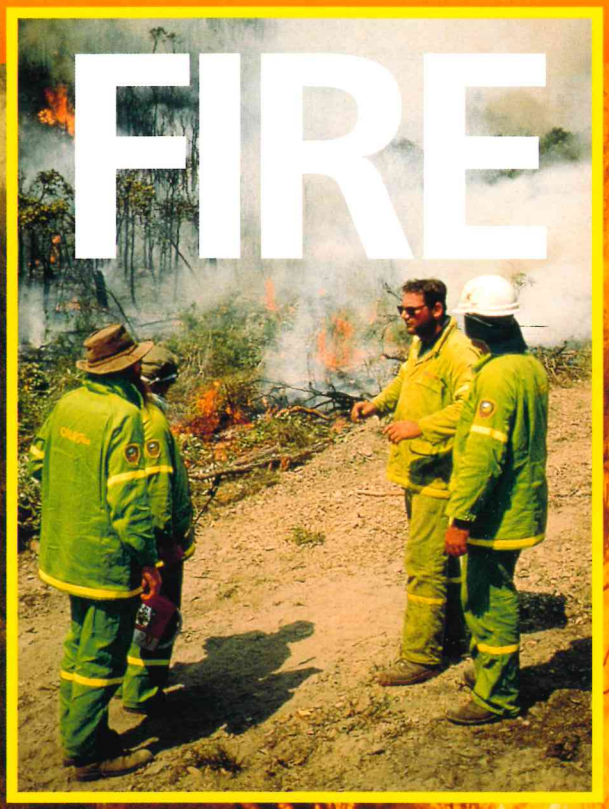
# MANAGING FIRE



DEPARTMENT OF
Conservation
AND LAND MANAGEMENT

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Fire has been a natural element of the Australian landscape for millions of years. Along with other natural disturbances, such as drought, storms and geological changes, fire has shaped the Australian environment, its native plants and animals and the ecosystems that sustain them. Many species have developed specific mechanisms to survive and tolerate periodic fire. Some even depend on fire for regeneration and other critical life stages.

Aboriginal people have used fire for more than 40,000 years for heating, cooking and for clearing the country to enable easier access for hunting, as well as to stimulate regrowth of native grasses to attract native grazing animals. Aborigines also used fire to create buffers to help protect them against the ravages of wildfires.

*Each year CALM firefighters battle hundreds of wildfires throughout the south-west forests.*
*Photo - Neil Burrows*

Early European explorers and colonists often referred to the ever-present smoke plumes and the Aborigines' extraordinary familiarity and dexterity at using fire in a wide range of circumstances.

But in Western Australia today, we have a very fire-sensitive community embedded in a very fire-prone environment. While natural fires in the past once would run their course until it rained, the creation of towns and settlements, community assets, farmlands and other developments has meant that today's community needs protection against the ravages of wildfires.

The Department of Conservation and Land Management (CALM) uses fire in a planned way to reduce the severity of wildfires. This in turn provides safety to firefighters, neighbours and visitors, protects community assets and natural values, and ensures the State's conservation lands are managed sustainably. There are three main types of planned burns:

**Fuel management** - these burns are designed to protect life, property, community assets, forests and parks, and environmental values including fire-sensitive species of native plants and animals.

**Ecological management** - planned burns are used to maintain and enhance ecological processes on which native plants and animals depend.

**Regenerating the forest** - moderate to high intensity fire is an effective tool for providing appropriate conditions for native forest regeneration following timber harvesting.

Low to moderate intensity fire is also used sometimes to remove debris in native forests and plantations following timber harvesting, to ensure they are protected from future fires.

In many cases, planned burns are undertaken to achieve both protection and ecological management objectives by varying the seasons, fire intensities and the intervals between fire.

