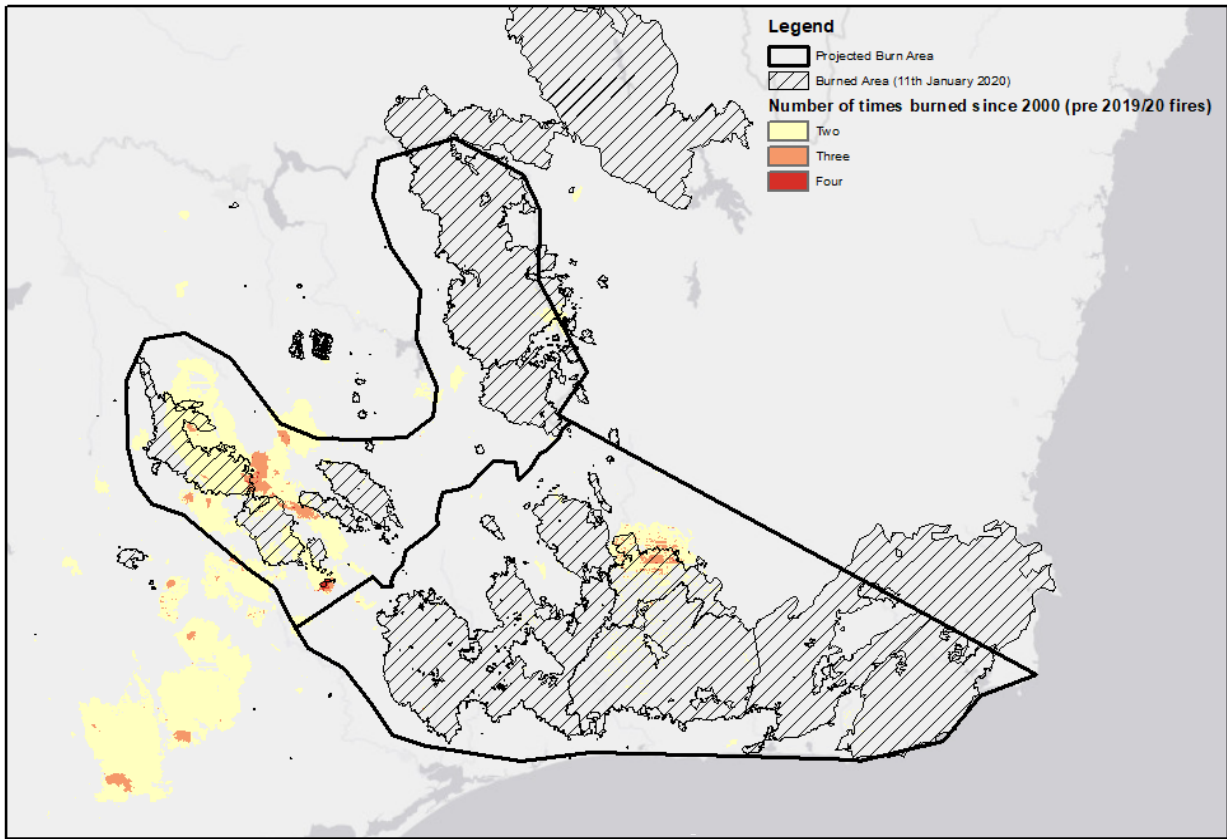**Figure 7: Area of current fire extent that has been burnt multiple times since 2000**

**Figure 8: Areas that have been burnt multiple times since 2000, excluding the current fire extent of the 2019/2020 fire season**
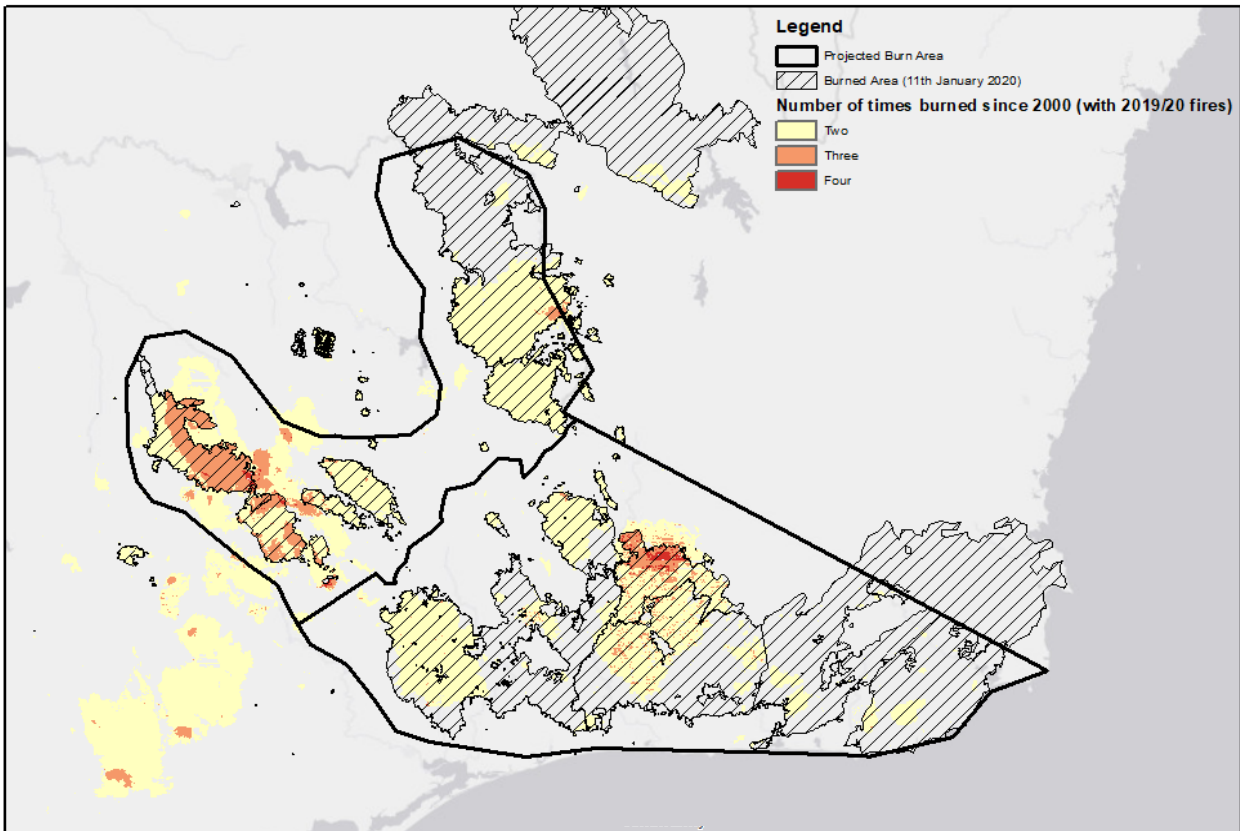


**Figure 9: Preliminary map of areas that have been burnt multiple times since 2000, including the current fire extent of the 2019/2020 fire season.**

# Emergency response

## Strategic planning approach

An overarching strategic approach to the biodiversity response and recovery for Victoria's bushfire emergency is vital for the coordination between different emergency response recommendations and multiple funding sources. Funding for this approach may come from different jurisdictions and sources (including external organisations). The prospectus and the following plans and strategies will be developed to ensure that all jurisdictions and external organisations are able to identify key actions for funding. The responsibility for delivering actions must be undertaken by the relevant land managers with coordination of the response and recovery (including allocation of funding) and oversight through DELWP.

