ICONS TO ASHES

HOW GIANT TREES, WILDLIFE, AND ANCIENT ECOLOGY OF THE WALPOLE WILDERNESS AREA ARE BEING DESTROYED BY PRESCRIBED BURNING

ACKNOWLEDGEMENT OF COUNTRY

We pay our respects to the Noongar people, to the Elders past, present and emerging, and acknowledge that sovereignty was never ceded. This always was, and always will be Noongar land.
We acknowledge the land, ecosystems and species on which this report is based upon are part of the Noongar country of the Pibulmun and Menang people.
We recognise they are part of a continuing culture with obligations of custodianship to the land upon which we visit, live, explore and research. We thank them and their ancestors for their care of country and for sharing their invaluable traditional knowledge and experiences with us.
We appreciate our friendships and the way we walk on country together to protect it.

AUTHORSHIP AND ACKNOWLEDGEMENT

This report was written collaboratively by members of Fire and Biodiversity Western Australia (FaBWA) and the Denmark Environment Centre Inc. April, 2023.

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Front cover:
Top inset and inside front cover: Red tingle forest, Walpole block, Gully Road, Frankland District, WA.
Lower inset: Severely damaged jarrah-marri forest in escaped prescribed burn FRK 092, Mitchell block, Thomson Road, Frankland District, WA.
Background and back cover: Jarrah-marri forest defoliated after prescribed burn FRK 092, Roe block, Roe Road, near Mt Roe, Frankland District, WA.

Inside back cover: Burnt and collapsed red tingle trees, Swarbrick (Tingleview) blocks, Jones Road, Frankland District, WA.

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Opening statement

The Walpole Wilderness Area (WWA) is one of Western Australia's natural wonders. Among its marvels are tingle and karri, some of the largest trees in the world, charismatic red-flowering gums with an international following, threatened wildlife including black cockatoos and mainland quokkas, and super-diverse ancient peatlands hosting relictual plant species that date back to Gondwanan times.

This report presents alarming findings from a series of ecological field trips by local conservationists and scientists to the WWA. It demonstrates how the natural icons and tourist attractions are under significant pressure from frequent prescribed burning, and how current burning practices are increasing the threat of wildfire to local communities. Fire regimes that cause declines in biodiversity are recognised as a key threatening process under Australian legislation[1].

As we continue to witness further damaging and risky burns, we see an urgent need for an independent review of prescribed burning practices. An immediate moratorium is recommended on burning red tingle forest, red-flowering gum and peatland habitats within the WWA. If such action is not taken, we risk irreversible degradation and severe population declines of these unique species and ecosystems.

[1] DAWE, 2022, *Fire regimes that cause declines in biodiversity as a key threatening process.* Department of Agriculture, Water and the Environment, Canberra, April. CC BY 4.0

Contents

Executive summary

The Walpole Wilderness Area (WWA) consists of a group of conservation reserves totalling 377,714 hectares of some of the most ecologically rich and unique areas on Earth. The concept was developed by the local community in 1998 to incorporate these reserves into a single integrated conservation reserve for nature conservation and was adopted by the WA Labor Government as an election commitment in 2001.

This report documents the findings of a series of ecological field trips into the biological heart of the WWA from January to December 2022. The focus of this exercise was to gain an understanding of how current fire and prescribed burning practices are affecting the ecological values of the area.

The field trips involved local conservationists, landowners, scientists, and members of community conservation organisations including Fire and Biodiversity Western Australia (FaBWA), the Walpole-Nornalup National Park Association (WNNPA) and the Western Australian Forest Alliance (WAFA). Several of the scientists involved have been researching and surveying the astonishing plants and wildlife in the region for decades. Consultation also occurred with the Frankland District Department of Biodiversity, Conservation and Attractions (DBCA) staff.

The findings are alarming and show that current fire management practices are having a profoundly detrimental impact on the ecology of the region and are placing our environmental icons at risk of irreversible degradation and driving species and ecosystem declines. Furthermore, recently observed intense prescribed fires are increasing the likelihood of cycles of more damaging bushfires, putting communities and our biodiversity at risk.

This report focuses on four key indicators of fire and management impact within the WWA:

- **The giant tingle trees** — Western Australia's unique forest giants rivalling California's giant redwoods.
- **The quokka (*Setonix brachyurus*)** — the vulnerable mainland population of Western Australia's iconic marsupial.
- **The red-flowering gum (*Corymbia ficifolia*)** — the charismatic tree with a tiny home and a global following.
- **The peatlands** — the mysterious and super-diverse wetlands that store carbon and provide a refuge for ancient and threatened species.

The report also documents how current prescribed burning is:

- **Detrimentally impacting the unique ecology** of the WWA at a landscape and ecosystem scale and failing to comply with the statutory Management Plan.
- **Increasing the threat of bushfire** to communities and private property adjoining the WWA.

To conclude, the report provides several recommendations for how the issues presented here can be addressed.

Maximum area, perverse outcomes

Prescribed burning in the Walpole Wilderness Area

The aim of the current WA prescribed burning policy and practices is to conduct prescribed burning over at least 200,000 hectares per year within the Forest Management Plan area and to maintain the age of fuel loads to less than 6 years in at least 45% of the landscape[2]. The Forest Management Plan area is approximately 2.2 million hectares and incorporates the Swan, South West and Warren Regions.

This policy means that prescribed burning operations in the WWA involve burning very large areas of 5,000 to 15,000 hectares or more in a single operation. This is mainly undertaken using incendiary devices dropped from aircraft to rapidly achieve complete or near complete burns over the majority of the burn area, after edge-burning along boundary tracks. The remote and vast nature of much of the WWA has made it a target for these relatively low-cost 'easy hectares'.

All of this leads to a perverse outcome driving fire regimes that often cause devastating environmental impacts and a greater risk of losing control of burns due to their large size and lengthy residence time in the landscape. Significant resources are required for follow-up work to achieve burn security.

This large-scale burning regime has severe ecological impacts both at a landscape and ecosystem scale and on individual species and is not consistent with the statutory Management Plan for the WWA. The WWA contains multiple ecosystem types, including old growth tingle and karri forests, jarrah forest, banksia woodland, shrubland, granite outcrops, waterways, wetlands and peatlands. While some species and ecosystems can tolerate frequent fire, others are much more fire-sensitive and are detrimentally impacted by the current imposed fire regime. This results in large areas of uniform fire age, rather than meeting the objective of a mosaic of fire ages as stated in the Management Plan.

[2]. *DBCA Annual report 2020-2021*: Service 9 | Department of Biodiversity, Conservation and Attractions (dbca.wa.gov.au)

This imposed fire regime has particularly severe impacts on wildlife in the WWA as the scale and method of aerial ignition leaves very little time or escape routes for animals to avoid the fires or smoke inhalation, particularly for nesting animals and less mobile species. Post-burn on-ground monitoring by scientists, wildlife carers and community members repeatedly confirms that fauna is being killed and injured as a direct result of prescribed burns.

