



# The Use of Fire as a Management Tool for Properties in the South-west of Western Australia



*Ngala kaaditj Noongar moort keyen kaadak nidja boodja.*

*We acknowledge the Noongar people as the Traditional Owners of this land*

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## Introduction

The use of fire as a management tool has been undertaken well before the settlement of Europeans. The Noongar people of the South-west used fire for various reasons as part of their day to day lives. Fire risk and hazard reduction is the responsibility of each and every landholder in the South-west of Western Australia. Whether you live in a township, on a hobby farm or undertake large scale farming, it is possible that you may be affected by fire at some point.

The most important part of Monitoring and managing fire risk is understanding the nature of fire itself and how it can be used to manage the land.

### IMPORTANT:

The information supplied in this document is intended to assist landholders with basic background knowledge of fire as a management tool. More in-depth information is available to landholders via a number of official websites, please take the time to familiarise yourself with these other sources of information to ensure you are making fully informed decisions in regard to fire management and property safety.

### A Brief History of Fire and the Noongar People

Throughout history fire has been used by humans for various reasons, frequent and strategic use of fire by the Noongar people in many areas of Australia, including parts of Western Australia's South-west, maintained grasslands beneath Tuart, Jarrah and Marri Wandoo forests and woodlands.

Western Australia has been home to the Noongar people for tens of thousands of years. Noongar people, the traditional owners of *Boodja* (country), have utilised fire as one of the main techniques for looking after the land 'caring for country', *Karl* (fire) is the very heart of their culture. The South-west Noongars traditionally used fire for a number of reasons; for cooking, keeping warm, hunting, making tools and weapons, clearing tracks, to promote fresh green shoots, and cultural ceremonies.

In general there are two types of fire in which Noongar people used; cool fire or burns of low intensity and fires of higher intensity. Cool fires were commonly used the most by the Noongar people, these low intensity fires were used for clearing smaller areas of undergrowth from forests to create easier access and movement through country. Easy movement across country was an important part of Noongar culture for many reasons, as the land itself changed with the seasons, the Noongar people needed to move freely to more suitable regions without the hindrance of thick undergrowth. Cool fire was also used to promote new growth, evidence suggested that plants germinating first after a cool burn tend to have the highest food value, with a more diverse range of species being present after a cool burn, keeping the balance within the understory layer.

The regular use of fire by the Noongar people in their daily lives, resulted in a mosaic of trees and grasslands that meant the highly combustible Eucalyptus forests were less likely to create intense bushfires.

In Noongar culture rules for fire and fire use vary, and are to this day, still dependent upon an intimate knowledge of the physical and spiritual nature of each area of the land. Without this knowledge it is impossible to 'care for country' in the appropriate way.



## **General Principles of Ecological Fire Management**

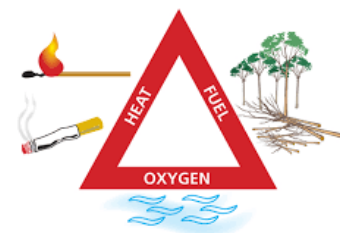
- ⇒ Fire is an environmental factor that will always influence the nature of fire prone landscapes, it is important for appropriate fire management for people to continue to reside in these landscapes.
- ⇒ No two fires are the same, behaviour of fire is dependant upon three factors; fuel, weather and terrain.
- ⇒ Fire management is necessary for two main reasons; for risk reduction to life, property, cultural and environmental values. For protection, maintenance and in some cases regeneration of ecological ecosystems.
- ⇒ Native flora and fauna vary in their adaptations and dependence of fire, not all species require fire in the same way or to the same extent.
- ⇒ The rate in which an ecosystem will recover is dependant upon the intensity of a fire and future rain events.
- ⇒ All landholders and managers are responsible for minimising the damaging impacts that wildfires have on life, property and biodiversity.
- ⇒ Fire management plans should take into consideration ecological and risk mitigation objectives.
- ⇒ All available knowledge, including Noongar knowledge, species vulnerability, fire history of area, potential environmental impacts and prevailing weather forecasts should be considered when planning fire management activities.
- ⇒ Smaller scale mosaic fire management in patches of vegetation throughout alternate seasons, will provide diverse habitat options and enable better post-fire recovery and re-population of an area.
- ⇒ Fire management should be planned and undertaken as part of an adaptive management framework, monitoring of the effects of a planned burned should be undertaken to ensure biological ecosystems are not permanently altered or destroyed.

## Uses of Fire for Managing Land in the South-west

Now days all land managers have a legal and moral obligation to minimise the damaging impacts that wildfires have on life, property and biodiversity. This applies to all landholders and land occupiers, including private homes, business and government.

Wildfire threatens properties, life and the environment, every year in the South-west over 300 wildfires are started by lightning, arsonist or misadventure. Many wildfires are uncontrollable and result in extensive damage, trained fire fighters are too often left to deal with these intense and dangerous situations.

Fighting bushfires is regarded as a science, based on weather, source of ignition and fuel. Western Australia is unique, being the only part of the world that conglomerates a hot dry Mediterranean climate with tall combustible forests. In this type of situation the only thing that can be managed to reduce the risk of wildfire is fuel.



*One of the most effective ways you can reduce fuel loads and the risk of bushfire is planned burning*

### Fire for Hazard Reduction

The term fuel refers to 'ground litter'; fallen leaves, twigs, bark, sticks and live or dead vegetation. Although ground litter is a major fuel for wildfires, many species of trees stringy or fibrous bark that can be blown upward as burning embers, setting spot fires ahead of the main fire. 'Spotting' and 'hopovers' are common in forest wildfires and can leap kilometres from the main fire, occurring almost always where heavy, dry fuel loads are found.