The overarching strategy considers that the current fires are exceptional in size and impact and recognises that under climate change we are entering a new world in terms of the scale and complexity of managing fire impacts on biodiversity.  Multiple large-scale active fires and the increasing proportion of areas that have been burnt multiple times since 2000, has expanded the context in which mitigation needs to be framed. This means that for some species and actions mitigation will need to include options beyond the fire areas.

The overarching strategy has multiple key elements:

- Developing **Species Plans for species of most immediate concern**. These plans will need to include information on the impact of the 2019/20 bushfires and will combine multiple actions to inform what needs to be done for the species in the immediate, short, medium and long term. The development of these plans will need to be prioritised, with the first grouping of species plans to be completed as soon as possible. There may be instances when the species plans need further information or analysis (e.g. Specific Needs analysis or Knowledge Framework analysis). This will be identified early and completed where necessary.

- Developing **Action Strategies for all potential response actions**. These strategies will include information on actions, timeframe and costs, identify the priority areas of action and transition planning which will identify triggers for change. These strategies will be linked to the species plans and share the same information. Critically, these strategies will be the key document for integration and coordination across species.

- Coordination with the **Bushfire Rapid Risk Assessment** recommendations and any actions that are funded and implemented.

- Connecting with the **Protecting Victoria's Environment - Biodiversity 2037** five-year refresh and ensuring that existing processes (such as Biodiversity Response Planning, Forest & Fire Planning, Catchment Planning) are utilised to progressively engage key stakeholders and support them in recognising and responding to the new world in which we operate.

The initial focus of the overarching strategy will be on the most urgent actions (i.e. *Phase 1 Immediate actions - as soon as able to operate in the fire area*) but all the timeframes are part of the overall emergency response.  Planning for short-term and medium-term actions can commence as soon as feasible.

# Timeframes for response

There are a wide range of potential responses and actions that can be undertaken to assist the recovery of biodiversity post-fire, and due to the criticality of time in an emergency response, they will be considered in terms of nested timeframes:

**Immediate actions (while the fire is still active)** *(note these are not the subject of this report)*

Two activities are already underway as part of standard fire response processes:

- wildlife welfare coordination, including responding to animals already being brought to treatment locations, and preparation for expanded activities once the fire ground is declared safe to enter.

- advice on managing risks of biodiversity impacts from on-going fire suppression activities (e.g. where to restrict application of retardant or blacking out actions in refuges[1] for localised high value biodiversity assets such as narrow endemics or very fire-sensitive species/communities).

**Phase 1 - Immediate actions (as soon as able to operate in the fire area)**

A number of risks require immediate action otherwise the opportunity to manage the risk will be lost. Some of these actions will require ground access, while others may be most effective if permission for air access prior to ground access is possible (e.g. it is critical to control cats quickly since they are known to travel long distances (25 km) and rapidly flood areas post-fire to prey on remaining native animals). Other actions include:

- extracting and/or translocating individual animals prior to further deaths or environmental degradation (e.g. water quality)

  - providing supplementary food/water, or artificial habitat.

**Phase 2 - Short-term broader-scale actions (up to 1 year)**

There are broader-scale risks that require timely actions otherwise the opportunity to manage the risk will be lost. For example, herbivore control in the burnt and adjacent areas is required because any remaining plants are more exposed to herbivory, and seedling and resprouting plants are more vulnerable to damage. Coincidently, the post-fire landscape provides a unique management opportunity to cost-effectively do this - short-term lack of vegetative cover and restricted public land access during the initial phase of recovery will enable aerial control of pest species.

Other actions include on-ground assessment of the status of critical species to improve targeting of management actions, and re-establishment/expansion of research technology (e.g. camera traps).

**Phase 3 - Medium-term actions (1 – 3 years)**

There are some risks that do not need immediate action so there is an opportunity to plan more thoroughly on the basis of information collected in the first-year post-fire. This could include reconsidering the mix and priority of conservation actions more broadly in the fire areas. For example, increased protection and/or management of other areas of habitat that have become more strategically important for key species as a result of the fires.

In other cases, a risk may take time to manifest and be treatable (e.g. weed infestations arising from the release of soil-stored seed).

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1. Refuges are places that promote species survival during times of stress. Refuges may reflect urgent and specific circumstances for protecting individual plants and animals, such as minimising further impact on residual or unburnt vegetation within or adjacent to the fire ground (immediate refuges). Refuges can also reflect longer-term and landscape-scale ecological circumstances for protecting and actively managing important populations across the range of each species (ecological refuges). Identifying ecological refuges requires consideration of protective topographic or environmental features (including surrounding land use), risk-spreading for future disturbance events, and shifting species distributions and dynamic interactions.

There is an important opportunity to review and build on the strengths of existing projects, and also to expand our thinking to trial novel management options.

**Phase 4 - Longer-term actions (beyond 3 years)**

As well as sustaining implementation of relevant short and medium-term actions, there are additional actions that will become necessary in the longer term. For example, restoring animals into previously burnt areas, and implementing measures to reduce the occurrence and/or impact of future high severity fires in significant locations.

## Summary of potential responses across time frames

From the first Biodiversity Bushfire Response Workshop (10th January 2020), experts were asked to identify strategies of emergency response for taxon groups, groups of similarly effected species and/or individual species. The workshop assessed the benefits of potential strategies but did not have time to explore address the negative impacts on other species. This was supplemented by an internal DELWP workshop with biodiversity policy, program and research staff.

The key actions that were identified to be priorities for immediate and short-term implementation (within next 6 months) are listed below.

- Protect and manage key unburnt areas and populations

- Intensified and sustained predator control within burnt and adjacent areas

- Intensified and sustained herbivore (deer, pig, horse) control within burnt and adjacent areas

- Emergency extraction, ex situ management and translocation of critical flora and fauna species

- Immediate reconnaissance of critical species to inform status following fire

These actions provided benefits to the greatest number of species and key flora communities of immediate concern and were identified by experts to be critical in the immediate and short term. A summary of the potential response actions across time frames is shown in Table 13. Examples of species or vegetation community specific strategies can be found in Appendix Three.

**Table 13: Summary of potential response actions across time frames (dark green shading showing time periods critical for success)**

