



**Hon Amber-Jade Sanderson MLA**  
**Minister for Environment; Climate Action; Commerce**

Your Ref: A924675; Petition No. 29  
Our Ref: 76-06520

Hon Peter Foster MLC  
Chair  
Standing Committee on Environment and Public Affairs  
Parliament House  
4 Harvest Terrace  
WEST PERTH WA 6005

Dear Mr Foster

Thank you for your letter received in this office on 28 October 2021, regarding Petition No. 29 for an independent review of the Department of Biodiversity, Conservation and Attractions' (DBCA) prescribed burning program.

Please find attached the requested information, and additional context that addresses concerns of the petition. I appreciate the opportunity to provide further information regarding DBCA's prescribed burning practices. I would like to reiterate that the McGowan Government remains committed to the use of prescribed burning as the primary means of reducing combustible fuel, and therefore the risk of bushfire to our community and the environment. The Government has the responsibility of balancing the impacts of prescribed burning on biodiversity against the need to protect our communities from the damaging impacts of bushfires.

I would also like to extend the opportunity of a field visit to the Standing Committee members, to view proposed and recent prescribed burns undertaken by DBCA to provide further insight. Should the committee wish to undertake a field visit, please advise my office to enable arrangements to be made.

Kind regards

HON AMBER-JADE SANDERSON MLA  
MINISTER FOR ENVIRONMENT

18 NOV 2021

Att

## Department of Biodiversity, Conservation and Attractions response to submission

Bushfire is a frequent occurrence in Western Australia with more than 93 per cent of land designated as fire prone by the Western Australian Department of Fire and Emergency Services (DFES). While Western Australia has not suffered loss and devastation of the same scale as the eastern states in recent years, the Wooroloo Bushfire in early 2021 demonstrated the risk associated with reduced bushfire mitigation undertaken at a local landowner scale to people, community, and the environment. The scale of bushfires in Western Australia over the past five years varied from large landscape fires more than 1 million hectares in savannas of the north-west and the vast deserts of the arid interior of Western Australia, to smaller bushfires ranging from less than a hectare to approximately 40,000 hectares in the forest, agricultural and urban bushland areas. Severe bushfires across Western Australia have resulted in loss of life, damage to critical infrastructure, and significant long-term impacts on communities and the environment.

The Department of Biodiversity, Conservation and Attractions (DBCA) is the lead agency responsible for conserving Western Australia's native flora, fauna and natural ecosystems, and many of its unique landscapes. Under the *Conservation and Land Management Act 1984* (CALM Act), DBCA is responsible for preventing, managing and controlling fire on approximately 26.9 million hectares of land, including national parks, conservation parks, regional parks, State forests, timber reserves and nature reserves.

Fire management, whether for community protection or biodiversity conservation, is a key responsibility of DBCA on lands for which it has statutory management responsibility under the CALM Act. In 2003, DBCA was also given responsibility for mitigation activities including, but not limited to, prescribed burning, and the mechanical construction and maintenance of boundary and internal fire trails and fuel reduced buffers, for a further 91.4 million hectares of unallocated Crown land and unmanaged reserves outside townsites and across the State.

DBCA maintains the largest paid frontline firefighter workforce (approximately 320 staff) in regional Western Australia and supports DFES and local government in suppressing bushfires across the State. In addition to the 320 frontline fighters, DBCA has approximately 100 dedicated fire management staff, and an additional 500 staff that participate in fire management activities in addition to their core role through other bushfire response rosters. DBCA staff also make up approximately 50 per cent of the staff involved in the four State Interagency Bushfire Pre-Formed teams.

In Western Australia, long standing bi-partisan political support has been critical in the continuation of a landscape-scale prescribed burning program that has spanned over 60 years.

The extent of prescribed burning undertaken over the past 60 years in south-west Western Australia has enabled land managers to achieve a high level of protection for community assets, and natural values on and near the lands managed by DBCA. There have been a number of examples where DBCA's prescribed burning program has resulted in the rapid containment of bushfires, even under extreme fire weather conditions. Examples include containing the spread of the Waroona bushfire on the northern side as it moved toward Dwellingup, moderating the rate of spread of the recent Yanchep bushfire as it moved north enabling emergency services to protect two subdivisions from impact, the large number of lightning strikes that occurred at the same time as the Waroona bushfire but were contained due to surrounding low fuel areas and a deliberately lit bushfire along Albany Highway near Dwellingup in 2017. This operational evidence observed by land managers who are directly involved in fire management operations, reinforces the value of fuel reduced areas in reducing the intensity of bushfires, and in providing safe conditions to apply effective bushfire suppression tactics.