Planned burning defines measured burning within a scheduled area under appropriate environmental conditions to reduce the fuel load within that area. Planned burns need to be carried out under mild and stable weather conditions to ensure the fire burns slowly, with low flames and is controllable, resulting in only the understory being effected by the fire.

Managing fuel loads through planned burning, whether in a nature reserve, agricultural setting or backyard will assist in reducing the rate at which bushfire can spread. By reducing the energy source from a fire, one of the three key factors is being eliminated, meaning the intensity at which the fire burns will be reduced significantly, giving property owners and firefighters a better chance of containing the fire and protecting property and livestock.



## Fire for Weed Reduction

Weeds can be defined as; plants that are growing in areas where they are not wanted and which have measureable environmental or economic impacts. Weeds are not necessarily always introduced species, numerous native species can become weeds in certain areas when they become over abundant, causing them to out compete other native species. This can alter the abundance or diversity of species that are important habitat and food for native wildlife.

Numerous weed species require soil disturbance in order to establish in an area. The majority of disturbances within a bushland or agricultural area are from clearing, slashing, cultivating or herbicide use. However, fire, whether natural or planned can create suitable conditions for weed invasions.



Although fire may seem like an excellent way to manage weeds, weed species are often advantaged by the burst of nutrients immediately available after a fire. Seeding weed species are generally annuals, compared to seeding native species that generally require time between each fire to set seed and replenish seed stocks, this can take up to several years for some native species. Frequent fire can deplete native species seed stock and encourage weed species to take over, thus rapidly eliminating native species from the ecosystem.

There can be advantages and disadvantages to using fire for weed control:

Advantages:

- Selective (spot burns)
- Removes excess foliage (for follow-up treatment)
- Supplements other methods
- Minimises risks to indigenous flora regeneration
- Encourages germination of soil-stored weed seed bank (for effective follow-up treatment)
- Inexpensive

Disadvantages:

- Non-selective
- Usually does not eradicate weeds
- Inappropriate for non-fire adapted areas
- Seasonal and timing limitations
- Encourages weed growth/germination
- Altered nutrient/moisture availability can favour weeds

- Potential for run-off/erosion at site
- Fauna, people and property risks
- Specialist knowledge required

Fire alone will not solve your environmental weed problems, without a strategic and effective post fire management plan, fire to control weeds, will likely result in an increase of environmental weeds dominating your bushland.

**The use of fire as a weed management tool needs to be supplemented by a strategic management and monitoring plan to ensure that the fire control is effective rather than detrimental**



Bridal Creeper emerging after a fire



Watsonia emerging after a fire

## Fire and Bushland Regeneration

Fire has been a constant visitor to West Australia's South-west forest for millions of years, it has shaped the evolution of many plant species and communities. Fire is an essential part of the life cycle of many native plant communities within the dry and wet Eucalypt forests of Australia.

Individual tree species can withstand the effects of fire to varying degrees, however, all eucalypt forest types depend on fire in some extent for regeneration. Eucalypt seed release is triggered by fire, with tough, woody capsules opening and emptying their contents onto nutrient-rich ash seedbeds, from which all understory competition has also been removed by fire, allowing for sunlight to penetrate through to the forest floor.

Approximately 70-75 per cent of understory, have the ability to re-shoot after fire within the drier upland forests of the South-west, the remaining species will generally germinate from the seed bank stored within the soil or on the woody capsules of the plants. Understory species will generally flower within three to four years after a bushfire has gone through the area, depending on rainfall.

Along creek lines and in the damper areas, the proportion of species re-grown from seed may be higher than the species that re-shoot from existing vegetation. In the Jarrah forest of the South-west, some species within the wetter areas can take up to six years to flower after fire.



Post fire seedling density and survival is dependent upon the season in which the fire took place, it has been discovered that the seedling density and survival of most species is greater after fire that has occurred in dry summer or autumn conditions, compared to fires in early spring. Abundant seedling regeneration and survival are predominantly important for thicket-forming species such as *Melaleuca viminea*, as these types of species are important habitat for a number of fauna species. These types of thickets require intense fire under dry conditions to successfully regenerate.

### Fire and Native Fauna

Consistency, scale and intermittence of fire are important to both the immediate impact of fire and the ability of fauna recovering from it. Reduction of forest areas in the South-west since European settlement has and continues to hinder the ability of fauna to recolonise when large areas of habitat are destroyed by intense fire. Add to this the introduction of invasive and predator species such as foxes, cats and weeds, remnant vegetation no longer have the ability to recover as they once did and provide protected habitat for vulnerable native fauna.







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## The role of fire as a regeneration tool

*In any discussion about Fire and Biodiversity management of the land, we need to firstly acknowledge this land and its original inhabitants, their knowledge and use of fire in the landscape.*

Methods that landowners can use to trigger regeneration in their bushland:

- Rake and pile burns
- Ash bed creation – larger piles of vegetation
- Mosaic burning
- Individual remnants of vegetation burnt with the aim of obtaining "patchiness" within that remnant



*Very good vegetation*



*Degraded/poor vegetation on the end of very good vegetation.*

*This area recommendations are rake and pile burns so that existing vegetation is not disturbed by machinery.*

Where the vegetation is degraded, a trigger mechanism may be required to encourage new regeneration.