| Hazard | Actions | Species and communities of most immediate concern which benefit | Phase 1 Immediate response | Phase 2 Short term | Phase 3 Medium term | Phase 4 Long term |
|---|---|---|---|---|---|---|
| Loss of food source | Supplementary feeding of critical fauna populations | At least 2 fauna species | | | | |
| Loss of critical habitat features | Create artificial hollows/ nest boxes | At least 17 fauna species (including arboreal mammals, owls and Glossy Black Cockatoo) | | | | |
| | Emergency extraction and temporary housing of critical fauna for ongoing conservation | At least 30 fauna species (including galaxiids, reptiles, Eastern Bristlebird, Large Brown Tree Frog, Long-footed Potoroo) | | | | |
| | Identify and design protections for key unburnt areas and populations within the current fire extent | At least 49 fauna species (including Diamond Python, Spotted Tree Frog, galaxiids, arboreal mammals) plus invertebrates of immediate concern | | | | |
| | Immediate reconnaissance of critical fauna and flora species to inform status and management following fire | At least 15 fauna species (including Long-footed Potoroos, Large Brown Tree Frog, Greater Glider) plus invertebrates of immediate concern | | | | |
| | Immediate reconnaissance of species and areas of cultural significance (intangible) | As determined by Traditional Owners | | | | |
| Change in water quality | Provide off-stream temporary ponds | At least 1 (Large Brown Tree Frog) | | | | |
| | Emergency extraction of critical fauna and temporary housing for ongoing conservation | At least 19 fauna species (Spotted Tree Frog, galaxiids, burrowing crayfish) | | | | |
| Increased predation pressure/ effectiveness | Intensified and sustained pest predator control within the current fire extent and adjacent areas | At least 47 fauna species (including Long-footed Potoroos, Eastern Bristlebirds) | | | | |
| Increased competition from pest herbivores | Intensified and sustained pest herbivore (deer, pig, horse) control within the current fire extent and adjacent areas | At least 23 fauna species (including Eastern Bristlebird and Large Brown Tree Frog) and critical flora communities (i.e. Rainforest) | | | | |
| | Fence local populations for protection from pest herbivore species | At least 11 fauna species (including Long-footed Potoroo and She-oak Skinks) | | | | |

| Hazard | Actions | Species and communities of most immediate concern which benefit | Phase 1 Immediate response | Phase 2 Short term | Phase 3 Medium term | Phase 4 Long term |
|---|---|---|---|---|---|---|
| *Increased grazing pressure on plants* | Intensified and sustained pest herbivore (deer, pig, horse) control within the current fire extent and adjacent areas | Critical flora communities (e.g. Rainforest and Alpine Ash) and sensitive key flora | ■ | ■ | ■ | ■ |
| | Fence local populations for protection from pest herbivore species | Critical flora communities (e.g. Rainforest and Alpine Ash) and sensitive key flora | | ■ | | |
| *Multiple short-interval burns* | Collection of seed and ex situ seed banking for key species | Critical flora communities and fire sensitive species (e.g. Rainforest and Alpine Ash) | ■ | ■ | ■ | |
| | Reseeding of vegetation communities in key locations | Critical flora communities (e.g. Rainforest and Alpine Ash) | | | ■ | ■ |
| *Increased competition from invasive plants* | Intensified and sustained weed control within the current fire extent and adjacent areas | Critical flora communities (e.g. Rainforest and Alpine Ash) and sensitive key flora | | ■ | ■ | ■ |
| *Impacts on Traditional Owner wellbeing through impacts on ability to connect to Country and health of Country* | Enhance Traditional Owner connection to Country and improve health of Country | As determined by Traditional Owners | ■ | ■ | ■ | ■ |
| *Small population size effects (inbreeding depression, vulnerability to localised disturbances)* | Identify and protect key unburnt areas and populations within the current fire extent | At least 49 fauna species (including Diamond Python, Spotted Tree Frog, galaxiids, arboreal mammals) plus invertebrates of immediate concern | ■ | ■ | ■ | |
| | Population management – captive breeding and translocation of critical fauna populations, sanctuary | At least 29 critical fauna populations (including Eastern Bristlebird, Long-footed Potoroo, Brush-tailed Rock-Wallaby) | ■ | ■ | ■ | ■ |
| *Disease* | Hygiene control in emergency response actions | At least 2 two species (e.g. amphibians) | ■ | ■ | ■ | ■ |
| | Protection of key areas without disease | At least 2 two species (e.g. amphibians) | ■ | ■ | ■ | ■ |
| *Change in importance of other populations* | Protect and manage key populations of species outside the current fire extent | At least 49 fauna species (including Diamond Python, Spotted Tree Frog, galaxiids, arboreal mammals) plus | ■ | ■ | ■ | ■ |

| Hazard | Actions | Species and communities of most immediate concern which benefit | Phase 1 Immediate response | Phase 2 Short term | Phase 3 Medium term | Phase 4 Long term |
|---|---|---|---|---|---|---|
| | | invertebrates of immediate concern | | | | |
| | Knowledge acquisition - Monitoring of key populations and impact of management actions, analysis et/ | At least 29 species (including galaxiids, crayfish, Diamond Python, arboreal mammals) | | | | |
| | Translocation of critical fauna populations | At least 29 critical fauna populations (including Eastern Bristlebird, Long-footed Potoroo, Brush-tailed Rock-Wallaby) | | | | |

## Location of priority response actions for immediate and short-term implementation

**Protect and manage key unburnt refuges[2] and populations**

There are important areas for biodiversity outside the current fire extent, but at risk of being burnt as the fire season continues. Through an initial desktop assessment, DELWP identified a selection of areas outside the burn area that required immediate protection from being burnt and from suppression activities (e.g. mechanical fuel breaks; Figure 10). These areas were identified using a desktop analysis that considered the relative vulnerability of vegetation (e.g. remaining unburnt rainforest) to severe fire and the presence important habitat for species of immediate concern (e.g. Ground Parrot at Howe Flat, unburnt parts of Errinundra National Park for Greater Glider).

When fire severity data are collated, DELWP will begin work to identify key unburnt areas and areas impacted by low severity fire that should be protected from future fire and may need intensive management (e.g. intensive invasive species management, protection from future fire) to enable species to recover back into the burnt areas. These areas will be considered as key unburnt refuges.
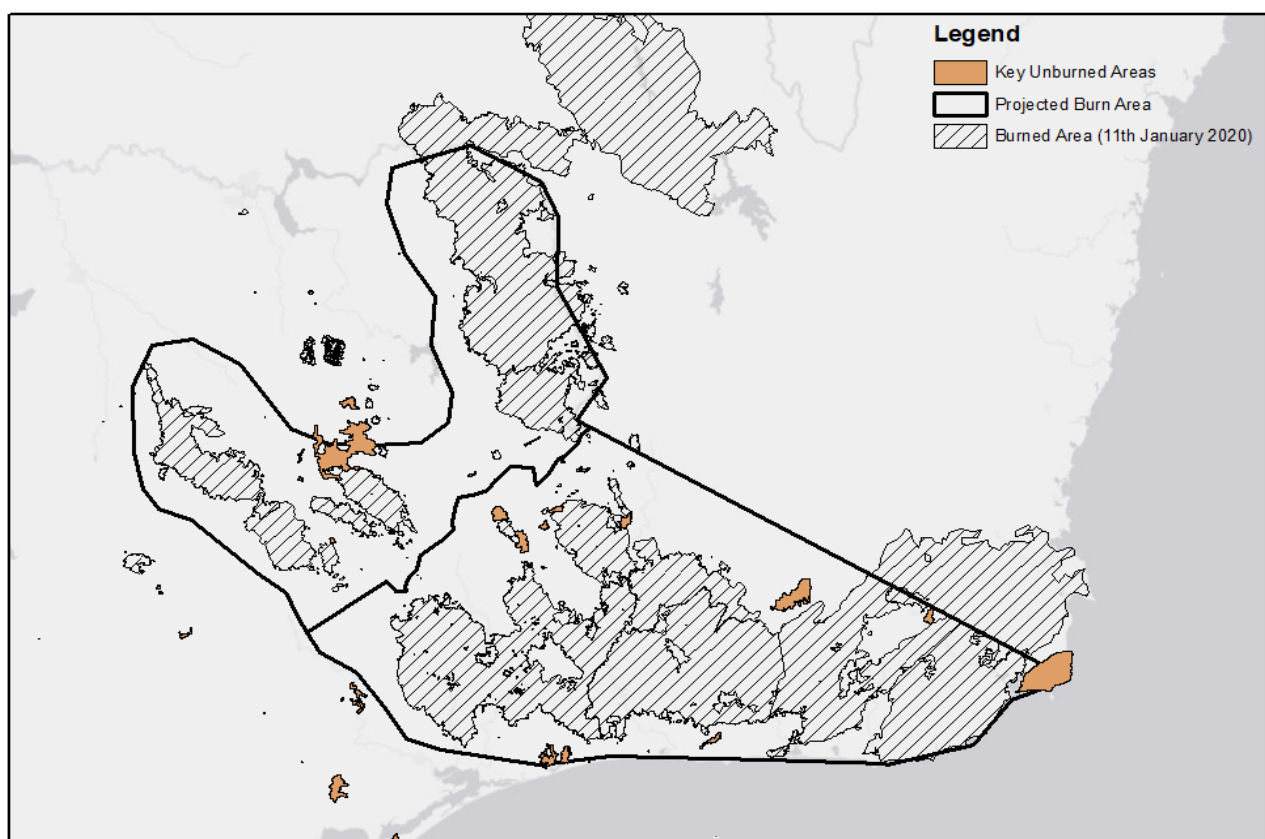