A large body of scientific and experiential evidence of the effectiveness of prescribed burning in reducing the intensity and damage from bushfires exists for Western Australia (Boer *et al.* 2009<sup>i</sup>;



Burrows and McCaw 2013<sup>ii</sup>; Cheney 2010<sup>iii</sup>; Gould *et al.* 2007<sup>iv</sup>; McCaw 2013<sup>v</sup>; McCaw *et al.* 2008<sup>vi</sup>; Sneeuwjagt 2008<sup>vii</sup>). Research (Boer *et al.* 2009) also demonstrates that the beneficial effect of prescribed burning on the incidence and extent of unplanned fires in south-west forests continues for around six years, with work undertaken by McCaw *et al.* (2008) suggesting that lightning ignitions are less likely to develop rapidly or to exhibit uncontrollable fire intensity in young fuels.

The Western Australian experience, supported by Boer *et al.* 2009, indicates that in order to restrict the extent of bushfires impacting less than one per cent of the landscape each year, the proportion of the landscape that needs to be fuel reduced is between seven to nine per cent per annum. In the case of south-west Western Australia, the annual prescribed burning target of approximately 200,000 hectares, which equates to about eight per cent of the DBCA-managed estate, is likely to result in an average bushfire extent of less than about 25,000 hectares per year (or about one per cent) and more importantly, to significantly reduce loss of life and property and reduced environmental damage.

### **Prescribed burning across the landscape**

It is important to undertake prescribed burning across the landscape for the following reasons:

- Large bushfires that develop away from urban or settled areas can spread rapidly towards urban areas, and if they are burning in long unburnt vegetation, they can be difficult or impossible to control.
- Managing fuels in the broader landscape away from private property helps mitigate the impacts of bushfires on infrastructure corridors of economic and public safety significance (powerlines, highways etc.), biodiversity, recreational, water catchment and other values.
- Large intense bushfires can have devastating effects on biodiversity:
  - More than three quarters of quokka subpopulations known to be present within the 2015 O'Sullivan (Northcliffe) bushfire area were lost in this single event. The subpopulations that survived were in locations that burnt under less intense conditions, either mildly at night, as part of a back burn used to stop the fire, or in habitat that for some other reason did not burn as intensely.
  - Banksia tree survival and seed production (a critical food source for endangered Carnaby's black cockatoo) is lower following higher intensity bushfires compared to low intensity prescribed burns.
  - Native forests were significantly damaged as a result of severe fire behaviour associated with long unburnt vegetation in the O'Sullivan, Lower Hotham and Waroona fires. Some areas in the affected forests will take many decades to recover their structure.
- Maintaining low fuel levels in the broader landscape is also important for allowing fire sensitive ecosystems, such as western ground parrot habitat, riparian zones, peat swamps and rock outcrops, to function as refugia. The ability to retain these areas as unburned is significantly reduced in the event of intense summer bushfires.
- Fighting bushfires in long unburnt vegetation is dangerous, and often unsuccessful because of the extreme fire behaviour. In populated areas of the State, such as the south-west, the State Government cannot accept a 'let it burn' policy because fires left unchecked can become very large, and burn over long distances and long time spans, eventually impacting communities and other values. It is therefore critical to manage fuel build-up both near private property and in the broader landscape, and incumbent on private property owners to also manage fuel on their land.

DBCA maintains a network of Fire Exclusion Reference Areas (FERA) which assists with long-term monitoring and research, by providing representative long-unburned landscapes within the areas

in which they are located. FERA are generally areas that are greater than 10 to 20 years since last fire. These fixed locations are available for research activities, as points of reference for studies of fire-driven ecosystem change, and for education and training. The network is not designed as a conservation measure, but rather an opportunity to allow research.