## Ash bed creation:

- Rake up leaves, gather larger twigs, branches
- Place in a cleared area or degraded area, preferably no overhanging canopy/trees
- Pick a cool fine day in Winter to light these up
- Plenty of water on hand
- Natural regeneration should occur in these ash beds the following Spring/Summer



*Heaps recommended to be used here.*



*This is the outcome years later with fencing, weed control, feral control, ash bed creation, rake and pile burns and some additional tubestock planting.*

*(5 years later) Note – kangaroo proof fencing was used, ongoing weed control, rabbit control, brushing, direct seeding, rake and pile burns and tubestock plantings – with watering through the summer seasons. Some natural regeneration has also occurred within these areas.*

*Note – ongoing weed control is essential.*

## Mosaic burning:

- Section the bushland into a mosaic pattern
- Burn one section at a time
- Where possible, leave creeklines and wetland areas unburnt so wildlife have habitats to escape into
- Different bushland blocks have different issues and biodiversity values – specific fire management for each bush block

*Examples : (note – differing soil types and vegetation types)*



*Landowner burnt sections every 8-10 years for 30 years – vegetation is in very good condition.*



*This property was burnt in sections every 5-6 years over 30-40 years and is described as being in excellent condition with high conservation values.*

*Mosaic burns leave sections unburnt for wildlife.*

*Mosaic burns leaves sections unburnt for different species of plants to flower and seed.*

### Whole remnant burning/patchiness:

When burning whole remnants – attempt to have some areas trickle slowly through the vegetation and other areas that will burn a little warmer – the aim of this is to create “patchiness” within the remnant.



- Patchiness leaves refuges for plants and animals
- Leave creeklines out of burning where possible
- Leave granite outcrops out of burning where possible
- Weed and feral animal control before and after

Some examples of patchiness: (Note these are different soil types and vegetation types)



*Burnt every 5-6 years, very good condition.*



*Burnt at every 8-10 years maintaining very good condition.*

When to Burn? The ultimate question for remnant bushland:

- Spring? burns are likely to affect juvenile wildlife.
- Winter? perhaps the safest?
- Not all native plants flower in Spring, not all juvenile wildlife are born in Spring.
- Autumn? Consider weeds.
- Each site or piece of remnant bushland is "site specific" and needs to be looked at on a case by case basis – these notes can be used as a guide, although each individual site has issues: weeds, ferals, disease, plants and animals to be considered prior to going ahead with any burning.
- Always use the precautionary principle and seek advice prior to undertaking any fire management.
- Contact your Local Government Fire Control Officer, or Department of Fire and Emergency Services for advice on protection of life and property, and check your Annual Firebreak Notice.

Ferals and weeds need to be controlled before and after any fire/burn.



### Acknowledgements

Photos taken by Kemp, C. © Cherie Kemp  
Off Reserve Conservation Officer, Department Parks and Wildlife.

### References

Abbott/Burrows (2003). Fire in ecosystems of South West Western Australia – Impacts and Management.

### Acknowledgements

Thankyou to all the private landowners for the use of their properties and their knowledge and experience.

Other reading material – contact Off Reserve Conservation Officer on 97525533



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## The Use of Fire in Small Remnants

Keywords: fire, regeneration, remnant bushland

Location: south-west Western Australia

Authors: Penny Hussey and Avril Baxter

### INTRODUCTION

Many landowners see a need to “clean up” their bushland by putting a fire through it to reduce the fire hazard and hopefully cause regeneration. However, in these altered landscapes the result may not be what we expect.

With flammable vegetation, dry summers and sources of ignition, it is not surprising that fires are an important component of ecosystems in south-west Australia. Over millions of years, native plants and animals have evolved various strategies to cope and persist in this fire-prone environment.

Today, however, trying to manage fire in small isolated remnants of native vegetation, while at the same time trying to conserve that bushland and all its native flora and fauna, presents an enormous challenge.

In this Wildlife Note we explore some of the issues and consequences of using fire in small remnants and provide a checklist to help you in your decision-making.

### WHY BURN BUSHLAND?

Planned fire may be prescribed to remove a perceived fire hazard or to promote regeneration (‘ecological renewal’).

#### Removing a perceived fire hazard

In areas where there is danger to life and property from wildfire, for example adjoining houses, fuel reduction for safety is a vital consideration. For example, burning sections during the cooler months of the year when the fire can be more easily contained and may go out overnight could be a suitable regime.

Nevertheless, conservation of the values of the natural community should be included in the fire management plans and compatible strategies considered, such as burning

sections in rotation, and having permanent low fuel zones adjacent to the infrastructure being protected.

#### Promoting regeneration

Nothing lives for ever. All living things must reproduce a new generation; in vegetation communities we call this ‘regeneration’. Without regenerative processes, a gradual decline of mature plants will eliminate them from an area, leaving no replacement seedlings. Work done in almost all south-west Australian vegetation communities shows that a ‘disturbance factor’ induces regeneration. One such disturbance factor could be fire.

There are two ways in which trees and shrubs respond to fire:

- the whole plant is killed and a new generation grows from seed (reseeder) or
- only parts of the plant are killed, and new growth arises from stem or rootstock (resprouter).

On extremely infertile and difficult soils, the most important role of fire may be in recycling nutrients. Without rapid decomposition by fungi or termites, or extensive leaf herbivory where the fauna recycle nutrients in their wastes, the nutrients remain held in living and dead plant material, so there is little left in the soil to fuel new growth. Both reseed and resprouter plants take advantage of this release of nutrients to grow rapidly after fire.



Fig. 1: Very soon after a fire, Kingias can be seen resprouting. No seedlings have yet germinated.  
Photo: N. Burrows.

If we wish to use fire for any reason at all, but especially for nature conservation, we need to be aware that the bush community's response to that fire may be very different to the response which would have occurred prior to European settlement.