**Figure 10: Initial key unburnt areas of high biodiversity value for immediate protection**

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2  Refuges are places that promote species survival during times of stress. Refuges may reflect urgent and specific circumstances for protecting individual plants and animals, such as minimising further impact on residual or unburnt vegetation within or adjacent to the fire ground (immediate refuges).  Refuges can also reflect longer-term and landscape-scale ecological circumstances for protecting and actively managing important populations across the range of each species (ecological refuges).  Identifying ecological refuges requires consideration of protective topographic or environmental features (including surrounding land use), risk-spreading for future disturbance events, and shifting species distributions and dynamic interactions.

**Intensified and sustained predator control within burnt and adjacent areas**

Invasive predators such as the red fox and feral cat are capable of exploiting burnt habitat as it provides favourable hunting conditions due to the removal of vegetation cover that prey would normally hide in. There are at least 47 species identified (e.g. Long-footed Potoroo, Brush-tailed Rock Wallaby, Long-nosed Potoroo) that have been impacted by the fire that will be at a greater risk of succumbing to predation by foxes and cats as a result. To address this, intensive predator control is required to reduce the heightened predation risk in the burnt area and adjacent unburnt refuges immediately post-fire as this is when prey are most vulnerable.

The DELWP decision support tool SMP provides an initial overview of the likely areas where intensive pest predator control will provide the greatest return on investment by benefiting the full range of species that may be vulnerable to predation (Figure 11). In addition, intensive predator control will be required at key local populations for species of immediate concern due to existing small population sizes (e.g. Brush-tailed Rock Wallaby, Eastern Bristlebird). Southern Ark—a landscape-scale fox control program in the East Gippsland burn extent—has been running for over a decade using regular ground baiting. Ideally this program would be intensified in the burn extent and around key refuges as soon as feasible, and intensive fox baiting expanded into new areas also burnt this season. When fire severity data are collated, DELWP will begin work to identify key unburnt areas and areas impacted by low severity fire that should be protected from future fire and may need intensive management (e.g. intensive invasive species management, protection from future fire).
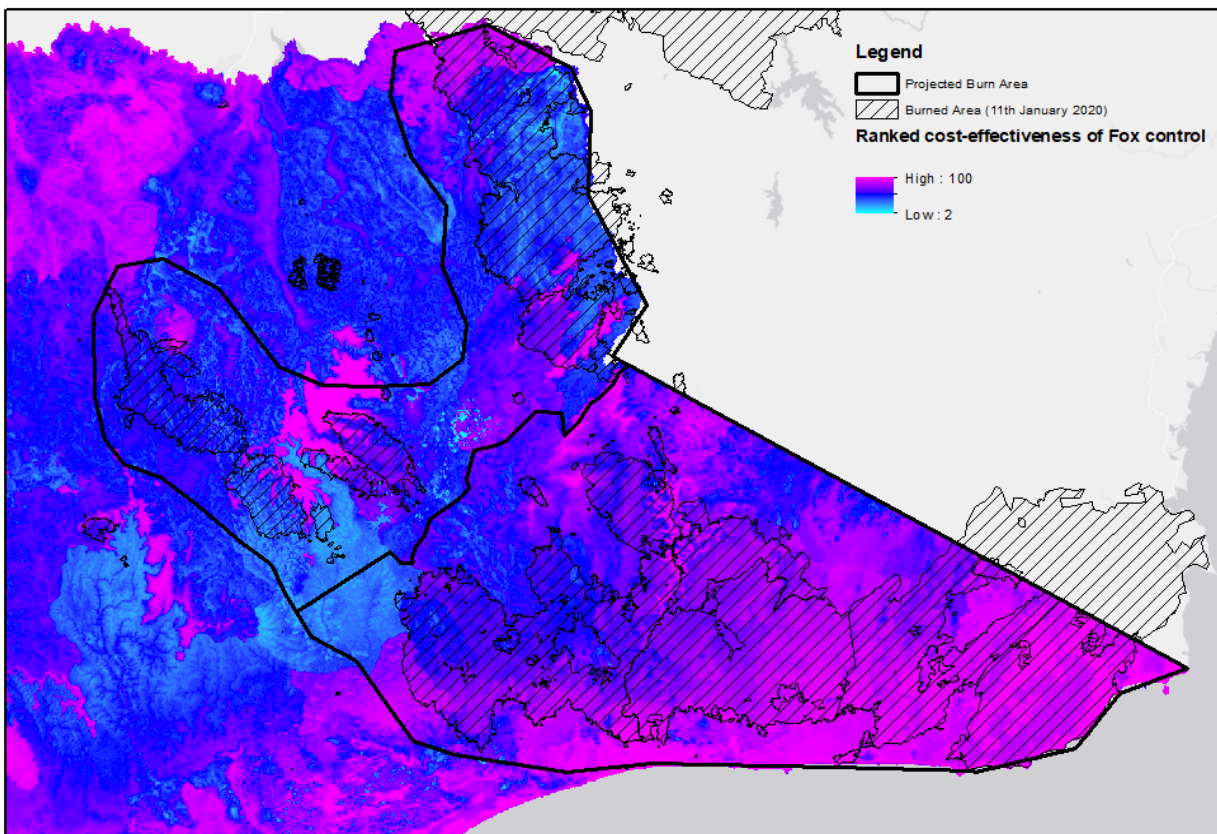


Figure 11: Indicative ranking of areas for implementing fox control according to relative cost-effectiveness. High values (100) indicate areas where fox control has a relatively higher return on investment compared with low values (0). Map output taken from Strategic Management Prospects v2.0 exposure draft.

**Intensified and sustained herbivore (deer, pig, horse) control within burnt and adjacent areas**

Large invasive herbivores such as deer, goats, pigs and horses are key threats across the burnt area and adjacent areas. Their effects are intensified in the post-fire landscape as they selectively eat new, recovering plant growth. Normally, controlling these invasive species is difficult throughout this region as the most effective method (aerial shooting) is ineffective in forest landscapes. The burnt area therefore presents a new and time-limited opportunity to implement landscape-scale control for these species in areas where control

was previously not possible. The DELWP decision support tool SMP provides an initial overview of the likely areas where intensive pest herbivore control will provide the greatest return on investment by benefiting the full range of species that may be vulnerable to herbivory (e.g. Figure 12).