### **Features of the DBCA fire management program**

- A new Bushfire Risk Management Framework (Howard *et al.* 2020)<sup>viii</sup> and strategy for DBCA-managed lands, guides the prioritisation of bushfire mitigation actions across the State through the development of Regional Fuel Management Plans for each of DBCA's nine regions. The Framework prioritises actions on the basis of proximity to settlements and infrastructure, vegetation type and the likelihood of a bushfire developing to an intensity that cannot be managed under elevated fire weather conditions, using State risk settings.
- Maintaining a consolidated Fire Science Program that is linked directly to land management and conservation responsibilities within DBCA that undertakes strategic research to inform fire management.
- The development of a process to produce a burn severity map for each prescribed burn across the south-west Bushfire Risk Management Zone allowing the assessment, reporting and recording of actual burn outcomes against individual burn objectives and associated success criteria, including actual burnt and unburnt data to provide detailed information associated with mosaics (an operation trial is being conducted this year in the three south west regions). Burn Severity Mapping compares pre-fire and post-fire vegetation structure/ecosystem condition and uses this to assign areas to a specific severity class. It aims to:
  - assess success of fuel reduction;
  - assess conservation efforts;
  - support accurate reporting and accountability;
  - refine operational decisions;
  - identify hazards; and
  - contextualise future fire research.

### **Looking to the future – identified work of importance to prescribed burning**

- Maintain and further develop capabilities for monitoring and evaluation through remote sensing technologies, to determine effectiveness and ecological impacts of planned burning. The tools will also be used to quantify the effects of unplanned fires which burn a sizeable area of DBCA-managed land each year, particularly in the more remote parts of Western Australia.
- Investigating interactions between fire management and climate change, and management actions that can be taken to adapt to changing conditions in the natural environment. Focal areas for research include managing fire in groundwater-dependent ecosystems with peat and organic soils in the drying environment of south-west Western Australia, and investigating how changes in seasonality may affect opportunities for regeneration and re-establishment of native plant species and communities.
- Continuing to better document and understand the implications of changing fire regimes, and varying management approaches for fire risk and environmental conservation.
- Ensuring the future platform for DBCA's prescribed burn planning and implementation systems is spatially enabled and supported by accurate datasets to assist in better end-to-end processes for identification, management and monitoring of biodiversity assets, better inform measurement and reporting on achievement of burn objectives and success criteria and to provide more timely and meaningful communication products for key stakeholder groups.
- Effective utilisation and operational delivery of research from Natural Hazards Research Australia (and from the former Bushfire Natural Hazards Cooperative Research Centre), and other external research providers. DBCA's Fire Science Program plays an important role in



evaluating new research and determining how new knowledge and products can be most effectively integrated into DBCA's operational fire program. This is facilitated through DBCA's internal Fire Research Engagement Group which includes representatives from Fire Management Services Branch, Fire Science Program and operational managers from regions throughout the State. New research products developed by the Bushfire and Natural Hazards Cooperative Research Centre currently under evaluation include the JASMIN soil moisture model, and the Pyrocumulonimbus Firepower Threshold diagnostic.

- Continued and proactive development of meaningful relationships with traditional owners through fire management activities for the continuation of Aboriginal cultural burning traditions, and connection to country.

## **Response to questions asked by the Standing Committee on Environment and Public Affairs**

### ***Practice of prescribed burns***

#### **1. The purpose of 'mosaic burns', and 'landscape scale burns' versus other types of burns, including cultural burns.**

**Please include advice on the evidence demonstrating the effectiveness of these types of prescribed burns and the department's interpretation and application of conflicting research.**

The Department of Biodiversity, Conservation and Attractions (DBCA) uses a range of methodologies to achieve a mosaic of burnt and unburnt areas at a landscape scale through the application of its prescribed burning program. The purpose of implementing prescribed burning at this scale is to provide a variety of vegetative stages across the landscape for ecosystem health, including different habitat requirements of species, and to reduce the risk of large-scale bushfires developing. Mosaics can be considered within burns (where patchy occurrence of fire or varying fire severity is considered), or across burns in a landscape (where patches have different times since last fire). DBCA aims to achieve both, through the implementation of individual burn plans, and more broadly through the development and delivery of a regional burn program.

