HOTSPOTS FIRE PROJECT

MANAGING FIRE ON YOUR PROPERTY:

A booklet for landholders in the central west

Nature Conservation Council of NSW

Environmental TRUST

FIREWISE

This project has been assisted by the New South Wales Government through its Environmental Trust.

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Managing fire on your property

VERSION 1, MAY 2007

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WHAT DOES THIS BOOKLET COVER?

Hazard reduction burn. © Mathew Shroder, NSW Rural Fire Service.

HOTSPOTS FIRE PROJECT

Managing fire on your property

© C. Wade, NSW Rural Fire Service.

1. LIVING WITH FIRE

1.1 Fire in the Central West

In many places, fire is part of life on the land in the Central West of New South Wales. Some landholders use fire as a land management tool. Others are concerned about the impact of wild-fire on their properties, particularly when drought creates tinder-dry fuels.

This booklet provides an introduction to how fire can be managed for protection of life and property, and for healthy, productive landscapes. Developed specifically for the Central West, this booklet also presents a framework for incorporating fire into property management planning activities.

Knowledge about the nature of fire and its effects on your landscapes will give you greater confidence in managing fire, both for the protection of life and property, and as a land management tool in building healthy land systems.

For some landholders, this information will stimulate a new understanding of the role of fire in shaping and sustaining local landscapes and the plant and animal species they contain. For those of you already in the know - this information will add to your existing knowledge and hopefully prompt some important new insights into fire management.

1.2 Fire and the Australian continent

Triggered by lightning strikes and traditionally used by Aboriginal Australians, fire has shaped the character of Australian landscapes for millions of years. Many plant and animal species have evolved strategies for coping with fire, and some species have developed ways to take advantage of the opportunities it creates.

Aboriginal Australians actively used fire as a management tool. In some parts of the landscape, we know Aboriginal fire management practices involved more frequent fire at finer spatial scales than was the case before human beings arrived here. However, there is much debate about the nature and extent of Aboriginal burning across the Australian continent.

Even if we knew the whole story about Aboriginal fire management, this knowledge may not give us all the answers we need for the future conservation of native plant and animal communities. The changes to our landscapes since European colonisation have been profound. In particular we are faced with fragmented vegetation, the spread of introduced species, and changes in the abundance of native plants and animals.

We need to draw on both old and new knowledge about fire in order to protect our bush and so manage for healthy productive landscapes. Much of our new knowledge and our current understanding of how fire might best be managed comes from looking at the way plant and animal species in different communities respond to fire. This topic is the focus of the next section.

"For me fire is part of a bigger narrative about learning to live like an Australian, as if we intend to stay on this continent for ever, for good."[1]

[1] Andrew Campbell - farmer, first national Landcare facilitator, and Executive Director of Land and Water Australia speaking at the Australia Burning forum held just after the 2003 fires in Canberra. Quote taken from: Campbell, A. (2003) "Learning to live with fire" pp 243-247 in Cary, G., Lindenmayer, D., and Dovers, S. *Australia Burning: Fire Ecology, Policy and Management Issues*, CSIRO Publishing, Collingwood, Victoria.

2. MANAGING FIRE FOR BIODIVERSITY CONSERVATION

2.1 Science based management

Scientists and land managers have long recognised the relationship between biodiversity (the variety of different plant and animal species) and healthy land systems. Only in the last 20 to 30 years, however, have Australia's scientists gained a better understanding of the significant role that fire plays in shaping these land systems and the biodiversity within them. Fire ecology is now an important area of scientific study.

For landholders, the most useful information to come out of this research relates to how different aspects of fire affect vegetation and wildlife, and how different plant and animal species respond to fire.

© W. Parker, Hotspots Fire Project.

2.2 Plant responses to fire

Many Australian plant species have developed reproductive strategies in close association with fire. Since fire is such a powerful disturbance force, changes in fire patterns can quickly influence which species (and reproductive strategies) will persist in an area and which won't.