A lack of compliance

The Statutory guiding document for DBCA's management activities in the WWA is the 2008 Walpole Wilderness and Adjacent Parks and Reserves Management Plan[3].

The Management Plan contains a number of requirements and Key Performance Indicators (KPIs) for DBCA, some of which relate to prescribed burning:

- The establishment of representative Fire Exclusion Reference Areas (FERAs) for each Landscape Management Unit.
- The development and publishing of specific Fire Management Guidelines for protecting and conserving significant habitats such as grasslands, coastal dune and heath vegetation, wetlands (including peat swamps), riparian zones, granite outcrops and tingle and red-flowering gum forests.
- The achievement of a diversity of fire ages within each Landscape Management Unit.

DBCA has failed to comply with many of these requirements and as a result the KPIs relating to fire management and biodiversity conservation in the Management Plan have not been met. For more detail on non-compliance with the Management Plan see Appendix 1.

A lack of research, monitoring and evaluation

Without long-term research, monitoring and evaluation to understand how repeated cycles of prescribed burning and other fires are impacting the condition, structure, function and composition of species and ecosystems over time, it is not possible to develop and demonstrate ecologically sustainable fire management. The DBCA science division and regional and district operations staff lack the resources to undertake this kind of research, monitoring and evaluation. Instead, they currently undertake limited monitoring of a small number of threatened flora and fauna species and communities, which does not necessarily indicate species population status, overall ecosystem condition or long-term sustainability of the imposed fire regime.
While the KPIs relating to fire management in the Management Plan are outcome-

[3]. Department of Environment and Conservation. (2008). *Walpole Wilderness and Adjacent Parks and Reserves Management Plan*. Government of Western Australia, Perth WA.

based, numerous flaws exist including reported outcomes that are too broad, ambiguous, inappropriate, missing vital components, or are difficult to measure. Furthermore, the plan does not require DBCA to monitor or evaluate the specific environmental impacts and outcomes of prescribed burns by scientific or technical means. As a result, the decimation, decline and death of tingle trees, peat systems, red-flowering gums, quokkas and other fire-sensitive flora and fauna species are not adequately understood, researched, monitored or evaluated. To undertake effective pre- and post-fire ecosystem condition and species research, monitoring and evaluation, greater resources are required to be allocated for long-term programs with relevant and measurable outcomes. A comprehensive and representative network of Fire Exclusion Reference Areas (FERAs) and other types of fire exclusion areas, as well as specific fire regimes, must be developed and closely researched, monitored, maintained and evaluated.

It is not evident to the community how pre- and post-burn research, monitoring and evaluations are undertaken and how lessons learned are incorporated into a precautionary and adaptive management approach, even though this was committed to in the Management Plan to avoid future adverse conservation outcomes.

A lack of accountability

A major cause for concern is the lack of any effective independent oversight of DBCA's prescribed burning activities and the outcomes it achieves for the environment and community safety. Despite much land being prescribed burned in the WWA, there has been no thorough evaluation of the costs and benefits of the practice. The Conservation and Parks Commission is responsible for evaluating DBCA's achievement of KPIs and other management objectives, however in recent years this agency has become unable to effectively fulfill this role owing to its dependence on DBCA and a lack of resources and government support.

As a result, DBCA is essentially both the land manager and the regulator, with no effective independent oversight or accountability. The lack of publicly available documents related to prescribed fire planning and decision-making further undermines confidence and trust in DBCA within the broader community.

Icons to ashes

How prescribed burning is killing the tingle giants of the Walpole Wilderness Area

Photo: Extremely hollowed out trunk of a fire-sensitive red tingle tree leaving it very vulnerable to collapse from fire events. Walpole block, Frankland District, Allen Road, North Walpole WA.

Tingle trees (*Eucalyptus jacksonii, guilfoylei and brevistylis*) are the largest trees in WA, rivalling the giant redwoods (*Sequoiadendron giganteum*) in California. These giants only grow in a tiny pocket of south-west WA where there is sufficiently high rainfall. While tingle trees have largely escaped intensive logging, much of their natural extent has been cleared for farmland, giving rise to the farming district of Tingledale. The remaining ancient tingles are a major tourist attraction, especially at the Tree Top Walk in the Valley of the Giants.

Despite their imposing size and significance as a tourist attraction, relatively little is known about tingles. In California, it is estimated that there are around 80,000 individual giant redwoods still growing in an area of 144 km^2, with some trees over 3,000 years old. In contrast, nobody knows how many giant tingles are left, how old they are or how healthy they are.

Unlike many other species of eucalypt, the tingles are vulnerable to fire, and repeated prescribed burning is damaging and killing the remaining old giants. Even low-intensity fires can get into their base, hollowing out the huge trunks, and with each successive fire numerous trees are weakened and structurally damaged. Many have come crashing to the forest floor as a result. Tree collapse can happen during the fire, days, years or even decades later as the fire-damaged trees can no longer support their own weight. This tragic process of attrition may take several prescribed burns over several decades, although evidence of tingle trees collapsing after each prescribed burn has been observed repeatedly.

Photo: Low and open understorey in red tingle forest that has not been burned for over 50 years. Giants block, Frankland District, Brainy Cut Off, Tingledale, WA.

"Being wetter, the presence of several relictual taxa and the high proportion of obligate seed species within the tingle mosaic suggests that these habitats have experienced less frequent fire."

Grant Wardell-Johnson, 2000. Researcher and Director of the Curtin Institute for Biodiversity and Climate.

As a safety measure, DBCA uses bulldozers to 'scrub-roll' around the large trees on the perimeter of tingle forest blocks before burning. This highly damaging and intrusive treatment is intended to reduce the likelihood of large trees catching fire and falling on roads or people. This demonstrates an awareness within DBCA that prescribed burns cause the trees to collapse.

Photo: Low and open understorey in red tingle forest that has not been burned for over 50 years. Giants block, Frankland District, Brainy Cut Off, Tingledale, WA.

As tingles require high rainfall, the understorey and litter layer stay moist for most of the year, which means tingle forests can only be burned during dry summer conditions. A post-fire inspection of a burn conducted in early January 2022 in an area close to Walpole revealed that this relatively low intensity burn has already killed many giant tingles and severely damaged many others to the point that they may not be able to survive or are on the brink of collapse due to structural fire damage.