*Front cover*
*Main: Kings Park Fire,*
*January 1989.*
*Photo - Carolyn Thomson-Dans*

*Inset: CALM firefighters.*
*Photo - Lachlan McCaw*

*Low intensity planned burns consume ground fuels and reduce the severity of summer wildfires.*
*Photo - Chris Garnett*

## Fire behaviour

Each year, around 500 bushfires occur on the lands CALM manages. Although most of these are caused by humans—either arson or by accident—lightning is a major cause, particularly in the south-west forests, along the south coast and in the Midwest Region north of Perth.

While every effort is made to contain them as quickly as possible, a combination of factors can mean that even a small fire can rapidly escalate into a raging inferno, releasing enough energy to power a city the size of Bunbury.

Fire behaviour is the term fire managers use to describe the fire spread, flame height and intensity or severity of bushfires.

The key factors that influence fire behaviour are wind, the slope of the area in which the fire is burning, and the amount and dryness of fuel available for burning.

In the forest areas, fuel comprises ground litter including leaves, bark, and fine twigs, and the low shrub vegetation. Each year, up to two tonnes per hectare of leaves and fine twigs accumulate on the forest floor in the jarrah forest. In the karri and tingle forest, this build up is considerably higher. In the absence of fire, these fuels become very heavy and after a few years will sustain a high intensity fire that cannot be controlled safely even on days of moderate fire danger.

Fire managers can't control the wind or slope—but they can control the amount of fuel available for wildfires by using planned burns to create strategic buffers in which the fuel loads have been regularly reduced.

Fuel reduction burns lit under mild weather conditions are low intensity, slow moving fires that creep across the forest floor consuming the leaves, twigs and bark. Not all the fuel is burned. These types of planned fires are designed to leave a mosaic of burned and unburned pockets to create a patchwork effect. Once forest fuels are reduced, a crown fire will not develop—even under extreme weather conditions.

*A bull banksia resprouting after fire.*
*Photo - G.Saueracker/Lochman*

## Native plant and animal management

Fire is a significant factor that has shaped the distribution and composition of much of Western Australia's native plants and animals. Many species have developed specific mechanisms that enable them to survive periodic fires. For example, some plant species resprout immediately after fires, while others rely on fire to crack their hard seed pods so that seeds are scattered in the resulting ashbeds in a nutrient-rich and competition-free environment for rapid regeneration after rain.

The impact of fire on a given ecosystem depends of several factors. These are the intensity of the fire, the season, the time since the last fire, the extent of the fire and the stage of plant growth. The long-term effect of fire on the landscape varies according to sequences of fire events rather than a single event.

Planning for burning takes all these factors into account. For example, the season in which planned fires are carried out is varied as much as practicable so that all fire dependent plants and animals are equally favoured. Similarly, the period between planned fires is delayed long enough to ensure that plants regenerating from seed have time to flower and develop adequate 'seed banks' needed to produce new seedlings.

*Tammar wallabies require fire-induced thickets in streamlines for refuge during reproduction and for protection from predators.*
*Photo - Babs and Bert Wells/CALM*

The planning process also considers the impact of fire on threatened species. Fire can be used to create low fuel areas around areas that contain plant species or animal habitats that require long intervals between fires. Alternatively, fire can be used to stimulate the growth of those species that, in the absence of fire, may become locally extinct.

Fires are also used to protect or regenerate animal habitats and to promote the growth of vegetation on which native animals feed, such as the thickets growing alongside streams where tammar wallabies and quokkas live. These thickets need periodic fire—about every 15 to 25 years—to regenerate. Therefore, strategic fuel-reduced buffers are needed in adjacent areas to protect their habitat from the ravages of wildfires.

*Young jarrah regrowth emerges through gaps in the forest canopy following carefully prescribed silvicultural burning.*
*Photo - Chris Garnett/CALM*

## Regenerating the forest

In the public forests of the south-west, planned fire is an important tool to regenerate the trees after timber harvesting. Under favourable weather conditions, high intensity planned burns are used to create nutrient-rich ashbeds on which seedlings will grow rapidly. Jarrah trees resprout from underground woody growths called lignotubers. Fire is used to stimulate these lignotubers into sending up new shoots that create a new forest. Fire also stimulates other understorey plant and tree species so that, over time, the variety of plants and animals in forests is maintained and enhanced.