Different plant species respond differently to fire: some do not tolerate fire; some tolerate it but don't rely on it for reproduction; and in many Australian plant species, one or more aspects of reproduction – flowering, seed release or germination – occur exclusively, or most abundantly, in the months or years after a fire.

Scientists describe two broad post-fire regeneration strategies that occur in areas with a long history of fire which are of particular relevance to fire managers: *obligate seeding* and *resprouting*.

When *obligate seeder* species are exposed to a fire, all, or almost all, plants are killed. These species can persist, however, by regenerating from seed (they're *obliged* to regenerate from seed if they are to survive in an area). This seed may be stored in the soil, on the plant (e.g. in cones), or brought in from nearby unburnt patches of vegetation by wind, water, birds or other animals.

Land managers implementing fire management strategies need to consider the frequency of burning if they wish to ensure the survival of these obligate seeder species.

Fire frequency needs to take account of the life span of obligate seeders, including the amount of time it takes for these plants to experience their first flowering and to produce seeds. If the interval between two fires is too short, the second fire may wipe out an entire generation of young obligate seeders before they have reached reproductive maturity (i.e: before they have started producing seed).

On the other hand, if fire is excluded from an area for too long, a whole generation of obligate seeders may move beyond reproductive age and die off before a fire has had a chance to trigger germination. While some seeds can survive in the soil for very long periods, seeds of some species are relatively short lived.

Obligate seeders reliant on seed dispersal from other areas may also be threatened by extensive fires. This is because no or few seed supply areas escape being burnt. As a consequence, the likelihood of animals (or other dispersers) bringing in new seed is reduced.

Fire *intensity* can also affect obligate seeders (and this is determined, in part, by the frequency of burning and associated build up of fuel). Particular temperature ranges may be necessary to trigger seed release and/or germination.

Resprouters are able to resprout after fire from woody underground *lignotubers* or from buds protected underneath their bark. Many landholders may be familiar with the behaviour of these plants. Some resprouters can tolerate frequent fire, and some can live for a long time without fire. However, it is important to note that even resprouter populations may be affected by very frequent fire or by fire exclusion, and may rely on seed to ensure healthy, diverse gene pools.

Obligate seeder *Styphelia triflora* (pink five-corners) occurs in forests and woodlands across the Central West. © P. Watson, Hotspots Fire Project.

Eucalypt resprouting from buds under the bark. © P. Donatiu.

Not surprisingly, in the absence of fire, those plants which come to dominate the landscape often include shrubs which are able to regenerate without fire and other long lived plant species. These plants tend to competitively exclude the smaller, short lived species from available light and space. A fire can help to open up the bush so that light can once again reach ground level triggering resprouting, germination, and plant growth in many species.

Red stringy bark (*Eucalyptus macrorhyncha*) resprouting from base three months after fire. © P. Watson, Hotspots Fire Project.

2.3 Fire regimes

Fire regime is the term used to describe aspects of fire that are important for managing vegetation and wildlife.

A fire regime includes the following factors:

- **Fire frequency -** ***how often fire occurs.***
- **Fire extent -** ***the area covered by the fire.***
- **Fire intensity -** ***how hot the fire is.***
- **Fire season -** ***what time of year the fire occurs.***

More on fire frequency:

It is important to consider the *sequence* of fire events. Long term effects on landscape and biodiversity are generally the result of a pattern of fires over time, rather than of just a single fire. (Although this is not to say that a single fire doesn't have the potential to significantly impact on a given area, like vine thicket for example).

The amount of time between fires and the frequency with which fires occur in a given area is important in the conservation of our plant and animal species.

Frequent burning tends to reduce shrub cover and increase grassiness in some vegetation types, while infrequent fire has the opposite effect. Frequent burning can therefore result in more open landscapes, while infrequently burnt areas may naturally be more shrubby. These differences affect the animals and birds that live in the bush. Some animals need shrub cover to shelter and breed, while others need open, grassy areas to find their food.