The stated reason for DBCA to apply prescribed burning in the tingle forest is to reduce fuel loads. However, this only has a very short-term effect. Within a few years following prescribed burning in tingle forest, fuel loads and flammability increase dramatically due to the germination of dense thickets of woody understorey species triggered by the fire event. The fuels continue increasing until the forest gradually starts self-thinning, an ongoing process that can take

several decades. If left unburned, the density of understorey plants decreases and after 35-50 years tingle forest that has been left unburned develops a very open understorey with significantly lower flammability[4].

DBCA is planning to burn large remaining areas of long unburnt tingle forest in its 2022/2023 Annual Burn Options Program, and additional tingle forest areas are earmarked within its Three-year Indicative Burn Options Program. It is highly likely that this will result in those blocks having much higher flammability in the future, increasing the risk to nearby communities while also killing or fatally damaging many more of the remaining giant tingle trees.

Photos: Example of a large red tingle collapsed during a prescribed burn. This tree has been weakened by previous prescribed burns. Tingleview (Swarbrick block), Frankland District, North Walpole WA.

[4]. Zylstra et al., 2023. *Mechanisms by which growth and succession limit the impact of fire in a south-western Australian forested ecosystem*. Functional Ecology. John Wiley & Sons Ltd on behalf of British Ecological Society. https://doi.org/10.1111/1365-2435.14305

"A precautionary response to the proposed burning of this superb example of unburned tingle forest should be adopted. Examples of long unburned eucalypt forest are being rapidly depleted before we even understand the ecological processes operating. Given the current hazard reduction programs, most if not all these areas could be eliminated across the continent within a decade or so. I would regard that as a national tragedy for our heritage forests"

Professor Peter Hitchcock (deceased) AM Adjunct Research Fellow, Cairns Institute, James Cook University, October 2018.

Evidence from Traditional Owners suggests that prior to the current prescribed burning regime the tingle forests were not regularly burned, either naturally or by Aboriginal people and the broad area of the tall forests were deliberately left unburnt.

Wadandi Pibulmun Yunungjarlu Traditional Owner and Elder Dr Wayne Webb says the tingle forest (or dtingle as it is said in Pibulmun language) holds great spiritual significance and was not burned by Aboriginal People:

"The dtingle trees hold great spiritual significance for my people. These living beings - dtingle trees - hold the spirits of our Pibulmun Ancestors. It's an absolute disgrace that our country is being so disrespected."

Dr Wayne Webb, Wadandi Pibulmun Yunungjarlu Traditional Owner and Elder

Photos pages 11,12, and 13: Red tingle trees showing why they are fire-sensitive. Extensive buttress attrition of red tingle trees makes them extremely vulnerable to collapse due to fire events. If they survive the fire event, they may still collapse soon after or in successive fires. Heavy rain or storm events also contribute to their demise after they have sustained structural fire damage. Swarbrick (Tingleview) and Walpole blocks, Frankland District, Allen Road and Jones Road, North Walpole, WA.

Photo: This low-intensity prescribed burn in red tingle forest resulted in treefall post-fire. DBCA prescribed burn in December 2019, Walpole block, Frankland District, Allen Road, North Walpole, WA.

Photo: Mixed red tingle-karri forest with extensive epicormic growth following severe crown scorch. Photo taken five months after a prescribed burn in March 2020, Walpole block, Frankland District, Hilltop Road, North Walpole, WA.

Photos: Pre-burn preparation where vulnerable large karri (above left) and tingle trees (above right) are marked and scrub-rolled around their bases, impacting on supporting vegetation, soil, fungi and invertebrates. Walpole block, Frankland District, Hilltop Road, Walpole, WA.

Charming to charred

How prescribed burning is threatening quokkas and other wildlife in the Walpole Wilderness Area

Photo: One of eight dead quokkas found after the 2018 DBCA escaped prescribed burn at Poison Hill in Nuyts block, D'Entrecasteaux National Park, WA.

There are at least 27 species of native mammals within the WWA, many of whose populations have declined significantly. Some now only exist as small, isolated populations[5]. Many of these species have specific habitat requirements including areas of long-unburnt vegetation.

Burning thousands of hectares in single prescribed burning events may have severe impacts on fauna. The typical procedure is for ground crews to ignite the edges of large blocks the previous day or days before, followed by ignition of the core of the block using incendiaries dropped from aircraft. In this situation, many animals are trapped and burned alive or suffer the impact of smoke inhalation. Aerial ignition is typically conducted rapidly during one or two afternoons and offers few escape routes for animals to avoid the fire, assuming they have the mobility to do so.

[5]. Department of Environment and Conservation, 2008. *Walpole Wilderness and Adjacent Parks and Reserves Management Plan*. Government of Western Australia, Perth WA.

One of Western Australia's most eminent botanists and ecologist, Professor Kingsley Dixon, has raised concerns about the impact of large-scale prescribed burns on animals:

"The scale, intensity and style of burning (multiple simultaneous ignitions) are unparalleled in terms of ecological impacts on fauna. We would not inflict such suffering upon our farm animals or pets yet every year many thousands of native animals are unable to escape prescribed burns with no post-fire humanitarian aid to burnt and injured wildlife."

Professor Kingsley Dixon, Curtin University: School of Molecular and Life Sciences; John Curtin Distinguished Professor and Foundation Director of Science at Kings Park and Botanic Garden for 32 years.

Photo: Quokka captured on camera in Walpole block, locality of planned burn FRK_058. Photo from iNaturalist, 2022 Walpole Wilderness Bioblitz Project.

Dr. Hugh Finn believes that wild animal welfare must be considered in the planning and evaluation of prescribed burning because inappropriate fire regimes cause unnecessary deaths, injuries and other pathologies impacting adversely on local population persistence. He notes that:

"Inappropriate fire causes deaths of animals that are physically painful and psychologically distressing because of their traumatic and debilitating nature . It causes physical injuries, other pathological conditions, and pain and psychological distress over a prolonged period as animals attempt to survive in the burnt environment or in the environments they are displaced to."

Dr. Hugh Finn, Curtin University: Curtin Law School

The WWA is home to one of the few mainland populations of quokka (*Setonix brachyurus*). Best known for the Rottnest Island population, the quokka is endemic to the south-west of Western Australia and is listed as vulnerable under WA State and Federal environmental protection legislation. It is recognised as a fire-sensitive species[6] and in 2007 its population size in the southern forest areas was estimated to be less than 700 individuals[7].

Photo: Perished quokka assumed to have starved to death or injuries following an escaped prescribed burn at Poison Hill in Nuyts Forest block, D'Entrecasteaux National Park, WA.