Prescribed fire regimes can be varied to meet diverse community protection, environmental and cultural needs. While contemporary prescribed burning practices may differ from cultural burning practices, which focus on cultural values for Indigenous Australians and are often assumed to be patchy and low severity, increasing engagement between traditional owners and other land managers is building an understanding of the differences, and the opportunities to improve fire management practices through a partnership approach. Importantly, the two approaches are complementary, and share the common goal to look after people and country.

DBCA's prescribed burning program is built upon a foundation of sound evidence, and over 60 years of operational experience. DBCA recognises the importance of continuing to improve knowledge, and understanding of fire in a land management context. It is for this reason that DBCA maintains an active fire research program with a statewide focus building on knowledge gained over more than 60 years through long-term studies and monitoring. DBCA is Western Australia's largest employer of fire science researchers. The DBCA Fire Science Program employs eight research and technical staff devoted to assessing and understanding bushfire and burn program outcomes, fire behaviour, fire risk, fire ecology, and interactions of fire with biodiversity conservation and management. Program staff collaborate with researchers in allied science programs, regional ecologists and fire leaders elsewhere in DBCA, as well as with researchers in CSIRO, the Bureau of Meteorology, Department of Fire and Emergency Services and universities around Australia (Murdoch, ECU, UWA, UNSW, ANU, Notre Dame).

DBCA is aware of research that states alternate views regarding fire management in south-west forests. After review and consideration by DBCA scientists, external collaborators including CSIRO and professionals active within fire and land management, DBCA has determined that key elements of this research do not appropriately consider aspects relevant to south-west forests such as actual fuel accumulation patterns, documented relationships with fire behaviour, currently implemented policy frameworks, actual fire intervals and relevant fire interval thresholds. As such, these views relate to scenarios distant from the reality of management practices. Separate from this determination, DBCA acknowledges that there is always room for improvement in relation to the planning and delivery of fire management, including understanding response to climate change, integrating cultural benefits and in understanding interactions with ecological values and processes. As a learning organisation with a focus on adaptive management, DBCA invests in research and initiatives to support this approach. Examples of projects in this area include long-term studies



assessing impacts of varying fire regimes in jarrah forest (e.g., Burrows *et al.* 2019<sup>ix</sup>), the mosaic burning program in tropical Kimberley savannah country (e.g., Radford *et al.* 2020<sup>x</sup>) and varying fire interval effects on vegetation composition and fuel loads (e.g., Tangney *et al.* *subm.*<sup>xi</sup>), and fire severity on tree survival and food resources for threatened cockatoos in banksia woodlands (e.g., Densmore and Clingan 2019<sup>xii</sup>).

## **2. In relation to prescribed burning targets:**

### **What are the annual prescribed burning targets?**

DBCA aims to maintain at least 45 per cent of department-managed land in the south-west at less than six years since last burnt (whether by bushfire or planned burn), in order to manage bushfire risk. In the south-west from approximately Lancelin to Denmark, DBCA is responsible for managing approximately 2.5 million hectares of land. This equates to DBCA being responsible for the management of approximately 46 per cent of land within the south-west. The 45 per cent target means, DBCA plans to conduct prescribed burning on about eight per cent or approximately 200,000 hectares of the forested areas that DBCA manages in the south-west forest regions annually. Across the landscape this equates to an average return interval of approximately 12 years, although this can vary depending on a number of factors.

DBCA's fire management program has the dual aim of managing risk to people, assets and the environment from the damaging impacts of bushfire, and ensuring healthy ecosystems and the conservation of biodiversity values on the land it manages. In this context, DBCA's burn program and the 45 per cent target across the south-west forested regions, is spread across three land management zones (LMZs).

The LMZs were generated by identifying each of the populated areas within the south-west forest region, and then creating concentric circular zones at a set distance from the urban and forest interface. It is important to note, that these zones are not a prioritisation for burning and that there is no hierarchy of importance between them; achieving the performance criteria requires the completion of the target quantity of burning in each of the zones each year. The depth and area of each of these zones is defined by fire behaviour characteristics relevant to the zone purpose. Both the 45 per cent target, and the breakdown of the LMZs are reported publicly each year as part of DBCA's annual report.