## EFFECTS OF FIRE ON NATURAL COMMUNITIES

The effect of fire on natural communities depends on many factors. Some of the most important are the frequency between fires, the season, its intensity, climatic events before and after the fire, the patchiness of the fire, the condition, size and connectivity of the bushland and the fauna present.

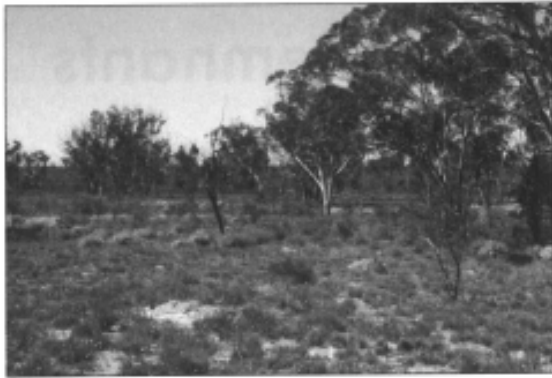


Fig. 2: Fire can change the composition of a plant community. The wandoo woodland in Wyalkatchem Nature Reserve had not burnt for over 60 years, and the ground layer consisted of perennials, grass-like plants and everlastings, as can be seen in the front of the photo. A very hot fire in the summer of 1999 through part of the reserve caused a massive germination of shrubs, which dominate the regeneration area. This change in community structure can clearly be seen in the centre of the photograph. Photo: P. Hussey

## EFFECT OF FIRE ON NATIVE PLANT COMMUNITIES

### Fire frequency



Fig. 3: Fire frequencies can affect vegetation communities. A fire in the 1960s led to the regeneration of sheoaks throughout this area. However, a fire four years later, which was stopped at the roadway, killed the regenerating sheoaks which had not been able to set seed, leaving room for powderbark wandoos, from a mature stand at the top of the ridge that had not been affected by the fire, to colonise the area. Photo: A. Baxter.

For many plants to persist after a fire, they must be able to reach maturity and set seed (the reseeders). Since plants

vary in the length of time they take to do this, it follows that the frequency of the fires will have a distinct effect on the composition of the vegetation community. For example, in woodlands, the understorey follows a cyclical pattern of growth / decline / renewal, often on a shorter timescale than the tree species.

As a general rule of thumb fire intervals should be at least twice as long as it takes the slowest maturing plant to flower and produce seed, and before older plants are no longer able to reproduce.

### Fire season

The time of the year in which the fire occurs will make a considerable difference. There are three possible fire seasons: midsummer/autumn, winter, spring/early summer.

#### *Midsummer / early autumn fires*

These fires are usually intense and difficult to control, they will consume most of the above ground material and most likely burn down mature trees. In doing so they remove herbivores (eg sap sucking insects) and parasites (eg mistletoe or dodder) from the population. Heat penetration of the dry soil is maximised, which will break the dormancy for some buried seeds such as wattles and peas. The chemicals produced by the fire will also encourage germination (see Fig. 2).

If the season is kind, then seeds which are stimulated to germinate by these fires will be supported by winter rain and plants that resprout from lignotubers will have water available to manufacture new food, using the released mineral nutrients to fuel the new growth. In adverse seasons the soil surface is exposed to potential wind and water erosion both from the bushland and into it from surrounding paddocks.

#### *Winter fires*

These low intensity fires will leave patches of unburnt vegetation. However, the new seed crop within the burnt patches may be destroyed before maturity, and plants such as everlastings and orchids, which have not evolved adaptations to survive fire during their growing season, will be damaged. Also, the fire may not trigger germination of the native seed stored in the soil, but could encourage the growth of grass weeds if they are present in the system.



Fig. 4: A winter burn in weedy bushland encouraged the growth of exotic grasses. Photo: A. Baxter



### Spring/early summer

These fires are low to moderately intense, depending on the air temperature and humidity, the amount and moisture content of the fuel and soil, and the wind strength. Some of the tree crowns will be scorched and some patches may be left unburnt. They will destroy that year's seed crop for many plants. Seeds on the surface will be stimulated to germinate, but the fire may not be hot enough to crack the dormancy of buried seed. They also encourage the growth of already established perennial grass weeds such as veldt grass. Germinating plants may not survive until the autumn break of the season. However plants that resprout will grow well over summer and out-compete seeders.

We recommend autumn burning for most regeneration burns, especially where regrowth of wattle and pea thickets is important. If, however, the potential intensity of the fire is a management concern, then the fire can be timed for after the first winter rains, which will reduce the fire intensity, but be prior to the active plant growth.

### Climatic events

The impact of unpredictable climatic events is enormous. Heavy rain after a fire can remove the ash, its mineral nutrients and germinating seed from the site. Weed seeds and artificial fertilisers can also be blown or washed in from surrounding paddocks. Regenerating plants can be affected by prolonged dry periods or frost, especially on granites and sandy soils.

### Patchiness of fire

Burning small patches at a time creates an uneven aged bushland which has many advantages for both plants and animals. Seeds from unburnt patches can reinvade the burnt areas and recently burnt patches can be used as a break for the next planned fire. This more diverse environment generally makes it more resilient to fire – a case of not putting all your eggs in one basket!

**A 'safe' plan is to use only small patches of fire within a remnant, to create a mosaic of vegetation of different ages which maximises the resources for fauna and makes the remnant more resilient to fire.**

## EFFECT OF FIRE ON NATIVE FAUNA

Fire may kill some animals, whilst those that survive by sheltering in burrows may die of starvation or predation soon afterwards. If the remnant is connected to or near other bushland, then recolonisation can occur. If the whole block is burnt and migration is not possible, the animal may go locally extinct. Hence, burning small patches within a remnant to create a mosaic of different ages will allow animals to persist in an area.