[6]. Department of Environment and Conservation (DEC), 2013. *Quokka (Setonix brachyurus) Recovery Plan*. https://www.awe.gov.au/environment/biodiversity/threatened/recovery-plans/quokka-setonix-brachyurus-2013
[7].Department of Sustainability, Environment, Water, Population and Communities, 2012. *Setonix brachyurus- Quokka SPRAT Profile*. Department of the Environment, Water, Heritage and the Arts, Canberra. Available from: http://www.environment.gov.au/sprat

Unlike their larger cousins, the kangaroos, quokkas cannot travel fast over the distances required to escape fire. If the quokkas survive the initial blaze and smoke inhalation, they are placed at considerable risk of perishing afterwards from lack of food, or predation by foxes and cats. The lack of food and cover makes quokkas and other small marsupials particularly vulnerable in the period immediately following prescribed burns.

Researchers have found that repeated prescribed burning over large areas can be detrimental to the long-term viability of quokka populations.

"Inappropriate fire regimes which result in fragmentation or loss of suitable habitat may have a significant impact on the quokka. In the southern forest, quokkas occupy habitats with low leaf litter, complex vegetation structure and patchiness of habitat. This habitat is lost after intense, homogenising fires, or fires which result in midstorey collapse and overstorey death"[8].

Inappropriate fire regimes may include long periods of fire exclusion, large and intense bushfires, large-scale, cumulative prescribed burns, such as multiple large burns adjoining each other in a short temporal period, and sustained, too frequent, prescribed burns.

Quokkas are not the only species that is adversely affected by repeated prescribed burning. Recent studies show that maintaining long unburnt habitat is critical to the conservation of many threatened species across Australia:

"To conserve many threatened vertebrate species in Australia, landscape management should emphasise the protection of existing long-unburnt patches from fire, as well as facilitate the recruitment of additional long-unburnt habitat, while maintaining historically relevant age distributions of more recently burned patches"[9].

[8]. Bain et al., 2016. *Prescribed burning as a conservation tool for management of habitat for threatened species: the quokka, Setonix brachyurus, in the southern forests of Western Australia*. International Journal of Wildland Fire.
[9]. Von Takach et al., 2022. *Long unburnt habitat is critical for the conservation of threatened vertebrates across Australia*. Landscape Ecology.

Flowers to flames

How prescribed burning is threatening the last wild populations of red-flowering gum

While red-flowering gums (*Corymbia ficifolia*) are cultivated around the world, there is concern for the long-term survival of the wild populations which are being severely damaged by fire and potentially, disease and climatic factors associated with a warming and drying climate.

The species, known as 'yorgum' to the Noongar people, only occurs naturally in the Great Southern region of WA. The largest populations are found in the Mount Frankland and Walpole-Nornalup National Parks within the WWA, as well as on some nearby private properties. Some smaller outlying populations occur further east near Denmark, at Boulder Hill near Two People's Bay and in the eastern part of the Stirling Range.

Despite its restricted natural distribution, the vibrant red flowers and compact form mean that the red-flowering gum is known and loved around the world as an ornamental street tree and garden plant. The species is the floral emblem of the south-west town of Denmark.

It is not known how many red-flowering gums are still alive in their natural habitat, but it appears many of the wild populations are struggling to recover from the impacts of severe fires and successive prescribed burns. Fire can have both immediate and long-term impacts on the condition of individuals and populations. Depending on the severity and frequency of fires, impacts can include scorching or torching of the tree crown leaving no canopy, structural damage to the trunk and branches, mortality of mature and juvenile trees, slow recovery of canopy and failed recruitment of younger trees.

A full understanding of the factors leading to the decline of the red-flowering gum is not clear, but it is evident that severe fires and successive prescribed burning are playing a significant role. Structural damage to large numbers of mature trees due to fire has been observed within the WWA. Researchers are concerned that post-fire recovery of the trees is also being impacted by climatic factors, such as reduced rainfall. They believe that the current high frequency and severity of fire is preventing the successful recruitment of new juvenile trees to replace those that have been killed and that this will inevitably lead to a population decline.

Photos pages 19 and 20: There are very few healthy specimens of red-flowering gums in DBCA-managed lands within the Walpole Wilderness Area. The only healthy specimens of good form are cultivated trees planted on road verges or on private land (shown above). Photo this page: Ficifolia block, Ficifolia Road.

Photos: Very old red-flowering gums with the centre of the tree burned out by repeated fire. Very few old specimens in good condition have been found on DBCA-managed lands in areas subject to frequent or high severity fires. Soho block, burned in December 2014 and on the Annual Burn Options Program for 2022-23, Frankland District, Trent, WA.

Photos: Red-flowering gums showing severe structural damage due to fire. While they can survive some fire impacts, repeated burning is killing these trees. Thames block, six years after the fire event, Frankland District, Middle Road, Trent, WA.

Photos: This mature red-flowering gum and the younger one in the photo above have been regrowing from epicormic shoots along their trunks and branches for approximately 6 years since the last fire in Dec 2014, and will need more recovery time before the next fire to reach their former height. They are doing their best under the circumstances with a spectacular display of flowers. Photos taken in January 2021. Thames block, Middle Road, Trent, WA.

Photo page 24: Red-flowering gum damaged from an escaped burn from private property in May 2018. Ficifolia block, Nut Road, Peaceful Bay, WA

Photos page 25: Red-flowering gums with extensive fire damage from escaped prescribed burn FRK_092, Nov-Dec 2022, and previous fires. Crossing block, Frankland District, Boronia Road, Trent, WA

Photo right: Red-flowering gums with extensive fire-related damage prior to escaped prescribed burn FRK_092, Nov-Dec 2022, Crossing block, Boronia Road, Trent, WA.

Photos below: Insufficient time between fires is thought to be contributing to sparse recruitment of juvenile red-flowering gums and a lack of young trees becoming established. Ficifolia block, Nut Road, Peaceful Bay, WA (left); Thames block, six years post-fire, Frankland District, Middle Road, Trent, WA (right).

Wetlands to wastelands

How prescribed burning is destroying the ancient peatlands of the Walpole Wilderness Area

The impacts of prescribed burning on the ecology of the WWA are not confined to giant or charismatic tree species. The unique and highly biodiverse peat swamps in the heart of the WWA are also suffering irreversible impacts. Over thousands of years the peat swamps in the WWA have built up deep organic peat layers, in some areas several metres thick. This accumulation represents an immense natural carbon store, and the moisture retained by these peats allows plants that date back to Gondwanan times to survive. The peats are home to unique species found nowhere else on Earth, such as the revered Albany pitcher plant (*Cephalotus follicularis*) and the nationally threatened Sunset Frog (*Spicospina flammocaerulea*).

Photo: Example of a healthy peat and wetland. Photo taken January 2021, Crossing block, Frankland District, South of Mitchell Rd, Mount Roe National Park, WA.