While there are no formal targets set elsewhere across the state, DBCA Parks and Wildlife Service's Bushfire Risk Management Framework (the Framework), defines how much fuel needs to be managed to achieve an acceptable level of bushfire risk. The amount of fuel management required varies according to the type of vegetation, and the value of surrounding assets. The Framework applies scientific knowledge, state policy settings and expert judgement to determine the fuel management required statewide. This requirement is then integrated with biodiversity conservation, and other land management objectives to develop a fuel management program in each of the department's regions. DBCA is currently in the initial phase of implementing this Framework across the state.

### **How are these targets determined?**

The above target for the south-west is based on a combination of peer reviewed science, and decades of operational evidence. A 2009 study in the south-west forests undertaken by Dr Matthias Boer and others, examined the historical occurrence of bushfire and prescribed fire over a 50-year period to quantify the impact of prescribed burning on the incidence, extent and size distribution of bushfires. This study determined that prescribed fire treatments had a significant effect on bushfire up to six years after treatment. It also demonstrates that over the 52 years from 1953 to 2004, with peak activity in the 1960s and 1970s, prescribed burning of about eight per cent



of the landscape each year significantly reduced the incidence, and extent of unplanned bushfires. This evidence reinforces the importance of undertaking effective bushfire mitigation to reduce the devastating impacts of summer bushfires on the community, and the environment. The target also corresponds with the separately developed approach in the Framework for forest areas.

### **3. What review process occurs to measure the effectiveness of each prescribed burn?**

DBCA's prescribed burn program planning involves identifying a series of potential prescribed burns to achieve the targets set in the nine regional fuel management plans (from the Bushfire Risk Management Framework settings), and other land management objectives.

Burn program planning is the process of translating the strategic objectives for fire management in a district or region into a series of prescribed burns that will help achieve those objectives. Each prescribed burn has a range of objectives set during the planning phase of the burn.

Burn evaluations are completed by the DBCA district or region following burn implementation, and prior to each burn being closed against the burn objectives set during planning. A post-season review is also completed by the region after each year's burn program. Considerations made during the review process include:

- extent to which burns met their objectives;
- effect that bushfire had on the region's risk profile and land management requirements; and
- lessons that were learned during the planning and implementation of the burn program.

DBCA undertakes a prioritised approach to monitoring post-fire and implements a variety of actions based on adaptive management. For example, DBCA has undertaken monitoring of fire and other disturbances through programs such as ForestCheck and the Walpole Fire Mosaic project, as well as developing a ground-truthed process to undertake satellite-based burn severity mapping for prescribed burns.

### **4. Apart from prescribed burns, what methods are used in other global localities to mitigate and reduce the severity of bushfires?**

In other jurisdictions across Australia, prescribed fire remains a key element of bushfire mitigation, albeit at far lower percentages of total managed landscape. However, since the devastating Black Saturday bushfires occurred in Victoria in 2009, and other subsequent significant summer bushfires that have occurred since that time, there has been a much greater emphasis on bushfire mitigation and funding agencies to undertake this important work. Different jurisdictions employ different balances of locally specific risk mitigation versus broad hectare targets. In addition to prescribed fire, forest management and mechanical mitigation measures such as thinning, slashing, mulching, and rolling of vegetation have been used. However, measures such as mulching, and slashing are unlikely to be environmentally appropriate or effective at the scale required to mitigate against large bushfires running through heavily vegetated forest areas, and impacting on communities and/or infrastructure.

In other jurisdictions globally, the above methods are also used. Other mitigation methods used include:

- Grazing - this is not appropriate in the Western Australian context due to the potential environmental impacts, and high naturally occurring level of toxins in our flora that have a lethal impact on non-native herbivores such as sheep, goats and horses.
- Managed bushfire – this approach is used in remote parts of Western Australia, and in more isolated parts of the United States of America and Canada where the decision to fight a fire or leave it to burn out naturally is based on a hierarchy of priorities set by the government agency responsible for fire management where the fire is burning. This can also be used to achieve environmental outcomes.



- Reliance on aircraft suppression of bushfires - to be successful, this approach needs to be underpinned by bushfire mitigation activities and ground crews, and is typically only effective in suppressing bushfires when they are very small, and can also support active fire suppression strategies on the flanks and less intense areas of active bushfires. There is a common public misconception that suppression aircraft put large bushfires out, but this has been proven not to be the case in all jurisdictions across the globe.