Different vegetation types are adapted to different fire frequencies. Variability in the interval between fires is important for maintaining species diversity. Repeated fire intervals of similar length are not always good news for plants or animals.

More on fire extent:

The area covered by any particular fire can vary widely. Some wildfires can be very extensive – for example fires around Coonabarabran in late November 2006 burnt out 131,000 hectares including 90,000 hectares of the Pilliga Forest. Planned burns may range from small burns of a hectare or less, to block burns of several hundred hectares.

Extensively burnt areas can affect the ability of plants and animals to recover after fire. © G. Basnett, Hotspots Fire Project.

Within a fire perimeter, patches will often remain unburnt. Extensive fires that leave few unburnt patches may limit the ability of animals to find refuge during the fire, and food and shelter after it has passed. Unburnt patches provide a base from which animals can slowly move back into burnt areas as these recover. Those undertaking planned burns often aim to leave unburnt patches.

Unburnt patches will provide animals with a refuge during and after the fire. © W. Drake.

However, small burns may also have a down side. Animals can easily move into small burnt patches from surrounding unburnt country. These animals may place too much grazing pressure on the recovering vegetation in these small patches. This problem may be particularly prevalent where animals such as kangaroos are abundant. If a greater area is burnt, grazing pressure is more likely to be spread, reducing impacts on regenerating vegetation. Landholders wanting to burn with biodiversity in mind may therefore want to aim for burns of reasonable size, while still ensuring unburnt bushland patches remain for fauna. Burning a number of patches at once is another way to spread grazing pressure over a larger area. Previously burnt patches can provide boundaries for later patch burns.

More on fire intensity:

A fire varies in intensity depending on factors such as wind speed, temperature, humidity, slope, fuel load and the structure of the vegetation. The most intense fires tend to occur during times of high temperatures and on days when humidity is low and winds are strong. As a general rule:

- Fire is more intense when a significant amount of fine fuel is available and dry enough to support it. 'Fine fuel' is material less than a pencil width.
- High intensity fires are more destructive and will kill more plant and animal species, but they are also naturally occurring and important in some plant communities.
- After a high intensity fire, lots of seed germination may occur. Areas opened up by a high intensity fire will provide increased areas of sunlight and space for young plants to develop.
- Variation in fire intensity probably plays a role in keeping the greatest number of species in the community (i.e. maintaining biodiversity).

Low intensity fire. © S. Hemer.

Fire frequency and extent, and even intensity are naturally patterned across a landscape, particularly in mountainous and hilly country. This is determined largely by weather, aspect, slope and vegetation type. Fire management should therefore both respond to and make use of these patterns. For example, gullies often contain more moisture loving plant species than upper slopes and ridges. Unplanned fire is less likely to burn into gullies, since the gullies are naturally wetter and species in gullies are more likely to be adapted to less frequent fire than species growing on higher ground. A fire management plan should account for this.

High intensity fire. © G. Walker, NSW Rural Fire Service.

More about fire season:

Climate and weather will influence fire season more than any other factor. In the Central West bushfires generally occur in the summer but the bushfire danger period can begin as early as October and extend through to March. Areas further west have been known to experience bushfires through until April.

Planned burns are, of course, constrained by the bushfire danger period and fire bans, as well as by weather. The window of opportunity for planned burns is usually limited to autumn. In the spring, after the winter rains, it is often still too wet.

From an ecological point of view, some variability in the season in which a fire occurs is likely to be the best way to go. While the season appears to affect some individual species, scientific findings do not point to a particular season being 'better' for a whole community of plant and animal species. Where possible, it is probably better to avoid always burning at the same time of year.

2.4 Fire regimes: implications for management

At best, fire management planning is a blunt tool. In some parts of the landscape, unplanned fire is inevitable at some time in the future. Prevailing weather conditions and natural landscape patterns will often influence fire season, intensity and extent. Management planning needs to be flexible to accommodate variability in landscape and weather patterns, and unplanned fire.