Due to their moisture content the peats are naturally resistant to fire. However, the warming and drying climate coupled with prescribed burning in late spring to early summer has left some peatlands vulnerable where the peat layer itself burns, and not just the vegetation layer above. Once the peat ignites it is extremely difficult to extinguish and as the summer progresses the peat burns

underground for several months, sometimes flaring up on hot windy days. This typically causes severe depletion or complete removal of the peat layer and can occur from a single fire event.

Burning the peatlands not only removes thousands of years of organic matter accumulation but leads to changes in plant species compositions as some species, in some cases species that were not present before, take advantage and dominate. This effectively stops the process of natural peat accumulation and conservation of peatland biodiversity.

Photo: Increasingly rare Albany pitcher plants growing on the surface of deep peat soils in a healthy peat system.

This process represents a very significant loss of soil carbon to the atmosphere as well as a loss of unique and threatened species. Burning these areas, and efforts to put peat fires out by tracking around them with bulldozers, exposes the peat soils to oxygen, making the soil acidic and preventing plants from becoming re-established at all. Bulldozed tracks and vegetation removal also spread dieback and create pathways for the entry of feral pigs and other animals that further degrade the ecosystems.

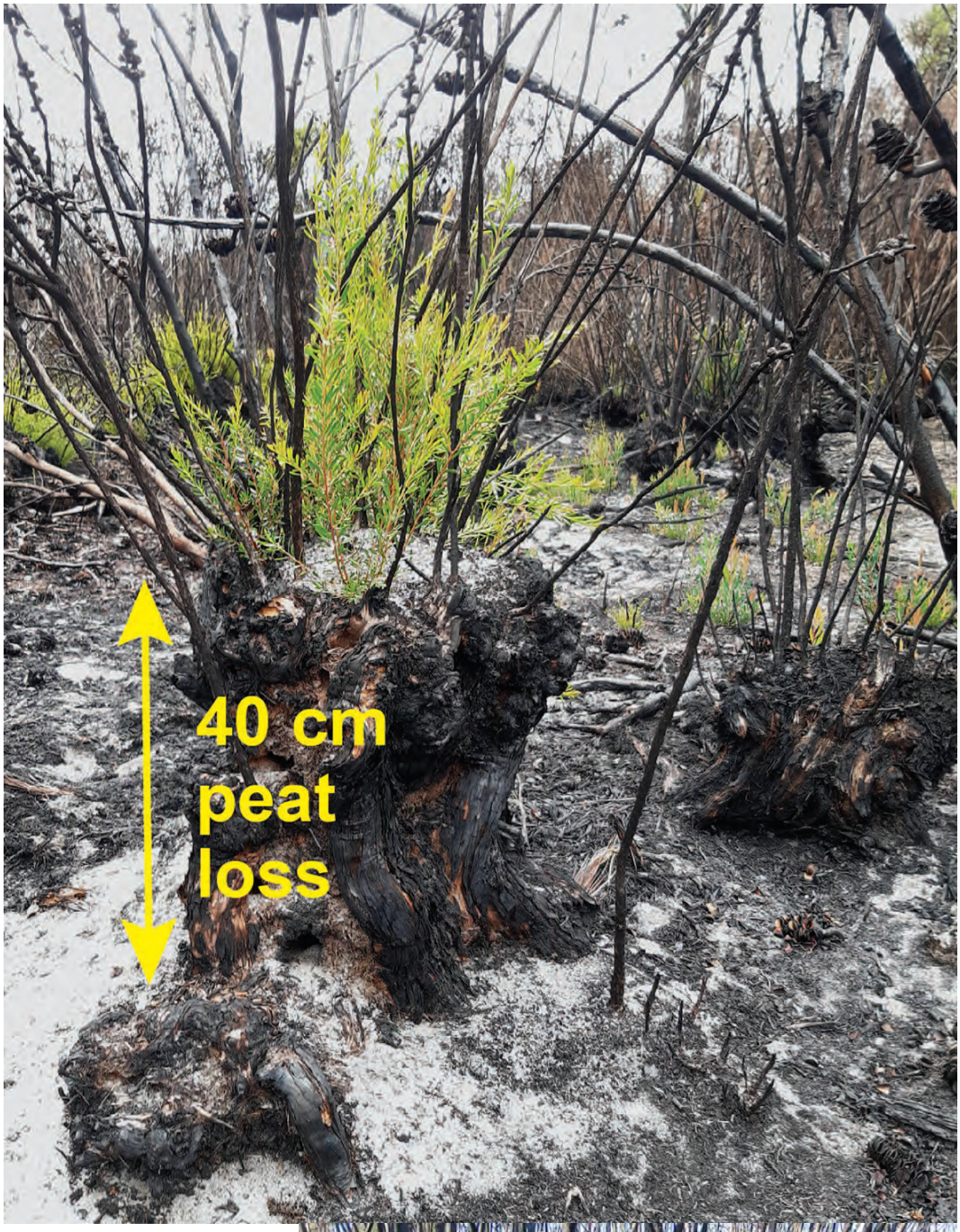
As prescribed burning is currently undertaken over very large blocks, areas of peatland within them are often burned in the same way and at the same frequency as surrounding forest or woodland types, despite their inability to withstand these fires. This has led to a number of peat systems being severely damaged by the spread of underground fires, and experts believe that many of these areas will not recover. This is contrary to the statutory Management Plan for the area, which states: "The Department will endeavour to apply fire regimes appropriate to the maintenance of ecosystem function and the maintenance of biodiversity to protect wetland systems of the plan area. (Walpole Wilderness and Adjacent Parks and Reserves Management Plan, 2008: Section 25 Fire)".

Photo: Large peatland swamp decimated by a prescribed burn. This peat burned for approximately 5 to 6 months after ignition in November 2020, including throughout very high fire danger conditions. Karara block, Frankland District, WA.

Photo: Burnt peatland swamp substrate and associated collapse and death of Tea Tree (*Homalospermum firmum*) which had not resprouted 6 months after a 5,000 hectare prescribed burn. Karara forest block, Frankland District, WA.

Photo: Burnt peatland swamp substrate after a 5,000 hectare prescribed burn. Subsequent damage from feral pigs and the introduction of weed species was evident. Karara block, Frankland District, WA.

Photo: Smouldering peat, weeks after initial fire. Sharpe block, Frankland district, Thomson Road, Trent, WA.



Photos above and left: Peat substrate loss to a depth of approximately 40 cm after a prescribed burn in late November to early December 2021 (burn FRK_081). It is estimated that this represents a loss of at least 5,000 years' worth of peat accumulation. Sharpe block, Frankland District, Thomson Road, Trent, WA.

Photo: Sedge species that build peat soils were totally destroyed in this prescribed burn, leaving only roots of woody plants that do not generate peat soils. This fire has ended a process of peat accumulation that has been occurring for thousands of years. Sharpe block, Frankland district, Thomson Road, Trent, WA.