### ***Impact of prescribed burns on threatened and endangered flora and fauna species***

#### **5. What impact has been recorded on threatened and endangered species of flora and fauna, including the loss of habitat and the impact on environmental ecosystem services?**

There is no evidence that low intensity, prescribed burning at five to seven-year intervals has long-term adverse effect on flora in south-west forests (see Burrows and Wardell-Johnson 2003<sup>xiii</sup> and Whittkhun *et al.* 2011<sup>xiv</sup>). With the exception of a number of species that grow in riparian zones and around rock outcrops, all southern forest understorey species for which there is data, reach maturity within three to five years of fire, with most reaching maturity within two-three years (Burrows *et al.* 2008<sup>xv</sup>). Current prescribed burn intervals and the approach to providing a mosaic of burnt and unburnt areas across the landscape, provide adequate time for replenishment of seed banks in forest ecosystems. For example, a study of *Banksia quercifolia*, an obligate seed species that is readily killed by fire and which occurs in the areas of the south-west, showed that it could persist under a regime of frequent low intensity fires because its habitat did not burn at every introduction of prescribed fire (Burrows and Middleton 2016<sup>xvi</sup>). On the other hand, it is extremely difficult to carry out patchy or mosaic burning in landscapes carrying long unburnt fuels.

Landscapes in which fire sensitive species and ecosystems, such as peatlands and rock outcrops, are embedded are best burnt when these landscapes are wet, and therefore when the landscape and critical habitat is unlikely to burn significantly. For a variety of reasons, the timing of burning is not always optimal and reignition can occur as the landscape dries. DBCA regions do consider the level of fuel moisture in preparing for prescribed burn implementation, to reduce the bushfire risk to peatlands and other fire sensitive elements of the landscape.

### ***Transparency***

#### **6. What transparency is provided to the public regarding the department's prescribed burning activities? Are there any public consultation processes? If yes, what methods are used and when does consultation occur?**

DBCA places the indicative annual prescribed burning program on the department's public website after it is corporately approved annually. This shows all areas that may have fire applied across the state within the financial year. The indicative annual program is larger than required to provide operational flexibility in the application of the program, under a range of climatic and weather conditions throughout the year.

Each DBCA district identifies possible issues with each of the proposed prescribed burns on the draft program. Consultation with external stakeholders is then undertaken at a state, regional and district level. For some industries, such as the apiary and wine grape growing industries, there are specific consultation processes in place.

Opportunities are provided for ongoing input and feedback from stakeholders, and the broader community or for them to seek more information at various stages of the burn program process. This communication is considered mutually beneficial because:

- officers may not have certain information about the burn environment;



- consultation may identify and fill knowledge gaps and ensure that planning is informed by the best available information;
- undertaking prescribed burning requires tacit community consent. The community needs to understand the reasons for, and risk inherent in, undertaking or not undertaking, the burn,
- stakeholders may need to change their behaviour to avoid the temporary effects of prescribed burns; and
- stakeholders may have outcomes they wish to achieve from prescribed burning which may be able to be incorporated to the burn program.

Methodologies utilised to conduct stakeholder engagement can include meetings, provision of information and maps, phone calls, emails, advertising, and mail notifications. Other actions that have been undertaken are presenting at community, stakeholder and industry meetings, inviting industry to present to DBCA staff and meetings with relevant Ministers and staff, as well as briefings to the Conservation and Parks Commission.

All immediate neighbours to DBCA-managed lands are notified well in advance of any proposed prescribed burns. Advice is provided to neighbours about the proposed burn including a map identifying the area of proposed ignition. Nearby, but non-neighbouring landholders, can be advised of a proposed burn by other means including letter drops, commercial radio announcements, electronic media and notices placed in local newspapers that reference the department's public website where the burn program is published.

DBCA routinely reports the outcomes of its annual prescribed burning program in its annual report.

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<sup>i</sup> Boer, M.M., Sadler, R.J., Wittkuhn, R.S., McCaw, L. and Grierson, F.P. 2009, Long-term impacts of prescribed burning on regional extent and incidence of wildfires – Evidence from 50 years of active fire management in SW Australian forests, *Forest Ecology and Management*, 259 (2009): 132-142.