Over many thousands of years, much of the Australian bush has evolved ways to live successfully with fire and use it to reproductive advantage. Many vegetation types have developed an ability to 'bounce back' from variable burn regimes. This bouncing back is often termed 'resilience'.

Resilience is important and provides opportunities for trial and error in managing fire on your property.

You should aim to vary your fire management actions over time, talk to people with knowledge in your region, and try different things based on your own observations of vegetation responses to fire on your property.

Biodiversity is more likely to be sustained when fire management extremes are avoided. Excluding all fire from your property, or burning as soon as vegetation has sufficient fuel to support a fire, will eventually see the loss of species adapted to a more moderate or variable situation.

3. FIRE IN THE LANDSCAPE: PUTTING THE SCIENCE INTO CONTEXT

Like many natural processes, the relationship between vegetation and fire regime is complex. However, there are some simple principles that emerge in the following stories about fire in particular plant and animal communities.

FIRE FREQUENCY IN TEMPERATE GRASSY WOODLANDS

Grassy woodlands on the slopes and tablelands of the Central West have been used extensively for pasture. Patches of good quality grassy woodland where native species still dominate are therefore very valuable from a conservation point of view.

Kangaroo grass. © N. Conroy, Hotspots Fire Project.

Fire frequency can affect the balance between woody species and grasses in some grassy vegetation types. Frequent burning tends to produce open, grassy landscapes, whereas in places where fire has been excluded or is rare, shrubs and young trees may increase in number.

Plant diversity in grassy woodland is concentrated in the ground layer. Here, tussock grasses such as kangaroo grass (*Themeda australis*), snowgrass (*Poa sieberiana*) and wallaby grasses (e.g. *Austrodanthonia* species) dominate the ground layer. Smaller grasses and herbs grow in the spaces between these tussocks. Fire burns the dense tussocks back, making space for the smaller species. Many grasses and herbs flower rapidly after fire, producing seeds which germinate while gaps between resprouting grass tussocks are still available. Some native tussock grasses, particularly kangaroo grass, are encouraged by fire. Thus fire provides a way for large native grasses, small grasses and herbs to live together.

Where fire has been excluded from grassy areas, shrubs may increase or decrease depending on whether or not the species present rely on fire for regeneration. Shrubs that depend on fire to regenerate will die off after a long fire-free interval, producing a more open understorey than in the years following fire. When a fire next comes along, these shrubs may reappear in large numbers as seed stored in soil is stimulated to germinate. Some shrubs, however, can regenerate between fires. Where this is the case, the density of these shrubs will increase in the absence of fire. Where fire frequency is low, and environmental conditions are right, these species may progressively come to dominate the landscape.

In some situations, shrub density may increase to the point where grasses and herbs are shaded out. Heavy litter which accumulates as time goes by after a fire may also leave little room for small ground layer species. Thus, relatively frequent fire may be important for maintaining vibrant populations of grasses and herbs as well as the animals which feed on them.

Both ground layer plants and shrubs form part of the rich diversity of grassy woodlands in the Central West. Varying fire frequency over time and space is important for maintaining this diversity. Patchy fires help to ensure enough space for all species including shrubs, grasses and herbs.

ENCOURAGING DIVERSITY IN WHITE CYPRESS PINE WOODLANDS

White cypress pine (*Callitris glaucophylla*) is a prominent feature of the landscape across central and western New South Wales. Unlike many shrubs in the Australian bush, the recruitment of white cypress pine isn't triggered by fire, but rather is an occasional event associated with particularly good rainfall. The density of young pines can be quite stunning. Unlike eucalypts, pine seedlings don't easily self-thin; thick stands of small spindly trees can remain for decades. Whilst these stands provide perches and nest sites for some birds, dense regrowth is less than ideal habitat for many fauna species.

The last two hundred years have seen many changes in the cypress pine woodlands. Some have been cleared for cropping, while elsewhere the density of pine has increased. The balance between eucalypts and pines, and between large and small trees, has also changed. Early 19th century leases often required landholders to remove eucalypts, shrubs and young pines. Mature pines provided excellent wood. As foresters know, pine regeneration happens readily in 'understocked' stands: where once mature eucalypts and pines left few resources for new plants, logging created gaps for young pines to come in.