Photo: Peatland swamp damaged from an 8,600 hectare prescribed burn in November 2019. Photo taken 2 years post-fire. Denbarker block, Frankland District, Blue Lake Road, Denbarker, WA.

Photo: Peatland swamp damaged from an 8,600 hectare prescribed burn in November 2019. The significant loss of the substrate due to fire is inhibiting the recovery of flora species. Photo taken 2 years post-fire. Denbarker block, Frankland District, Blue Lake Road, Denbarker, WA.

Photo: What appears to be a healthy wetland is actually a former peatland area where peat-forming sedges and rushes have been removed by fire and colonised by surrounding shrub species causing drastic fire-driven changes in species composition and ancient ecological processes. This peatland is no longer naturally accumulating organic matter in the soil as it had done for thousands of years. Soho block, Frankland District, Boronia Road, Trent, WA.

Photo left: Trenches or mineral earth breaks are often constructed using machinery to try and contain ground fires due to prescribed burns in peatlands. These trenches oxygenate the soil resulting in acidification, while machinery increases the risk of the introduction of Phytophthora dieback. Sharpe block, Frankland district, Thomson Road, Trent WA.

Photo right: Phytophthora dieback introduced by machinery used in attempts to suppress peat fires ignited by prescribed burning. The dieback front can be seen in the foreground of the photo. Soho block, Frankland District, Boronia Road, Trent WA.

Communities at risk

How prescribed burning can increase bushfire risk around the Walpole Wilderness Area

Prescribed burning in the WWA not only presents serious threats to ecosystems and iconic species but can also increase the risk of wildfire to local communities and landholders. This is occurring through three different mechanisms:

1. Transforming long unburnt open forest areas with low understorey into highly flammable thickets with extremely dense growth triggered by fire events.
2. Diverting resources and equipment away from rapid bushfire detection and suppression to undertake prescribed burning in remote areas during late spring and hot summer months where areas are left to burn or continue to smoulder through days of high to extreme fire danger conditions.
3. Creating the risk that prescribed burns will escape, threatening or destroying private property and thousands of hectares of native bushland, as has occurred in Margaret River, Milyeannup, Stirling Range, Mount Roe and Mount Frankland National Parks and other places in the WWA, for example.

Photo: Typical example of dense understorey regrowth in tingle forest following mass germination of karri wattle (*Acacia pentadenia*) and karri hazel (*Trymalium odoratissimum*) species triggered by prescribed burning. It is not possible to walk through these areas or to see into the forest for more than a few metres owing to the density of undergrowth. Giants block, Tingledale, Frankland District.

How burning can increase forest flammability and lead to a counterproductive cycle of repeated fire

Many of the National Park areas around the town of Walpole and Nornalup and adjoining private property to the north and east are tingle-karri dominated forests. In this forest type, fuel levels typically stabilise and over several decades may decline leaving an open and low understorey where moisture is retained in the humus layer. This same phenomenon has been documented in Victorian Ash and other forest types[10,11].

Photo: Typical open understorey in long unburnt tingle forest. The ground layer is dominated by sedges and Bracken Fern and the mid-level by sparse tall shrubs and groves of karri sheoak (*Allocasuarina decussata*) and karri oak (*Chorilaena quercifolia*). It is easy to walk through this area with unobstructed views deep into the forest. Giants block, Frankland District, Howe Road, Tingledale, WA.

After prescribed burning, there is an initial short period of very low fuel, followed by a long period of dramatically increased fuel loads resulting from the mass germination and regrowth of intermediate height understorey species after the fire event. This dense understorey can lead to very dangerous conditions in a bushfire because it facilitates the production of more heat and greater flame heights, leading to an increase in the risk of scorch or defoliation of the tree canopy due to laddering.

[10]. Zylstra, P.J. 2018. Flammability dynamics in the Australian Alps. *Austral Ecology* (2018) 43, 578–591
[11]. Zylstra et al. (2022). Self-thinning forest understoreys reduce wildfire risk, even in a warming climate. *Environmental Research Letters. 17* 044022. IOP Publishing. https://iopscience.iop.org/article/10.1088/1748-9326/ac5c10

Prescribed burning of these forest types places them in a cycle where they must be repeatedly burned in an attempt to keep these dense fire-stimulated fuel loads low, even though this high frequency burning damages the larger trees that dominate these forest types. This is ecologically destructive, resource intensive, and counterproductive to community safety and highlights the importance of preserving long-unburnt areas of tingle-karri forest.

The transformation of tingle forest from low flammability open forest to dense, highly flammable thickets as a result of prescribed burning has been observed by locals since prescribed burning began in these forest types in the 1960s:

"Before prescribed burning started, my brother and I used to run barefoot through the tingle forest from our farm to the Frankland River to catch marron. But when they started burning the forest in the 1960s, the undergrowth became so thick we could not even walk through it anymore."

Tony Pedro, Farmer, volunteer firefighter and conservationist.

Photo: Long unburnt red tingle forest with open understorey near Walpole. This area was previously designated as a Fire Exclusion Reference Area (FERA) but was removed from this network by DBCA and is now listed for prescribed burning this season (2022/2023; Burn ID FRK_058). If it goes ahead, this burn will trigger growth of a dense understorey and much higher fuel loads. Walpole block, Collier Road, Frankland District, Walpole, WA. Photo: March 2022.

Photo: Adjacent to the above is red tingle forest that was prescribe burned in March 2020. This burn resulted in significant tree crown scorch and the collapse of numerous mature red tingles. Prolific germination of the understorey means a significant source of fuel will develop. This will likely increase the severity of the next fire. Walpole block, Collier Road, Frankland District, WA.

Prescribed burning based on flawed assumptions about fuel loads and bushfire risk

In its initial planning phase, DBCA calculates ages since last fire to select potential areas for their annual burn options and three-year indicative burn programs. This method assumes that the longer an area is left unburned the greater the fuel load (and therefore the greater the risk of intense bushfire). Much of the fire-age data used for this purpose in the once higher rainfall zone of the Southwest, either lacks detail or is inaccurate. More importantly, this approach does not acknowledge the low and declining fuel in long unburnt forests. As a result, DBCA is now targeting these long unburnt areas for prescribed burning despite the highly counterproductive effect on community safety and despite DBCA's internal unpublished guidelines which acknowledge the declining fuel levels in long-unburnt tingle forests.

DBCA has litter accumulation tables for karri, jarrah, wandoo, mixed stands of karri, jarrah and marri, and plantations of exotic Pinus pinaster and Pinus radiata, but not for tingle or other vegetation types. The forest fire behaviour tables for Western Australia have remained unchanged since the 1985 edition, which does

not account for the impact of successive fires and changing conditions due to increased effects of climate change on plant growth and fuel accumulation rates[12].