The fire frequency that favours particular animals varies considerably from animal to animal. Some animals require long unburnt vegetation, for example, mallee fowl which require leaf litter for nest building are more common in mallee and broombush which has not been burnt for more than 40 years. A study in the Fitzgerald River National Park found that capture rates of honey possums were low

for four to five years after a fire and peaked at 30 years - this pattern follows the amount of cover available.

Winter fires will disrupt the breeding cycle of some animals and spring fires may kill some young animals, for example nesting birds.

Hollows are also very important. Ironically, fire consumes hollows in trees and logs on the ground, and it creates them. Many animals including bats and 18% of Australian birds have been shown to use tree hollows for nesting or cover; numbats and some lizards need hollow logs on the ground. For these animals, the effects of fire can improve or destroy the habitat that they require. To save hollows, you may need to remove any debris that has accumulated against the trunks of favoured trees and around logs on the ground.

## EFFECT OF FIRE ON SMALL REMNANTS

Disturbance is a key factor in opening up the bush to change, and fire is a major disturbance.

Small bush remnants are very often isolated and subject to far more disturbing factors than they would have suffered prior to European settlement, putting the natural communities under great stress. They are less resilient and often degrade to a simpler community.

Generally, the greater the 'edge-to-area ratio', the more effect the stress factors will have and the more quickly the bush is likely to degrade. Linear strips such as roadsides are the classic example.

### Weeds

Having opened up the bushland it is very easy for weed invasion to occur at the edges and quickly cover the whole patch. Many introduced plants – especially pasture and crop weeds – enjoy disturbance and will displace native disturbance opportunists such as everlasting daisies. Similarly perennial/woody weeds, such as tagasaste, will displace shrub species.

This leads to a change in community structure, which will provide different resources for fauna and in turn respond differently to fire.

Many weeds will change the fire's characteristics including its readiness to burn, how easily it will spread, and the temperature at ground level. Bunch grasses which evolved in southern Africa under a regime of annual burning (eg African love grass, tamboukie, veldt grass), cause a massive change in the fire response when they come to dominate the ground layer of Western Australian communities. Veldt grass in banksia woodland is a good example of this bad problem.

You can use the period immediately after a fire, (whether the fire was planned or unplanned) to undertake control of some difficult perennial weeds such as African love grass or bridal creeper. They will respond to the fire with rapid growth from underground reserves, often before native plants have started to resprout or seeds to germinate. Thus they can be hit immediately with a knock-down herbicide, without danger of damaging desirable native plant regeneration. In addition, because the fire opens up

an area, it is easier to reach dense infestations, and to locate all sites for control work.

## WHEN NEVER TO USE FIRE FOR REGENERATION

When the soil is buried by wind-deposited material

Sometimes the natural soil surface (including rootstocks) is covered by a non-wetting layer of soil (usually sand), straw, weed seeds and sheep droppings blown in from an adjoining paddock. This prevents heat cracking the buried seeds and the chemicals leached from combustion products from reaching seeds and so stimulating germination. Buried rootstocks will often not regrow. Such a site, very common along sandplain roadsides, is gone for ever.

During or immediately after a severe drought

In this case, the plants are already under extreme stress and being forced to regenerate could totally exhaust those that resprout from lignotubers and so lead to death. Similarly there may not have been good seed set in previous years. Give the bush a couple of years of average conditions in which to recover.

When a locust plague is predicted for the following year!

## SOME MANAGEMENT PRINCIPLES

The correct use of fire can stimulate regeneration and regrowth in bushland, thus creating habitats for fauna.

There is no need to "tidy up" the bush; some standing dead vegetation is beneficial in your bushland, providing habitat for many animals. As a general rule, if more than fifty percent of the understorey shrubs are dying or dead, the area is ready for a regeneration fire.

Successful regeneration of reseeders species is dependent

**A cautionary tale - fires can be deceptive. A landholder reported:**

"On a cool May morning I lit a small fire on a 2.5ha block of bush. It burnt slowly and gradually went out. Thinking this was a very good result, I went off to town for about three hours. On returning, I found a blaze that required neighbours and the volunteer fire brigade to attend."

on the availability of viable seed. Before burning an area of bushland, monitor the plants over the previous year to ensure that they have produced viable seed. Not all plants produce seed each year and this can affect the success of the regeneration. Other species may be able to regenerate from soil seed stores. Knowing your plants can help to plan a successful regeneration burn.

If all the shrubs are gone (eg after a long period of grazing or a long period without fire) some of the small seeds which could have been stored in the soil may be absent. You may

need to introduce more seed into the system, preferably from a similar site nearby. The best way to test this out is to set up a small trial area and monitor regeneration.

Similarly, if there is not sufficient woody debris on the bushland floor, it may not carry a fire of sufficient intensity to promote regeneration of seeds such as wattles or peas, which are stored in the soil seed bank for many years.

A mosaic of small patch burns will create a greater variety of habitats for animals and allow them to recolonise an area as it regenerates. It will also prevent major losses to the bushland's resource if detrimental climatic events occur after the fire. If this is not possible, a combination of 'heap burns' (bonfires) and direct seeding is recommended, on-going in different locations every year (see Fig 5).

Aboriginal people used to burn bushland to attract grazing animals. Heavy grazing pressure can undo all the good the regeneration burn has done! Therefore after using fire, check immediately to ensure that fences are intact and stock excluded. Rabbits need to be controlled and in some instances (and under a specified management plan) kangaroos culled.