Fire regimes have also changed. Historians and scientists who have studied cypress pine forests generally agree that fires started by Aborigines and lightning probably once helped maintain a mosaic of woodland patches. In many places the understorey was open and grassy under a canopy of eucalypts and mature pines, while in other places shrubs and young cypress grew thickly or in clumps. White cypress pine is much more sensitive to fire than the eucalypts that grow with it. Not that all cypress plants are killed in every fire: even in hot wildfires a proportion generally survives by getting above the flames. Seedlings, however, are readily killed in a burn. Thus fire has the potential to kill very young regrowth, and to thin dense cypress stands.

Landholders who wish to encourage native plants and animals may find fire a useful tool for managing white cypress pine. However, while opening up dense cypress pine stands is likely to increase their habitat value, getting fire into them without burning down the neighbourhood can be challenging. Encouraging eucalypts and deep-rooted perennial native grasses may help: grasses and eucalypt litter will create ground fuel for fires, may discourage pine regeneration and should directly benefit native birds and animals through providing food (nectar, seeds, insects) and nest sites. Fire, in turn, should encourage eucalypts and native grasses, and may trigger germination of native shrubs such as wattles and peas, creating more habitat for fauna. The trick will be to find fire regimes that balance all the different elements: pines, eucalypts, grasses, shrubs – a job for landholders, people familiar with fire and scientists to tackle together.

FIRE AND ANIMAL HABITAT

Although there will always be exceptions, areas which are often burnt tend to be less dense and have more open spaces. Infrequently burnt areas may naturally be thicker. These differences affect the animals and birds that live in the bush.

The scarlet robin (*Petroica multicolor*) for example, takes advantage of the open spaces provided by frequent fire. The lack of dense undergrowth makes it much easier for them to see and pounce on their ground dwelling prey. By excluding fire from woodland and forest landscapes, animals that rely on open spaces tend to be replaced by species adapted to more shrubby environments.

On the other hand, birds such as the white-browed scrubwren (*Sericornis frontalis*) forage for insects on the foliage and bark of shrubs or enjoy feeding amongst the leaf litter under sheltered thickets. This shrub dependent species will generally return to regenerating shrubby areas within three years after a single fire; but by increasing the frequency of fires and removing shrub thickets across the landscape, you risk losing these animals.

Thus both open and dense patches are important in conserving the range of animal species found in the bush. Variable fire intervals across time and space help ensure the habitat needs of the full range of species are met somewhere in the landscape.

Some animals respond directly to patchy vegetation. Some birds, for example, perch on trees and shrubs in dense, shrubby environments, and forage in open grassy areas. The powerful owl (*Ninox strenua*) is a good example of this. The powerful owl lives in wet and dry sclerophyll forests in eastern Australia from the coast to the tablelands. This bird has a strong association with long-unburnt areas of forest for its nesting and roosting locations. However, it is known to forage in open forest areas. Patchy, frequent fires provide the open, accessible forest areas in which small birds and mice become easy prey. Here too variability in fire frequency over time and across the landscape has a role to play in conserving diversity.

The scarlet robin takes advantage of open spaces created by fire.
© Dave Watts.

The powerful owl responds well to patchy vegetation.
© Evolving Images.

4. MANAGING FIRE FOR DIFFERENT VEGETATION TYPES

If different vegetation types are adapted to different fire frequencies, how do landholders know whether their fire management actions are good for biodiversity?

To help make these decisions, the Department of Environment and Climate Change (DECC) has developed *fire frequency guidelines* for broad vegetation types around NSW. These guidelines are periods of time bounded by 'thresholds'. When we talk about thresholds we are talking about the upper and lower limitations to survival for species that are particularly sensitive to very short, or very long, intervals between fires. The fire frequency guidelines aim to ensure fire intervals are long enough to let vulnerable obligate seeders grow to maturity, while also ensuring fire happens often enough to keep short lived species around.