All prescribed burn management plans and policies must take climate change into consideration as it is clearly affecting weather patterns, moisture levels, accumulation of organic matter, species health and resilience, and the ability of fauna to cope with prescribed burns. More research is required to ascertain whether some vegetation types could be burnt often and mildly, particularly in zones close to towns. This could compliment weed management and removal of long dry grass during summer.

How prescribed burning may divert resources from fire suppression

In south-west WA, prescribed burning is a highly resource intensive exercise, requiring very significant funding from the State government. In addition, in the WWA prescribed burns are routinely undertaken in late spring to summer and often continue to burn through dangerous fire weather conditions. These burns must be monitored and patrolled over the following months to ensure they do not escape on days of high or extreme fire danger.

This means that less resources may be available for other forms of fire management and suppression, including funding for firefighting equipment, fire detection, planning, education and other fire preparedness and mitigation measures. The safety of the community could be better served by investing a greater proportion of funds in state-of-the-art systems for rapid detection and at-source suppression, including a greater emphasis on locally based aerial firefighting capability.

How prescribed burns risk becoming wildfires

There is always the risk that prescribed burns will escape, becoming wildfires and causing major damage to biodiversity as well as private property. In recent years, escaped prescribed burns in the Peak-Roe-Crossing area in the WWA, Margaret River, Stirling Range and Milyeannup have caused extensive damage to houses and significant areas of forests, woodland and heathland. Most prescribed burns are conducted in spring leaving the risk of reignition from smouldering logs or underground fire throughout summer and autumn, until the next good rains. This is of particular concern in the WWA where reignitions spread to areas of unburned karri and peatlands and continue to burn through dangerous fire weather conditions.

[12]. Sneeuwjagt, R.J. and Peet, G.B. (1985). *Forest Fire Behaviour Tables for Western Australia (3rd ed.)*. Department of Conservation and Land Management, Perth WA.

Photo: Severely damaged jarrah-marri forest with numerous old growth trees with large hollows suitable for black-cockatoo nesting or habitat for other hollow-dependent fauna. Many habitat trees have fallen during and after this escaped prescribed burn Nov-Dec 2022. Mitchell block (FRK_092), Thomson Road, Frankland District, WA.

Picture: Severely damaged jarrah-marri forest and granite outcrop. Escaped prescribed burn, Mitchell block (FRK_092), Thomson Road, Frankland District, WA.

Conclusions

Current prescribed burning practices are having a severe and damaging effect on the iconic trees and ecology of the WWA, and in some cases are risking the extinction of species that exist nowhere else on Earth.

If the current pattern of prescribed burning continues there will be no long-unburnt areas within the WWA, and the detrimental changes we are already witnessing in its overall ecology will dominate. Over time, the giant tingles, unique peatland habitats and wild populations of red-flowering gum will be lost.

The primary objective of current prescribed burning practices is the protection of life and property. Yet, burning in the dominant tingle and karri forest types may have the effect of increasing the flammability of these forests and devalues these beautiful areas for ecotourism.

Furthermore, large-scale prescribed burning creates a serious risk of burn escape and wildfire ignition. Conducting, monitoring and attending to ongoing or escaped prescribed burns may divert resources away from rapid bushfire suppression.

Strategies for biodiversity conservation and community protection have to take into account our changing climate and include comprehensive calculations of the risks and effectiveness of prescribed fire as a bushfire mitigation tool.

Recommendations

The effectiveness and efficacy of DBCA's approach to burning large areas of the conservation estate frequently as the main tool to mitigate the risk of fires affecting people and property requires urgent independent review. The claim that current prescribed burning practices are contributing to the maintenance of biodiversity values and ecosystem resilience must also be interrogated for a range of ecosystems.

The following recommendations are presented with a view to improving the situation, and with the long-term objective of moving to a fire management regime that protects wildlife and biodiversity while also balancing the needs of community protection with an informed and risk-based approach to fire planning.

Commission of inquiry

1) As an overarching priority, it is recommended that the McGowan Government establish an independent expert commission of inquiry into DBCA's prescribed burning practices, policies and programs. This should examine and publicly report on:

a) ecological impacts and sustainability of prescribed burning in a drying climate;
b) community safety and bushfire fire risk outcomes;
c) impacts on natural carbon stores;
d) animal welfare implications;
e) impacts on cultural heritage and recognition of traditional fire management practices;
f) governance and accountability issues including the adequacy of independent oversight, appropriateness of key performance indicators and compliance with plans, policies and guidelines.

Urgent practical management actions

The following practical actions are recommended as an immediate and urgent priority:

2) Place an immediate moratorium on prescribed burning of tingle, red-flowering gum and peatland habitats within the Walpole Wilderness Area while a comprehensive risk assessment is carried out, which includes the effects of climate change as well as carbon and biodiversity outcomes.

3) Ensure the preservation of sufficient habitat refuges for threatened fauna and fire-sensitive vegetation, including long unburnt areas, and establish a comprehensive system of fire exclusion areas in each ecosystem type.

4) Develop improved methods and techniques for prescribed burning that allow specific fire regimes to be achieved at an ecosystem scale and enable fire to be excluded from fire-sensitive areas and signification populations of threatened fauna. This would require changing current practices of rapidly burning large blocks in a uniform way using aerial ignition and working at much smaller scales to match those of individual ecosystems.

5) Work with Traditional Owners and Custodians to improve understanding of cultural and traditional fire management practices and engage them on an ongoing basis in the appropriateness, planning and implementation of any prescribed burning. Traditional Owners and Custodians should be adequately supported and resourced to engage in this process.

6) Increase and prioritise investment in modern firefighting capabilities including on-ground and aerial equipment to enable rapid and effective response to suppress wildfires before they escalate.

7) Increase transparency and accountability and improve community and stakeholder consultation on prescribed burning. Ensure community and stakeholder consultation on prescribed fire plans before they are finalised, and publish all relevant information including fire management guidelines, prescribed fire plans, fuel load assessments, and pre- and post-fire monitoring and evaluations.

Research, monitoring and evaluation actions

8) Establish a comprehensive scientific monitoring and evaluation program to monitor impacts of prescribed burning, including pre- and post-burn ecological impacts, and outcomes for fire sensitive species and ecosystems. This will require significantly increasing resources available for scientific monitoring and evaluation, which should be overseen by the WA Conservation and Parks Commission to ensure independence of DBCA (see separate recommendation).

9) Commission an independent study of the flammability of different vegetation types, including tingle forests, with emphasis on how vegetation type and structure, surface and near-surface litter and landscape factors influence fire behaviour and fire severity, and how fire affects flammability.

Improving governance and accountability

10) Update the current approach used by DBCA for assessment of bushfire risk to one based on risk assessment and flammability, rather than the current simplistic approach using fuel loads and years since previous fire. This approach must be informed by an independent study of the flammability of different vegetation types.