Follow the prohibited and restricted burning times for your area. Remember, nothing said here can override a landholder's responsibility under the Bushfires Act and the Fire and Emergency Services Act. You are obliged to keep the fire under control and on your property. If it escapes you could be answerable for the damage caused.

Essentially, to keep your bushland healthy, planned fire is a management tool you may need to consider. But before you get out the matches, work through the attached checklist.

Whatever strategy is chosen, there will inevitably be gains and losses. Though we may plan as well as we can, the result of fire in your small remnant is in the lap of the gods!

**'Hot' fires severely damage existing trees and can affect fauna. In relatively small remnants they are neither practical nor desirable. Piling dead material into low heaps and then burning them can create the same effect in a manageable way.**



Fig 5: Brushing on ashbed trial, Muresk College of Agriculture. A 'tidy-up' bonfire was burnt on this site, then a week or so later, a seed-bearing branch from a nearby York gum was placed onto the ashbed. Three years later, this vigorous young tree is the result.

Photo: P. Hussey

# Small Remnant Fire Management Checklist

1. *What do you hope to achieve by burning this bushland?*

- protection of human property from wildfire?
- promote regeneration of the vegetation community?
- or both?

The answer will dictate what type of fire you use.

2. *Does the whole remnant need to be burnt, or will a smaller burn satisfy the objective?*

- whole remnant
- smaller burn

A smaller burn minimises the possibility of irreversible ecological failures (eg should a severe drought occur in the seasons following the fire).

3. *Can small areas be burnt over several years to create a mosaic of vegetation of differing ages?*

- yes
- no

Vegetation at different stages of growth is ideal for the maintenance of resources for fauna.

4. *Is the remnant connected to other remnants by a suitable bush corridor?*

- yes
- no

This will influence how fauna can get away from the fire, or return to regenerating areas.

5. *If it is not connected, can a bush corridor be planted prior to any burn being undertaken?*

- yes
- no

Consider the needs of, for example, small birds, and design the corridor to facilitate their movement.

6. *Are the major plant species setting seed?*

- yes
- no

If not, regeneration will be impeded. Allow twice the length of time to first seeding of the slowest growing plants for an appropriate interval between fires.

7. *Are there weeds in the bush?*

- yes
- no

Control prior to the burn.

8. *Is there a nearby source of weed seed?*

- yes
- no

Leave a buffer between the source of the seed and the area to be burnt.

9. *Is spread of *Phytophthora* or other plant diseases possible?*

- yes
- no

Take appropriate precautions.

10. *Is Declared Rare Flora, Threatened Fauna or a Threatened Ecological Community present?*

- yes
- no

Consult CALM.

11. *Are there special flora/fauna habitat features present, eg a wetland, or hollows in logs or trees?*

- yes
- no

They may need to be specially protected.

## FURTHER READING

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## ACKNOWLEDGMENTS

Many thanks to Ken Atkins, John Carter, Brad Commins, Cherie Kemp and Lachie McCaw for helpful comments on earlier versions of the text.

# Fire Management Plan

Name of bushland: .....

## OBJECTIVES

## ISSUES

Problem	Solutions

## PLAN OF ACTION

What	Who	When

## MONITORING AND EVALUATION

What	Date	Results

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Published by the Department of Conservation and Land Management, Perth.  
 All correspondence should be addressed to: The Editor 'Wildlife Notes', CALM Species and Communities Branch, Locked Bag 104,  
 Bentley Delivery Centre, WA 6983. Phone: (08) 9334 0530, Fax (08) 9334 0199

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## Planned Burning Times and Regulations

Planned burning for the South-west of Western Australia , on private property, is best undertaken from April to October each year, timeframes can alter depending on recent and predicted weather patterns and at the discrepancy of each local Shire. Planned burning activities should generally be undertaken when:

- The weather is cool.
- The wind is light to gentle (less than 20kms/hr).
- There is enough moisture in the vegetation (it is ideal to burn after 2 days, but no more than 10 days, since 5 millimetres of rain or greater).

**It is extremely important to keep an eye on the weather forecast for the following several days after the day of the burning activity, to ensure that the mild conditions**

**All Landholders and managers are responsible for managing fuel loads in accordance with the regulations and requirements of your local government**

**Contact your local government or visit their website for fire notice information. Legal requirements can be found in the DFES Burn SMART guide which can be downloaded at [www.dfes.wa.gov.au](http://www.dfes.wa.gov.au)**



## Preparing for a Planned Burn

Preparing for a planned burn is just as important as undertaking one, there is a significant responsibility that comes with undertaking a planned burn and in the wrong conditions, any planned burn can escape and become a devastating bushfire.

The Department of Fire and Emergency Services has developed Burn SMART, a helpful and easy to use resource to support landholders throughout the South-west in the preparation and initiation of a planned burn on their property.

A small amount of information from the Burn SMART guide has been included in this document for your convenience. However, it is recommended that you download the entire document from the DFES website to ensure you are full equipped before you begin preparation for your planned burn.

**It is important for every landholder in the South-west to familiarise themselves with the DFES Burn SMART document and other related documents for planned burning within their local shire**



## Conducting a Planned Burn and Permits

All areas of the South-west have been experiencing extended drought periods, with this less likely to change in the future, it is highly important that properties are prepared for the hot, dry summer months. As stated previously, all property owners within the South-west are responsible for undertaking fire prevention methods. Penalties apply for property owner neglecting these responsibilities.

### Burning Permits

Every Shire within the South-west has a certain date to which burning is NOT permitted, overall these date are around 30 December to 28 March. A burning permit must be obtained to undertake any form of burning (including rubbish and garden material) from 15 November to 29 December.