Hotspots is working with DECC and local ecologists to further develop these guidelines to take into account the considerable differences between regions within NSW. The region covered by the Central West Catchment Management Authority includes a very wide range of environments, from the tablelands to the slopes and down onto the plains. Across this gradient rainfall varies from 900 to 300 mm, summer temperatures change from mild to very hot, frost days decrease massively, and soils change. All these factors affect which plants grow where, and how fast they grow. They also affect the way fire behaves, and fire frequency guidelines aim to reflect these differences.

The recommended fire frequency intervals are based on what scientists currently know about fire ecology, and will continue to be refined as more information comes to hand. Upper thresholds in particular are currently based on very limited data.

Fire frequency intervals for broad vegetation types found in the Central West are listed on the following pages, starting with vegetation types that grow in wetter areas.

Western slopes grassy woodland. © W. Parker, Hotspots Fire Project.

4.1 Vegetation types of the Central West

Rainforest

© G. Basnett, Hotspots Fire Project.

Rainforest is dominated by soft leaved trees with vines, ferns and palms in the understorey. These forests grow on moist sites with fertile soils. The moist environment shades out the more flammable species that fuel fires, thereby protecting this type of forest from fire events. Although a wildfire may occasionally go through a rainforest (and the community may be able to recover slowly), rainforest is very sensitive to recurring fires. Fire should therefore be excluded where possible.

Wet Sclerophyll Forest (shrubby subformation)

© G. Basnett, NSW Rural Fire Service.

Wet sclerophyll forests (shrubby subformation) are tall eucalypt forests with a dense understorey of ferns, herbs, and shrubs with broad soft leaves. These forests grow on relatively fertile soils in high rainfall areas. In the Central West, stands occur on the tablelands east of Oberon. Although it is understood that fire is important in these forests, the fire intervals needed to preserve the dominant eucalypts and safeguard other biodiversity values are still unclear. Shrubby subformation wet sclerophyll forests are likely to experience occasional intense wildfires, perhaps every 50 to 100 years. Less intense but more frequent understorey fires may have a role in maintaining shrubs, ferns and herbs. Currently, variable fire intervals in the range 25 to 60 years are recommended for shrubby subformation wet sclerophyll forests across the state.

Wet Sclerophyll Forest (grassy subformation)

© P. Watson, Hotspots Fire Project.

Grassy subformation wet sclerophyll forests are dominated by straight trunked eucalypts, with a grassy understorey and sparse shrubs which may have hard or soft leaves. This tall forest type also grows on fertile soils in high rainfall areas. It is similar to wet sclerophyll forest (shrubby subformation) but has a more open canopy, less shrubs and a greater grassy or herbaceous groundcover. In the Central West, remnants occur on the tablelands. Appropriate fire frequencies for this forest type are still being debated. The present state-wide recommendation is for fires every 10 to 50 years.

Several NSW studies have found that fire frequency has a profound effect on vegetation structure in wet grassy forests. Frequently burnt areas are open and grassy, with a diverse herbaceous ground layer, while infrequent burning is associated with an increased abundance of shrubs and small trees. Each environment provides habitat for a distinct suite of plants, insects and small mammals. To provide for the full range, it is probably

important to keep some parts of the landscape open with relatively frequent fire, while other places are burnt less often to allow thicker habitat to develop.

Dry Sclerophyll Shrub Forest

© P. Watson, Hotspots Fire Project.

This vegetation type covers forests and woodlands dominated by eucalypts, with a hard leaved shrubby understorey. The term *sclerophyll* refers to the hard, leathery leaves of many distinctly Australian trees and shrubs. In the shrubby understorey of these forests there are many obligate seeders and resprouting shrubs. The cover of grasses and sedges is sparse. Dry sclerophyll shrub forests grow on poor soils in moderate rainfall areas. The shrubby forests of the eastern Pilliga and the stringybark forests of the tablelands and slopes are examples. Variable fire intervals between 7 to 30 years are recommended to maintain diversity in this vegetation type.