Intensive and sustained herbivore control within the burnt area and adjacent unburnt refuges has been identified as a key action for immediate implementation that would benefit at least 23 fauna species, as well as important vegetation communities such as rainforest and alpine bogs. Through the workshop, experts identified this action as key to the post-fire recovery for a range of species of immediate concern.
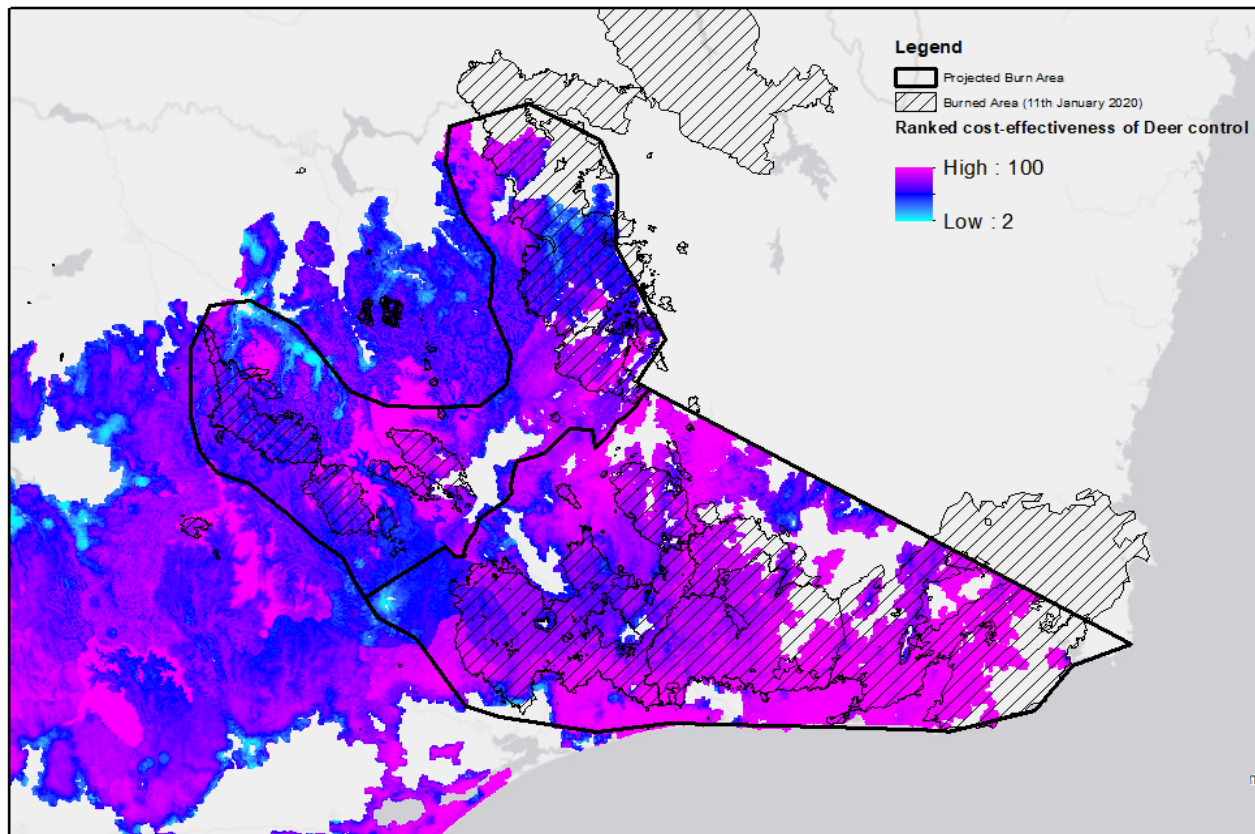


**Figure 12: Indicative ranking of areas for implementing deer control according to relative cost-effectiveness. High values (100) indicate areas where deer control has a relatively higher return on investment compared with low values (0). Map output taken from Strategic Management Prospects v2.0 exposure draft.**

**Emergency extraction, ex situ management and translocation of critical flora and fauna species**

Some species of immediate concern are particularly vulnerable to severe fire and the post-fire landscape, to the point where short-term survival of populations is highly uncertain. Mostly, this applies to species with small population sizes and restricted distributions. Therefore, immediate extraction or translocation of individuals out of the burnt area or potentially burnt area may be required to ensure the persistence of species in Victoria. A range of species were identified for which this will likely be necessary.

For example, native freshwater fish such as Victoria's highly range-restricted galaxiid species, are highly sensitive to the impact fires can have on water quality in streams due to increased sedimentation and pollution from ash into waterways. Due to the highly restricted distribution of some species, and because fire has impacted the entire range of some species (e.g. East Gippsland Galaxias) there is a real and immediate risk that post-fire sediment flow will lead to extinction. Temporary extraction of individuals into aquaria is therefore required to ensure the survival of some species. This process was achieved successfully following the 2009 Black Saturday fires and is a proven viable action.

Similar actions will likely be required for a range of critical terrestrial fauna species that have had large proportions of their distribution impacted, including Eastern Bristlebird, Long-footed Potoroo, Brush-tailed Rock Wallaby and some amphibians and reptiles. This may involve short-term holding of insurance populations for re-release once habitat has recovered or translocation out of burnt areas into unburnt areas of suitable habitat. By building populations that are geographically isolated (including in captivity), the risk of

an extinction event caused by a single fire in the future will be reduced. These actions will be informed by models of the known distributions of species (e.g. Figure 13 and 14) and expert advice on where key populations remain.