**All planned burning dates are subject to change each year, check with your individual shire for exact date prior to planned burning of any sort.**

Fire permits can be obtain from your local shire and all conditions imposed by the Shire's Fire Control Officers and Authorised Persons must be followed. Conditions may include;

- Three adults present at the fire at all times.
- Neighbouring property owners and occupiers notified at least four days before burning or on the day if agreed.
- Running water or a fire unit with pump and at least 500 litres of water at the fire at all times.
- Specific time of burn
- Certain wind conditions and direction for fire and smoke management.

**Fire permits are automatically cancelled on days of extreme fire danger as NO burning of any type is permitted on these days.**

**NOTE: If you are wanting to undertake a planned burn and are not confident on how to prepare and/or undertake the burn, contact your local Volunteer Bushfire Brigade or Shire's Fire Control Officer for assistance**





DFES  
Department of Fire & Emergency Services

FOR A SAFER STATE



TRAINING / KNOWLEDGE / ENGAGEMENT

# Burn SMART

## Planned burning fact sheet



Burn SMART

### What is planned burning?

Planned burning is the deliberate burning of a specific area, under carefully managed conditions, to reduce fuel such as dead wood, leaf litter, bark and shrubs.

### Why is planned burning important?

If you own or manage land in Western Australia it is your responsibility to reduce the risk of bushfire impacting it. This applies to all landholders and land occupiers, including private homes, businesses and Local, State and Federal Government.

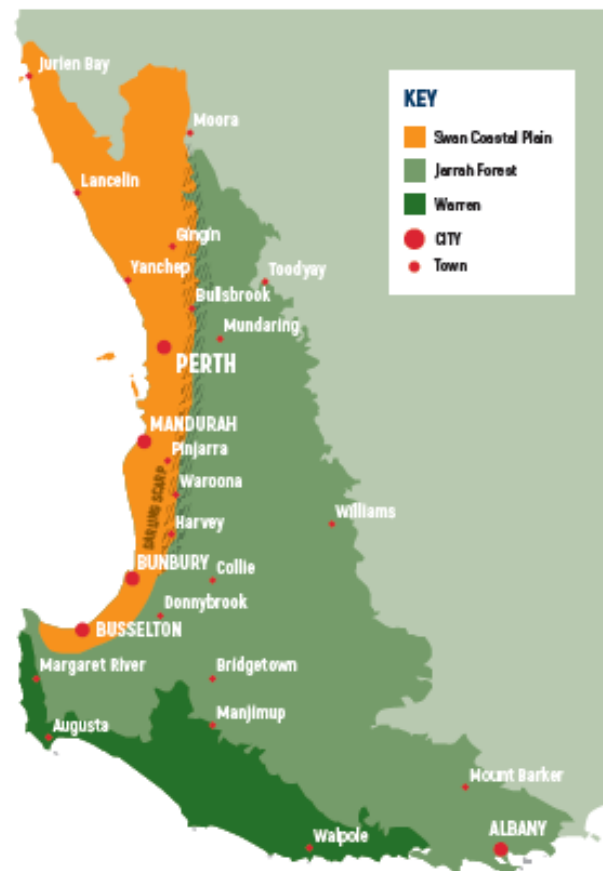
**Under the right conditions, planned burning can help you to reduce the amount of flammable material on your property, potentially reducing the impact of bushfire.**

When a bushfire enters an area of reduced fuel, the rate of bushfire spread slows and the intensity at which it burns is reduced. This means landholders and firefighters have a better chance of containing the fire and it is less likely to cause damage to property.

**In the wrong conditions, a planned burn can escape and become an uncontrollable fire, putting lives and homes at risk. If you plan to burn, plan to Burn SMART.**

### How do I Burn SMART?

DFES' Bushfire Centre of Excellence has created a Burn SMART Guide and Burn SMART Checklist, with information for private landholders about planned burning, and actions to take before, during and after your burn. The Guide and Checklist apply to properties within the Swan Coastal Plain, Jarrah Forest or Warren biogeographic regions (see map). **Copies can be downloaded at [dfes.wa.gov.au/plannedburning](https://dfes.wa.gov.au/plannedburning) or ask your local fire brigade.**



**Remember, YOU are responsible for any burns on your property and must take care to recognise and manage risks. Plan smart. Burn SMART.**

Find out more at: [dfes.wa.gov.au/plannedburning](https://dfes.wa.gov.au/plannedburning) / Email: [BushfireCoE@dfes.wa.gov.au](mailto:BushfireCoE@dfes.wa.gov.au)

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Acknowledgment: This resource was prepared by DFES Community Preparedness in collaboration with the Bushfire Centre of Excellence.

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# Burn SMART Checklist



Burn SMART

## Stages 1 and 2: Planning the burn

Planning should be undertaken weeks or even months in advance of your planned burn.

	✓ COMPLETE
Develop a fuel management strategy for your property. Sketch how you will divide your property into manageable burn patches. Refer to full instructions on pages 12-14 of the Burn SMART guide.	
Contact your local government for information on burning restrictions in your area. A permit to burn will be required during restricted burning season.	
Prepare your burn patch. Refer to and complete the list of preparations on page 14 of the Burn SMART guide.	

## Stage 3: Before the burn

	✓ COMPLETE
Confirm it has been two days but no more than 10 days since it last rained (5 mm or greater). You can check at <a href="http://www.bom.gov.au/climate/data">www.bom.gov.au/climate/data</a> .	
Check for mild weather conditions for the next several days at <a href="http://www.bom.gov.au/places/wa">www.bom.gov.au/places/wa</a> . Do not burn if strong winds and dry conditions are forecast.	
Ensure all equipment is available and in good working order. Include a metal rake, shovel, hose or another source of water.	
Confirm that the people helping you with the burn are still available.	
Notify all neighbours no less than four days prior to burning. This includes neighbours separated by a road, lane or waterway.	