Dry Sclerophyll Shrub/Grass Forest

© P. Watson, Hotspots Fire Project.

Dry sclerophyll shrub/grass forest consists of open eucalypt forest with a sparse hard leaved shrub layer and continuous grassy groundcover. These forests occur on moderately fertile soils in moderate rainfall areas, have often been used for pasture, and are extensive in the Central West. Examples occur on the outwash plains of the Pilliga and on the tablelands and slopes around Mudgee. Across the state, intervals in the 5 to 25 year range, with occasional intervals of up to 50 years in some areas, have been recommended for these forests. The grass component is likely to be best maintained by short intervals, while the shrub component is predicted to increase with longer intervals.

Heathland

© W. Parker, Hotspots Fire Project.

Heathland is dominated by hard leaved shrubs, many of which are obligate seeders. Heath grows in high rainfall areas, on infertile soils, often in exposed positions. In the Central West, montane heaths are found to the east of Rylstone and Kandos. Fires at a range of intervals between 7 to 30 years are recommended for maintaining biodiversity in heathlands. Within this range, variability in inter-fire interval is important, as this creates the space for large and small species with a range of responses to fire to live together.

Sclerophyll Grassy Woodland

© P. Watson, Hotspots Fire Project.

This is open eucalypt woodland with an understorey of grasses, herbs and scattered shrubs. Sclerophyll grassy woodland grows on rolling terrain with fertile soils and moderate rainfall, and has been extensively used for grazing. In the Central West remnant grassy woodlands are found across a wide range of environments, from the tablelands to the slopes. As the slopes give way to the plains the species composition of grassy woodlands shifts towards plants that are able to cope with a drier climate.

A variable fire frequency of between 5 to 40 years has been recommended across the state. In places where plants grow relatively quickly because of higher rainfall and warmer temperatures, intervals compatible with retaining a diverse, grassy understorey along with some shrubs are likely to lie towards the lower end of this range. In the higher country of the tablelands, where plants grow more slowly and snow gums are sometimes found, somewhat longer intervals are likely to be appropriate.

Grassland

© G. Basnett, Hotspots Fire Project

Grassland is notable for its lack of woody plants, although a few low shrubs can sometimes be found in these communities. A wide variety of herbs grow in the spaces between tussocks of perennial native grasses such as *Themeda australis* (kangaroo grass), *Poa sieberiana* (snowgrass) and *Austrodanthonia* species (wallaby grasses). Many plants in these native grasslands are easily missed; some may not even be visible through autumn or winter, but re-emerge to flower in spring. Grassland once occurred in the Central West around Bathurst, as well as on floodplains in some areas. Grazing and pasture improvement have extensively modified the grasslands, so remnants where native species continue to thrive are places to be cherished.

Across the state, fires at intervals between 2 to 10 years are recommended to keep dominant grasses from overwhelming smaller herbs and to open up gaps for seedlings to germinate and grow. As rainfall decreases the spaces between grass clumps may close up more slowly, and wet-dry cycles may become the main factor creating space for smaller species, reducing the need for fire.

Wetland

© P. Watson, Hotspots Fire Project.

Wetlands are found along inland rivers in areas that are periodically or permanently flooded with fresh water. In these floodplain areas, forests of river red gum form a mosaic with lignum shrublands and reed-beds. In their natural state these wetlands usually have a dense groundcover of water loving sedges and herbs, and provide wonderful habitat for waterbirds.

Drought, river regulation and grazing have all impacted inland wetlands. Wet-dry cycles play a vital role in maintaining their diversity, and ensuring these continue is the major issue for their survival. Scientists have not yet studied the role of fire in inland floodplain wetlands, although intervals between 7 to 35 years have been suggested.