11) Abandon simplistic and arbitrary targets and performance measures for prescribed burning, including:

a. The nominal minimum 200,000-hectare annual target for prescribed burning across the south-western Forest Management Plan area.
b. The policy of maintaining a fuel age of less than 6 years across 45% of DBCA-managed land.
c. The DBCA key efficiency indicator of achieving maximum area burned at minimum cost.

12) Review and update all prescribed burning policies, procedures and guidelines, taking into consideration:

a. The effects of climate change on the ability of ecosystems to sustain and recover from fire events. Prescribed burns should not be undertaken in drought conditions when ecosystems are more vulnerable to permanent damage from fire, and recovery from fire is compromised;

b. Long-term scientific monitoring and evaluation of the effects of prescribed burning on sensitive ecosystems; and

c. The effect of declining fuel loads and reduced flammability in long unburnt forest types.

d. The advice of independent scientists and the Threatened Species Scientific Committee.

13) Place enforceable Ministerial Conditions on the 2024–2033 Forest Management Plan (FMP) following assessment of the Plan by the Environmental Protection Authority (EPA). At a minimum, conditions should:

a. Ensure that prescribed burning is not damaging ecological values or degrading natural carbon storage and sequestration capacity on FMP lands.

b. Require regular independent auditing and public reporting of environmental outcomes from DBCA's prescribed burning program.

c. Ensure increased transparency and consultation on prescribed burning plans and programs, including with the Threatened Species Scientific Committee.

d. Require the update of all prescribed burning policies, procedures and guidelines (see separate recommendation).

14) Address the lack of independent oversight of DBCA's prescribed burning program by strengthening the independence and role of the Conservation and Parks Commission. At a minimum this must include:

a. Appointing qualified ecologists to the Commission

b. Making the Commission genuinely independent of DBCA, including by reinstating independent funding and staff to the Commission;

c. Ensuring that the Commission has a role in approving any planned burn programs and individual prescribed fire plans prior to burning being undertaken by DBCA.

15) Ensuring that the Commission has operational responsibility for scientific monitoring of the impacts of prescribed burning.

APPENDIX 1

DBCA's non-compliance with the Statutory Management Plan for the Walpole Wilderness Area

The guiding document for the DBCA's management activities in the WWA is the Walpole Wilderness and Adjacent Parks and Reserves Management Plan (Department of Environment and Conservation, 2008, Walpole Wilderness and Adjacent Parks and Reserves Management Plan. Government of Western Australia, Perth WA). This Statutory Management Plan was made under the Conservation and Land Management Act 1984.

The Plan contains a number of requirements and KPIs related to fire and prescribed burning, which DBCA has not complied with. These areas of non-compliance are summarised below.

Fire Exclusion Reference Areas (FERAs)

The 2008 Plan requires DBCA to:

> *Ensure that at least one Fire Exclusion Reference Area is established in each Land Conservation Unit (LCU) occurring in the planning area.*

Currently DBCA has no FERAs in the red tingle forest and it is understood that FERAs in other areas have been moved, abandoned, or altered by past wildfire and prescribed burns and not often re-established in representative areas. This defeats the purpose of maintaining these areas as long-term fire exclusion areas for science, and as conservation refuges for species that are adversely impacted by fire. These are vital as there are many factors about these habitats that are still poorly understood.

Apart from tingle forest, the targeting of unburned areas with equal to or greater than 6-year fuel loads as part of DBCA's fire management program means that there are very few long-unburnt blocks of the other ecosystem types within the WWA.

Fire Management Guidelines for significant habitats

The Walpole Wilderness Management Plan (2008) states that:

> *The Department is preparing specific fire management guidelines for significant habitats occurring across the landscape that require specific fire regimes, such as granite outcrops, peat swamps, grasslands, old growth forest, tingle and red flowering gum forest types.*

The importance of these Guidelines is reflected in DBCA's KPIs set out in the Management Plan:

> **KPI 25 . 4** The extent to which fire management guidelines have been prepared for significant habitats requiring specific fire regimes.
>
> **Target:** Development of published fire management guidelines for significant habitats requiring specific fire regimes.
>
> **Reporting Requirements:** After 2 years

Fourteen years later, DBCA has still not published specific Fire Management Guidelines for some of these habitat types and most of them that have been completed have not been made publicly available.

Burn objectives for significant habitats

The lack of Fire Management Guidelines and burn objectives for significant habitat types within the WWA means that DBCA is also unable to meet another important KPIs contained in the Management Plan:

> **KPI 25 . 3** The extent to which fire management guidelines for significant habitats requiring specific fire regimes are addressed in burn objectives
>
> **Target:** Burn objectives are met for significant habitats requiring specific fire regimes
>
> **Reporting Requirements:** annually

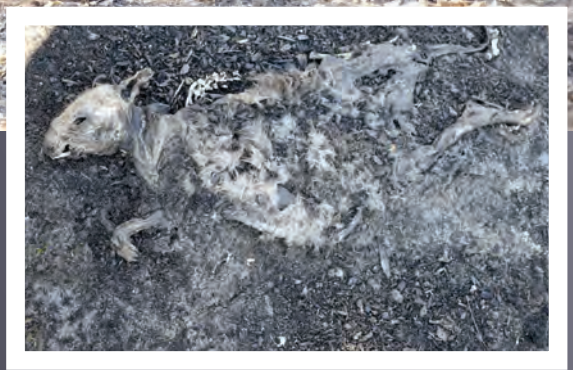
This is the only KPI in the Management Plan that goes anywhere close to measuring actual on-ground conservation outcomes from prescribed burning, and DBCA cannot meet it because the outcomes it is aiming to achieve have not been defined.

Requirements to achieve fire age diversity

Another important KPI in the Management Plan relates to fire age diversity within Land Management Units:

> **KPI 25 . 1** The extent of fire diversity measured by the diversity and scale of post-fire fuel ages within a Landscape Conservation Unit
>
> **Target:** The distribution of post-fire fuel ages (time since fire) for each Landscape Conservation Unit approximates the fuel age distribution in Figure 9
>
> **Reporting Requirements:** annually

The burning of very large blocks containing a range of ecosystem types in single prescribed burning events has the result of homogenising the fire age in these areas and reduces fire age diversity within these blocks, contrary to the requirements of the Management Plan. Measurement of fire extent and severity during and after prescribed burns has been highly variable and poorly documented and recorded. Historical fire events are not accurately mapped, and the fire age data used by DBCA are too broad and lack accuracy.



Current prescribed burning practices are having a severe and damaging effect on the iconic trees and ecology of the Walpole Wilderness Area, and in some cases are risking the extinction of species that exist nowhere else on Earth.