To prevent large-scale ecosystem change in areas impacted by multiple burns since 2000, collection of seed and subsequent aerial re-seeding will likely be required to initiate forest regeneration within the burnt extent. This will require large-scale aerial re-seeding of Alpine Ash to initiate forest regeneration. Fire severity mapping and on-ground assessment will assist to target where this is most needed.
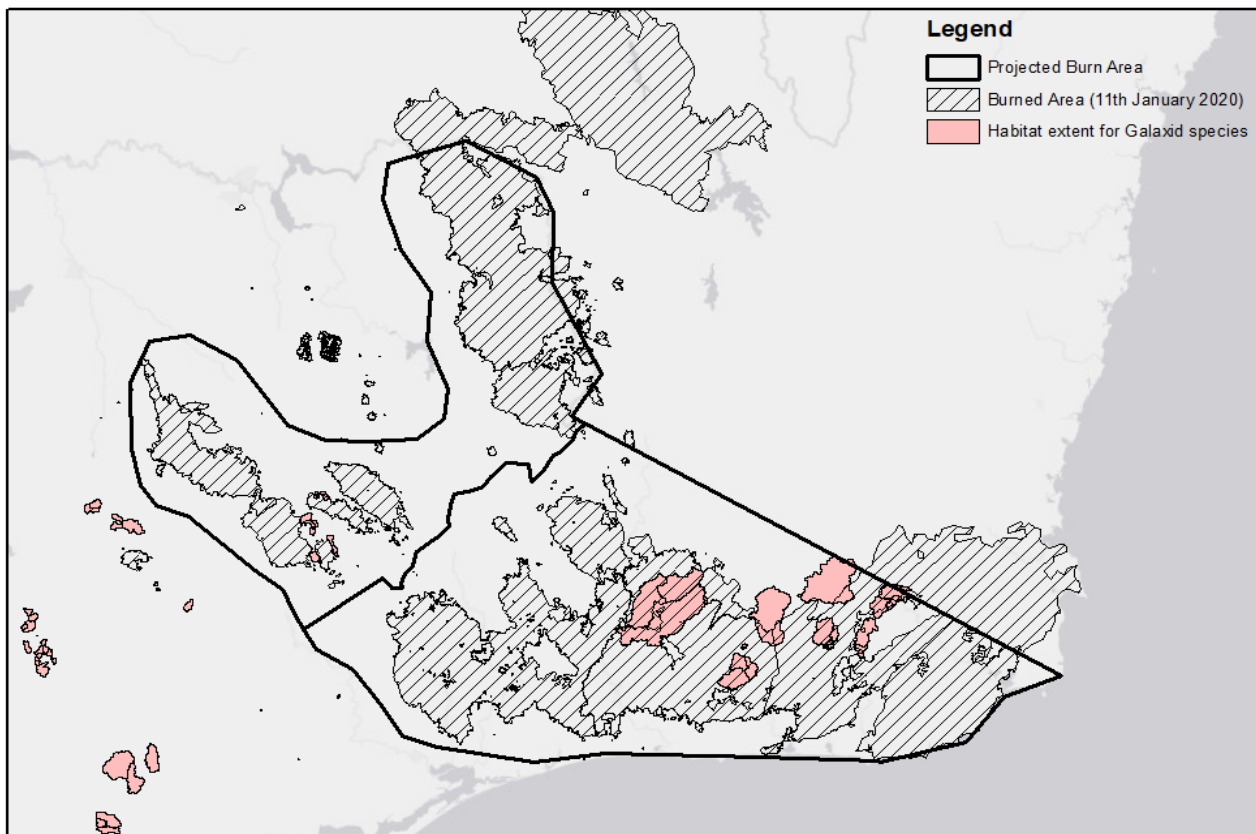


**Figure 13: Likely habitat extent for endemic freshwater galaxiid species across Eastern Victoria. Each polygon shows the habitat extent a different galaxiid species. Key galaxiid species within the burn extent that may require immediate extraction include the Yalmy Galaxias, East Gippsland Galaxias, Roundsnout Galaxias and McDowell's Galaxias.**

**Immediate reconnaissance of critical species to inform status following fire**

A selection of species of immediate concern were identified as requiring immediate reconnaissance of the status of key populations post-fire. This is particularly focused on species that have had all known populations burnt and their current status is unknown (e.g. *Lastreopsis decomposita*), or species that have had key populations within the burnt extent (e.g. Long-footed Potoroo, Greater Glider, Glossy Black Cockatoo), but the actual impacts are unknown. In addition, fire sensitive vegetation communities such as rainforest and double/triple burnt Alpine Ash (*E. delegatensis*) forest will require immediate reconnaissance to determine their status and what actions may be feasible post-fire (e.g. regeneration activities).
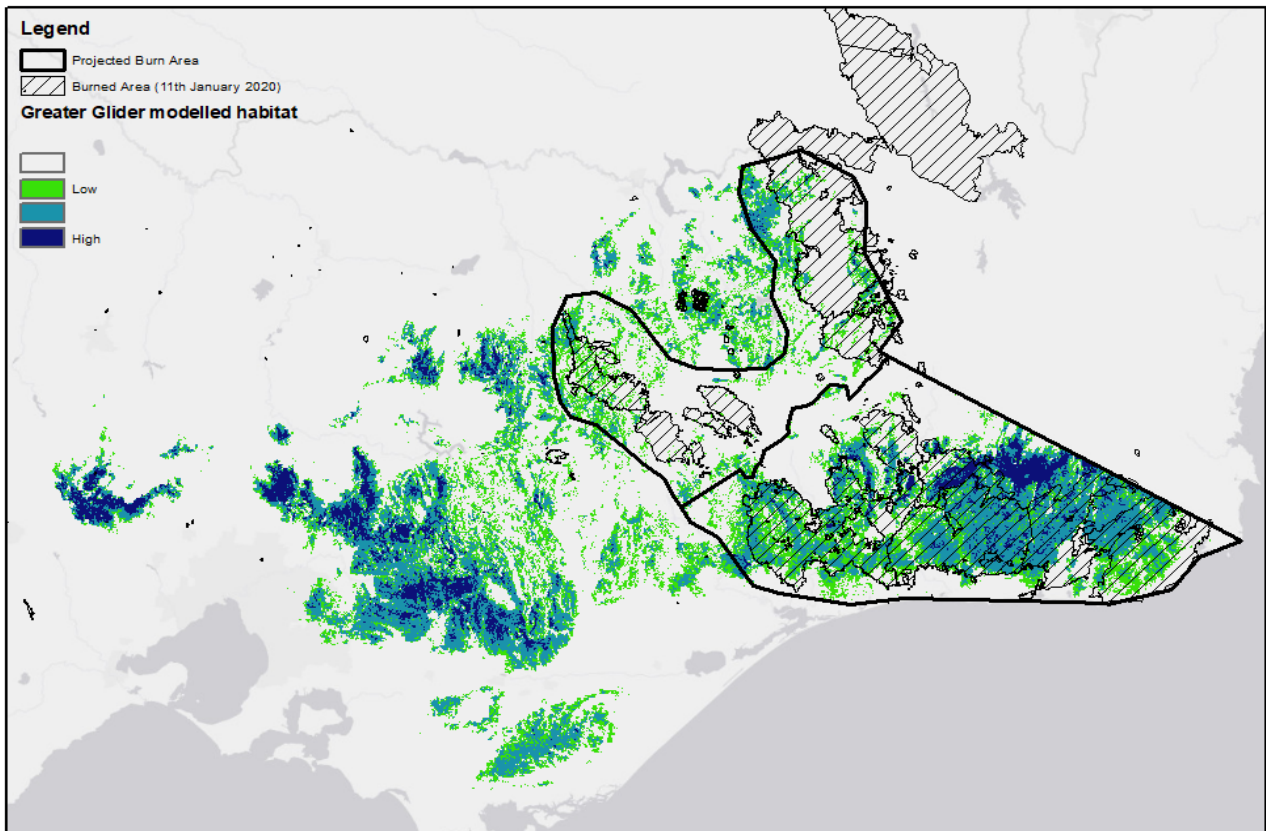
**Figure 14: Modelled habitat distribution for Greater Glider in eastern Victoria. Darker colours indicate areas of relatively higher habitat suitability compared to lighter colours. This model could help guide on-ground survey and assessment to understand post-fire recovery of the species.**
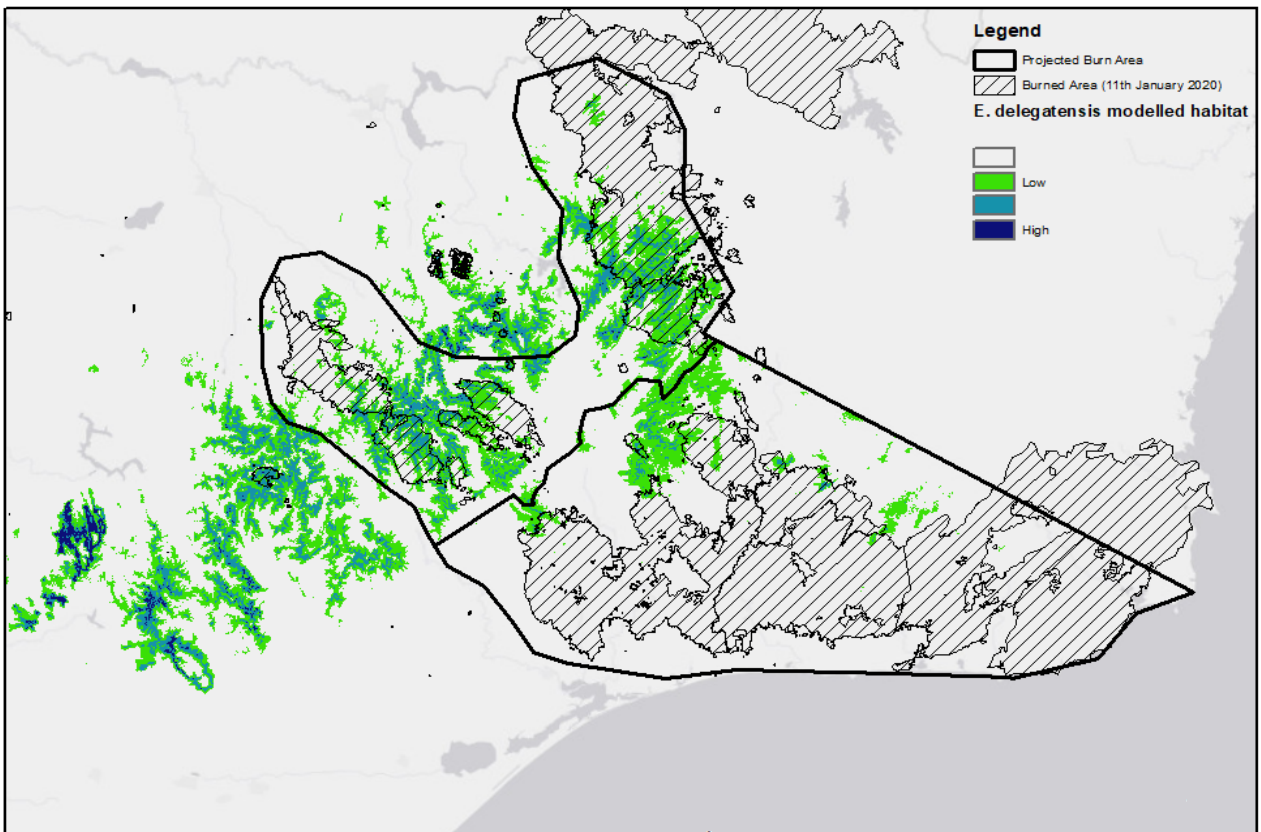