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## Stages 4 and 5: Day of the burn

	✓ COMPLETE
Visit <a href="http://www.emergency.wa.gov.au">www.emergency.wa.gov.au</a> for current Total Fire Ban and Fire Danger Ratings In your area.	
Visit <a href="http://www.bom.gov.au/wa/warnings">www.bom.gov.au/wa/warnings</a> to check that the Bureau of Meteorology has not issued a severe weather, strong wind warning or haze alert for your area.	
Check your local weather forecast at <a href="http://www.bom.gov.au/places/wa">www.bom.gov.au/places/wa</a> . Wind speeds should be less than 20 kilometres per hour. Relative humidity should be greater than or equal to 40%.	
Notify your local government of your Intent to burn, if required. If a permit has been issued, ensure burn conditions comply with those outlined on the permit and any additional notifications are completed.	
Complete the leaf moisture method on pages 8-9 of the Burn SMART guide. Confirm fuel moisture levels are appropriate for a burn.	
Call your neighbours and remind them that you're burning today.	
Register your burn with the DFES Communications Centre on <b>08 9395 9209</b> .	
Conduct a pre-burn briefing with everyone who will be helping with your burn.	
Know the steps you need to take in <b>Stage 5: During the burn</b> shown on page 17 of the Burn SMART guide.	

If the above steps have been completed and the conditions are suitable, progress with your burn.

## Stage 6: After the burn

	✓ COMPLETE
Check the burn area the following day to ensure the fire has not reignited. There should be no smoke, smouldering vegetation or glowing embers.	
Thoroughly check the burn patch several times a day for at least two days after the burn. Check for longer if the weather becomes hotter, drier or windier. Larger fuels may continue to smoulder for several days and potentially reignite. Monitor the area until you are confident that the burn is completely extinguished.	

For more advice, consult your local government ([www.walga.asn.au/About-Local-Government/Online-Local-Government-Directory.aspx](http://www.walga.asn.au/About-Local-Government/Online-Local-Government-Directory.aspx)). Always check your local government requirements before conducting a burn.

Find out more at: [dfes.wa.gov.au/plannedburning](http://dfes.wa.gov.au/plannedburning) / Email: [BushfireCoE@dfes.wa.gov.au](mailto:BushfireCoE@dfes.wa.gov.au)



# Burn SMART

## Leaf moisture method



### Leaf moisture method - understanding the results

How quickly and intensely a dead leaf sample burns offers a strong indication of its moisture level. This is valuable to consider when judging the potential success of a planned burn. Use these markers as a guide.

Wet	Damp	Moist	Dry	Very dry
<p>Leaf burns only when pointed straight down or does not burn at all</p> <p>If in the area to be burnt, then the fuel is too moist to burn</p>	<p>Leaf burns when angled down but not when level</p> <p>If the leaf sample is from the:</p> <p><b>Top layer</b> The fire will burn slowly</p> <p><b>Bottom layer</b> The fuel moisture is okay</p> <p>Fires with damp fuels tend to need the wind and/or a slope to spread</p>	<p>Leaf burns when level but not when angled up</p> <p>If the leaf sample is from the:</p> <p><b>Top layer</b> The fire will burn at the upper level of intensity for a burn</p> <p><b>Bottom layer</b> The fuel moisture is okay</p>	<p>Leaf burns when angled up, but not if vertical</p> <p>If the leaf sample is from the:</p> <p><b>Top layer</b> The fire will burn at too high an intensity for a burn</p> <p><b>Bottom layer</b> The fuel is too dry to perform a burn</p>	<p>Leaf burns when angled straight up</p> <p>The fuel is too dry to burn</p>
<p><b>Recommendation</b> Postpone planned burn until moisture levels drop</p>	<p><b>Recommendation</b> Proceed with planned burn</p>	<p><b>Recommendation</b> Proceed with planned burn, but exercise caution</p>	<p><b>Recommendation</b> Do not proceed with planned burn</p>	<p><b>Recommendation</b> Do not proceed with planned burn</p>

Find out more at: [dfes.wa.gov.au/plannedburning](https://dfes.wa.gov.au/plannedburning) / Email: [BushfireCoE@dfes.wa.gov.au](mailto:BushfireCoE@dfes.wa.gov.au)

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Department of Biodiversity, Conservation and Attractions, Parks and Wildlife Services, [www.dpaw.wa.gov.au](http://www.dpaw.wa.gov.au)  
City of Bunbury, [www.bunbury.wa.gov.au](http://www.bunbury.wa.gov.au)  
Shire of Bridgetown Greenbushes, [www.bridgetown.wa.gov.au](http://www.bridgetown.wa.gov.au)  
Shire of Manjimup, [www.manjimup.wa.gov.au](http://www.manjimup.wa.gov.au)  
Maroo Wildlife Refuge Inc, [www.maroowildliferefuge.com](http://www.maroowildliferefuge.com)  
Birdlife Australia, [www.birdlife.org.au](http://www.birdlife.org.au)  
FAWNA, [www.fawna.com.au](http://www.fawna.com.au)  
Blackwood Basin Group, [www.blackwoodbasingroup.com.au](http://www.blackwoodbasingroup.com.au)

**The production of the document, 'The Use of Fire as a Management Tool for Properties in the South-west of Western Australia', produced by the Blackwood Basin Group, 2020.**

***This project is supported by the Department of Agriculture and Water Resources, through funding from the Australian Government's National Landcare Program.***