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## When to burn

Low intensity, patch burns designed to provide protection to natural and community assets are usually conducted in spring or autumn when the weather is mild and fire behaviour is more predictable and easier to manage. Spring burns generally leave moist gully systems untouched and generally result in a burnt and unburnt patchwork. Autumn burns are usually more complete due to the dryness of the fuels and vegetation.

High intensity burns for forest regeneration are usually scheduled in summer when fuels are dry and easily consumed.

Even though burns might be scheduled for a particular season, the actual number carried out depends on prevailing weather conditions and available resources. Often, burns scheduled for a particular year are postponed for a later time when conditions are more favourable.

*Burn Managers measure forest fuel weights that are used to calculate fire spread and intensity for planned burns.*
*Photo - Lachlan McCaw*

## Planning for burns

CALM has a strict set of operating procedures that need to be followed in preparing for and conducting planned burning. Proposed burns are planned many years ahead so that managers can program other activities such as recreation and visitor management, habitat regeneration and commercial forest management.

Environmental impacts are assessed before the burn is approved, and all safety factors are identified. A detailed 'prescription' is prepared, which includes objectives, burn condition calculations (dependent on weather, fuel moisture, slopes) and the lighting pattern needed to achieve the objectives.

During the development of the annual burn plans, CALM staff liaise closely with local communities through shires, volunteer fire brigades and the Fire and Emergency Services Authority.

CALM staff also liaise closely with neighbours and notify them when burns will be carried out. Signs warning of imminent burning are posted in prominent positions in the area several weeks before the burn. The first ignition involves edge burning around the perimeter of the burn. This initial burn helps minimise the risk of the planned burn escaping into other parts of the forest or on to neighbours' land.

A decision to go ahead with a planned burn is based on accurate weather forecasts from the Bureau of Meteorology for days before and after the burn. This information is needed to calculate predicted fire behaviour, and the direction and spread of smoke plumes.

The burns are lit either by ground crews using drip torches for small areas, or from aircraft using incendiary devices for large-scale burns. Other ignition methods include driving along established tracks using a flame-thrower or using an aerial drip torch slung under a helicopter. The latter are used to develop moderate to high intensity fires to burn heavy fuels resulting from timber harvesting.

CALM crews, sometimes with the assistance of local volunteer fire brigades, constantly monitor progress while the burn is under way and then mop up and patrol the edges to ensure the fire is safe.

*Smoke from CALM planned burning is diverted away from population centres by accurate weather forecasting and burn scheduling.*
*Photo - Jiri Lochman*

## What about smoke?

CALM works closely with other agencies including the Bureau of Meteorology and the Department of Environmental Protection in developing processes to ensure smoke from planned burns does not impact on cities and large towns.

CALM fire managers take account of many factors such as burn location and size, wind speed and direction and the likelihood of temperature inversions—where a layer of cooler air is trapped under a layer of warmer air. While these inversions moderate fire behaviour, they also can trap smoke and lead to haze.

The careful application of the smoke management system has ensured that in the past few years, smoke from CALM's planned burns have been well within haze standards set down by the National Environment Protection Authority. These standards are equal to the most strict in the world.

## Conclusion

The use of fire to achieve land management and nature conservation objectives remains a contentious issue among some members of the public. There is a variety of views within the community that range from the belief that there should be no interference to natural fire patterns through to the belief that because fire is a natural part of the forest's ecology it should be used freely as a management tool.

However, one fact that cannot be denied is that fire was, is and will remain an integral part of our natural Australian environment. Perceptions by Australians continue to evolve .

*Planned burning is designed to create mosaics of burnt and unburnt patches that provides protection to farms and forests.*
*Photo - Cliff Winfield*

## Further reading

CALM has produced a special edition of *LANDSCOPE* Magazine —*Fire - the Force of Life*—which focuses of the role of fire in the landscape and in land management. Copies are available from local CALM offices.

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