**Figure 15: Modelled habitat distribution for Alpine Ash (*Eucalyptus delegatensis*) in eastern Victoria. Darker colours indicate areas of relatively higher habitat suitability compared to lighter colours. This model could help guide seed collection and on-ground assessment for post-fire recovery of the species.**

# Appendix One – General species impact in current fire extent

Table 15. General species impacts within the **current fire extent** (spilt via broad taxon).

| Taxon Type | Over 95% | 50% or more | 20% or more |
|---|---|---|---|
| Mammals | 0 | 2 | 22 |
| EPBC | 0 | 1 | 7 |
| FFG | 0 | 1 | 8 |
| VROT | 0 | 1 | 10 |
| Birds | 0 | 5 | 31 |
| EPBC | 0 | 0 | 1 |
| FFG | 0 | 2 | 8 |
| VROT | 0 | 2 | 9 |
| Reptiles | 0 | 2 | 16 |
| EPBC | 0 | 0 | 0 |
| FFG | 0 | 2 | 3 |
| VROT | 0 | 2 | 3 |
| Amphibians | 0 | 6 | 15 |
| EPBC | 0 | 2 | 5 |
| FFG | 0 | 2 | 5 |
| VROT | 0 | 4 | 10 |
| Aquatic Fauna | 1 | 2 | 3 |
| EPBC | 0 | 0 | 0 |
| FFG | 1 | 1 | 2 |
| VROT | 1 | 2 | 3 |
| Flora | 4 | 168 | 689 |
| EPBC | 0 | 10 | 19 |
| FFG | 1 | 18 | 48 |
| VROT | 4 | 162 | 397 |

# Appendix Two – General species impact in potential impact area

Table 16. General species impacts within the **potential impact area** (spilt via broad taxon).

| Taxon Type | Over 95% | 50% or more | 20% or more |
|---|---|---|---|
| Mammals | 2 | 9 | 40 |
|     EPBC | 2 | 5 | 10 |
|     FFG | 2 | 6 | 13 |
|     VROT | 2 | 6 | 16 |
| Birds | 3 | 14 | 75 |
|     EPBC | 0 | 1 | 1 |
|     FFG | 2 | 5 | 9 |
|     VROT | 2 | 5 | 12 |
| Reptiles | 2 | 11 | 35 |
|     EPBC | 0 | 2 | 2 |
|     FFG | 2 | 6 | 7 |
|     VROT | 2 | 6 | 10 |
| Amphibians | 4 | 12 | 22 |
|     EPBC | 2 | 4 | 7 |
|     FFG | 2 | 3 | 7 |
|     VROT | 3 | 8 | 12 |
| Aquatic Fauna | 1 | 2 | 3 |
|     EPBC | 0 | 0 | 0 |
|     FFG | 1 | 1 | 2 |
|     VROT | 1 | 2 | 3 |
| Flora | 235 | 796 | 1489 |
|     EPBC | 16 | 24 | 30 |
|     FFG | 34 | 62 | 78 |
|     VROT | 234 | 516 | 640 |

# Appendix Three – Species-specific responses examples

Below are examples of species that are typical of a range of syndromes observed. The strategies listed in each example are for demonstration purposes only are may vary when an appropriate analysis has occurred, and experts are consulted.

## Long-footed Potoroo

62% of habitat is within the current fire extent and a large amount of remaining habitat is at risk of burning. The species is vulnerable to predation by both foxes and cats and has a high genetic risk index. There is no ex-situ population of this species.

Table 17. Strategy of actions to support the recovery of small mammals of immediate concern (i.e. Long-footed Potoroo)

| Hazard | Actions | Immediate response | Short term | Medium term | Long term |
|---|---|---|---|---|---|
| Loss of critical habitat | Emergency extraction of individuals from burnt area | ███ | ███ | | |
| | Create artificial hollows/ nest boxes | | ░░░ | ░░░ | ░░░ |
| Increased Predation pressure/ effectiveness | Intensified and sustained predator control within burnt and adjacent areas | ███ | ███ | ░░░ | ░░░ |
| | Fence local populations | ███ | ███ | ░░░ | ░░░ |
| Small population size effects (inbreeding depression, vulnerability to localised disturbances) | Translocation of critical fauna populations | | | ░░░ | ░░░ |
| Change in importance of other populations | Protection of unburnt habitat | ███ | ███ | ░░░ | ░░░ |

## Galaxiids

A number of Galaxiid species have been impacted, including Yalmy Galaxias (95% of habitat distribution in the current fire extent), East Gippsland Galaxias (100% of potential habitat extent burnt) and Roundsnout Galaxias (38% of potential habitat extent burnt, and remainder in projected burnt area). All populations will be significantly impacted by reduced water quality after rain events.