<sup>ii</sup> Burrows, N. and McCaw, L. 2013, Prescribed burning in southwestern Australian forests, *Frontiers in Ecology and Environment*, 11 (online Issue 1): e25-e34, doi: 10.1890/120356.

<sup>iii</sup> Cheney, N.P. 2010, Fire behaviour during the Pickering Brook wildfire, January 2005 (Perth Hills Fires 71-80), *Conservation Science W. Aust.*, 7(3): 451-468 (2010).

<sup>iv</sup> Gould, J.S., McCaw, W.L., Cheney, N.P., Ellis, P.F., Knight, I.K. and Sullivan, A.L. 2007, *Fire in dry eucalypt forest fuel structure, fuel dynamics and fire behaviour*, Ensis-CSIRO, Canberra, and Department of Environment and Conservation, Perth.

<sup>v</sup> McCaw, L. 2013, Managing forest fuels using prescribed fire: A perspective from southern Australia, *Forest Ecology and Management*, 294: 217-224.

<sup>vi</sup> McCaw, W.L., Gould, J.S. and Cheney, N.P. 2008, Quantifying the effectiveness of fuel management in modifying wildfire behaviour, Paper presented at the 2009 AFAC Conference, Gold Coast, Australasian Fire Authorities Council and Bushfire Cooperative Research Centre, Melbourne.

<sup>vii</sup> Sneeuwjagt, R.J. 2008, Prescribed Burning: How effective is it in the control of large forest fires?, Paper presented at the 2008 AFAC - Bushfire CRC Conference, Adelaide, Australasian Fire Authorities Council and Bushfire Cooperative Research Centre, Melbourne.

<sup>viii</sup> Howard, T., Burrows, N., Smith, T., Daniel, G., & McCaw, L. 2020, A framework for prioritising prescribed burning on public land in Western Australia. *International Journal of Wildland Fire*. <https://doi.org/10.1071/WF19029>.

<sup>ix</sup> Burrows, N., Ward, B., Wills, A., Williams, M., and Cranfield, R. (2019) Fine-scale temporal turnover of jarrah forest understory vegetation assemblages is independent of fire regime. *Fire Ecology* 15.

<sup>x</sup> Radford, I. J., Woolley, L. A., Corey, B., Vigilante, T., Hatherley, E., Fairman, R., Carnes, K., Start, A. N., and Wunambal Gaambera Aboriginal, C. (2020) Prescribed burning benefits threatened mammals in northern Australia. *Biodiversity and Conservation* 29: 2985-3007.

<sup>xi</sup> Tangney R, Miller RG, Fontaine JB, Veber WP, Ruthrof KX and Miller BP. (submitted) Vegetation structure and fuel dynamics in fire-prone, Mediterranean-type Banksia woodlands. *Forest Ecology and Management*

<sup>xii</sup> Densmore, V. S., and Clingan, E. S. (2019) Prescribed burning in a mediterranean-climate region mitigates the disturbance by bushfire to a critical food resource for an endangered bird, the Carnaby's cockatoo. *Fire Ecology* 15: 36.

<sup>xiii</sup> Burrows, N. and Wardell-Johnson, G. (2003). "Fire and plant interactions in forested ecosystems of south-west Western Australia" in I Abbott and N Burrows (eds) *Fire in ecosystems of south-west Western Australia: Impacts and management*, pp. 225-268. Backhuys Publishers, Leiden, The Netherlands.

<sup>xiv</sup> Wittkuhn, R.S., McCaw, L., Wills, A.J., Robinson, R., Andersen, A.N., Van Heurck, P., Farr, J., Liddelow, G., and Cranfield, R. (2011). 'Variation in fire interval sequence has minimal effects on species richness and composition in fire-prone landscapes of south-west Western Australia', *Forest Ecology and Management*, vol. 261, no. 6, pp. 965-978.

<sup>xv</sup> Burrows, N.D., Wardell-Johnson, G., and Ward, B. (2008). 'Post-fire juvenile period of plants in south-west Australia forests and implications for fire management', *Journal of the Royal Society of Western Australia*, vol. 91, pp. 163-174.



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<sup>xvi</sup> Burrows, N. and Middleton, T. (2016). 'Mechanisms enabling a fire sensitive plant to survive frequent fires in south-west Australian eucalypt forests', *Fire Ecology*, vol. 12, no. 1, pp. 26-40.