**Table 18. Strategy of actions to support the recovery of galaxiid species of immediate concern**

| Hazard | Actions | Immediate response | Short term | Medium term | Long term |
|---|---|---|---|---|---|
| *Loss of critical habitat features* | Emergency extraction of critical fauna for ongoing conservation | X | | | |
| | Establish and/or maintain captive fauna populations | X | X | X | X |
| | Protect and manage key unburnt areas and populations | X | X | X | X |
| *Change in water quality* | Management of waterways and sedimentation | | X | X | X |
| *Increased Predation pressure/ effectiveness* | Intensified and sustained predator control within burnt and adjacent areas (trout) | X | X | X | X |
| *Small population size effects (inbreeding depression, vulnerability to localised disturbances)* | Translocation of critical fauna populations | | | X | X |
| | Monitoring of key populations and impact of management actions | | X | X | |

# Large Brown Tree Frog

53% of habitat distribution in the current fire extent and 81% in the potential impact area. Large Brown Tree Frog have a Very High genetic risk.

**Table 19. Strategy of actions for recovery of the Large Brown Tree Frog**

| Hazard | Actions | Immediate response | Short term | Medium term | Long term |
|---|---|---|---|---|---|
| Loss of critical habitat features | Emergency extraction of critical fauna for ongoing conservation | ■ | ■ | | |
| | Establish and/or maintain captive fauna populations | ■ | □ | □ | □ |
| | Protect and manage key unburnt areas and populations | ■ | ■ | □ | □ |
| | Immediate reconnaissance of critical species to inform status following fire | ■ | ■ | □ | □ |
| Change in water quality | Provide off-stream temporary ponds | □ | □ | □ | |
| Increased competition from pest herbivores | Intensified and sustained herbivore (deer, pig) control within burnt and adjacent areas | | | □ | □ |
| Small population size effects (inbreeding depression, vulnerability to localised disturbances) | Translocation of critical fauna populations | | | □ | □ |
| | Immediate reconnaissance of critical species to inform status following fire | | □ | □ | |
| Disease | Hygiene control in emergency response actions | ■ | ■ | □ | □ |
| | Protection of key areas without disease | ■ | ■ | □ | □ |

## Warm Temperate Rainforest

70% of mapped Warm Temperate Rainforest distribution is within the current fire extent. A key location of warm temperate rainforest is in an area with high potential to burn

Table 20. Strategy of actions in unburnt and burnt rainforest to support the recovery of Warm Temperate Rainforest

| Hazard | Actions | Immediate response | Short term | Medium term | Long term |
|---|---|---|---|---|---|
| **Burnt Rainforest** | | | | | |
| *Increased grazing pressure on plants* | Fence localised populations | ■ | ■ | | |
| *Increased grazing pressure on plants* | Intensified and sustained herbivore (deer, pig) control within burnt and adjacent areas | ■ | ■ | ▨ | ▨ |
| *Multiple short-interval burns* | Collection of seed and ex situ seed banking for key species | ■ | ■ | ▨ | ▨ |
| *Multiple short-interval burns* | Reseeding of vegetation communities in key locations | | | ▨ | ▨ |
| *Change in importance of other populations* | Protect and manage key unburnt areas (identify unburnt refuges) | ■ | ■ | ▨ | ▨ |
| **Unburnt Rainforest** | | | | | |
| *Multiple short-interval burns* | Collection of seed and ex situ seed banking for key species | ■ | ■ | ▨ | ▨ |
| *Change in importance of other populations* | Protect and manage key unburnt areas | | ▨ | ▨ | ▨ |
| *Change in importance of other populations* | Adjust priority for protection and management | | ▨ | ▨ | ▨ |

# Eastern Bristlebird

The Eastern Bristlebird has 42% of its Victorian range in the current fire extent, and 83% in the potential impact area. In addition to this, large amounts of the Eastern Bristlebird's range in New South Wales have also been burnt. The species has a very high genetic risk.

**Table 21. Strategy of actions to support the recovery of the Eastern Bristlebird**

| Hazard | Actions | Immediate response | Short term | Medium term | Long term |
|---|---|---|---|---|---|
| Loss of critical habitat features | Emergency extraction of critical fauna for ongoing conservation | � | ▓ | | |
| | Protect and manage key unburnt areas and populations | ▓ | ▓ | ░ | ░ |
| Increased competition from pest herbivores | Intensified and sustained herbivore (deer, pig) control within burnt and adjacent areas | | ▓ | ▓ | ░ |
| Increased Predation pressure/ effectiveness | Intensified and sustained predator control within burnt and adjacent areas | ▓ | ▓ | ░ | ░ |
| Small population size effects (inbreeding depression, vulnerability to localised disturbances) | Translocation of critical fauna populations | | | ░ | ░ |

# Appendix Four – First Biodiversity Bushfire Response Workshop

## Organisations represented at the workshop

Representatives from 21 organisations participated in the workshop. There were a number of other organisation who were unable to attend at short notice some of whom have sent through addition notes or information. DELWP will continue to work with the organisations to build a shared understanding around the impacts and potential response and recovery actions. The following organisations have contributed to date

Australian Wildlife Conservancy

Birdlife

Charles Darwin University

Charles Sturt University

Country Fire Authority

Deakin University

Department of Environment, Land, Water and Planning

DELWP Arthur Rylah Institute

Department of the Environment and Energy

La Trobe University

Melbourne University

Monash University

NSW Department of Planning, Industry and Environment

Parks Victoria

RMIT University

Royal Botanic Gardens Victoria

Taungurung Land & Waters Council

The University of Melbourne

Trust for Nature

Victorian National Parks Association

Zoos Victoria

## Workshop outline

On the 10th January 2020 the First Biodiversity Bushfire Response Workshop was held. The Workshop brought together conservation experts and managers to develop high priority species, actions and conservation strategies required for the recovery of species and ecological communities following the 2019/2020 Victorian fire season.

Experts initially considered the current and predicted fire impact zone, as at 9am 10th January 2020. This expected impact area was then split into two broad regions:

a) North East (comprising the Corryong and Alps fires)

b) East Gippsland (comprising the Mallacoota, Buchan and Snowy River complex fires)

Using a structured expert elicitation approach, in groups based on taxonomic expertise (Arboreal Mammals, Other Mammals, Birds, Reptiles, Amphibians, Freshwater species, Rainforest flora, and other flora), experts were asked to:

1. Identify the key plants, animals and vegetation communities that are of immediate concern

2. Identify the actions and overall response strategies required to assist the identified species recover post-fire, and for each action:

a) Estimate the likelihood each species would persist if no recovery actions were taken

b) Estimate the likelihood each species or entity would persist if each recovery action was undertaken

c) Estimate the social feasibility and the technical feasibility of each action

The key actions identified as necessary for immediate implementation were:

Identification and protection of key unburnt refuges within the fire extent

Intensive predator (fox and cat) control within the burnt area and adjacent refuges

Intensive herbivore (deer, goats, pigs, horses) control within the burnt area and adjacent refuges

On-ground assessment of key species and populations to guide short and medium-term post-fire action

Emergency extraction and/or translocation from the burnt area or projected burnt area for key species