In the past, some landowners periodically fired the fast-growing reed-beds to encourage new growth, however there seems to be little history of fire in red gum forests or adjacent flood-prone shrublands. Given the importance of periodic inundation in these areas, fire may have little role to play. Because reed-beds occur on peaty soils they are vulnerable to peat fires when the sustrate is dry, so planned fires are best conducted when the soil is wet. Note that freshwater wetlands are areas of great environmental sensitivity, and need to be treated with care.

Semi-arid Woodland

© R. Grant.

Away from rivers, in the western half of the area covered by the Central West Catchment Management Authority (CMA), grow semi-arid woodlands. Sclerophyll trees such as eucalypts, wattles, cypress pines and she-oaks dominate. Drought-resistant shrubs and grasses make up the understorey, with grasses likely to be more abundant on the occasionally inundated floodplains, while shrubs are thicker on uplands. Semi-arid woodlands are also home to many ephemeral grasses and herbs.

Drought plays a major role in shaping the vegetation and also influences fire regimes. In many places fires will only burn when the grasses which flourish after good rains dry off. Though shrubs have always occurred in semi-arid woodlands, in some places they have thickened up considerably since European settlement, and lack of fire is thought to be one of several factors involved in this change. Fire frequency guidelines for semi-arid woodlands are particularly tentative due to a lack of data, however intervals between 6 and 40 years have been proposed.

5. FIRE MANAGEMENT PLANNING

5.1 Introduction

If you live in a fire prone landscape, eliminating fire from your property is not a practical solution. Managing fire is an important part of living with fire, both to protect life and property and to respond to the needs of the bush.

Traditionally many landholders see their assets as being their house and property as well as the productivity of their land. In addition to this, a growing number of landholders consider the different plant and animal species on their property to be assets of real value.

If you consider native vegetation and wildlife as assets, *effective planning* will be essential in meeting the challenges associated with fire in the Central West.

This planning needs to address two goals: (1) protection of life and property and (2) protection of environmental values.

Each goal requires its own particular management strategies which can be developed and implemented at the property level. However, in particular areas of your property, these two goals may come into conflict. In these instances, the relative advantages and disadvantages need to be weighed up and tradeoffs are often inevitable. Your priority may be life and property - and understandably so.

Landholders exchange local fire knowledge and experience. © Never Never Resources.

5.2 Protecting *all* your assets

The idea that biodiversity is an important economic and social asset has been acknowledged in the *Rural Fires Act (1997)*. The Act sets up a Bushfire Risk Management Planning Process that is designed to protect life, property and the environment.

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HOTSPOTS FIRE PROJECT
Managing fire on your property

A zoning approach to fire management planning

The Bushfire Risk Management Planning Process uses a *zoning* approach to fire management planning.

1. **Asset Protection Zones** are fuel reduced areas around assets or groups of assets which are adjacent to bushfire hazards. These areas contain highly modified vegetation with minimum fuel loads to prevent fire from having a pathway to the assets. Asset Protection Zones provide a safe *defendable space* for fire fighters and homeowners to use if there is a fire. The NSW Rural Fire Service recommends reducing fuel in these zones by 70-100%.
2. **Strategic Fire Advantage Zones** are strategic fuel reduced areas designed to slow a fire and reduce its intensity. Some properties will have natural Strategic Fire Advantage Zones such as creeks, dams and rainforest gullies. Other low fuel areas may need to be maintained using slashing or hazard reduction burning. The NSW Rural Fire Service recommends reducing fuel in these zones by 50-80%.
3. **Land Management Zones** are areas that are managed to maintain or enhance land management objectives, including biodiversity. Fire history, vegetation type and fire frequency are important considerations in these areas. The NSW Rural Fire Service recommends burning in these zones to maintain a mosaic of areas with varying fuel loads.
4. **Fire Exclusion Zones** are areas where fire is actively excluded. These areas may include rainforest and other fire sensitive vegetation and some cultural/historic heritage sites and production areas.

When planning for a bushfire hazard reduction burn it is important to define your objectives. The fire frequency intervals in a Strategic Fire Advantage Zone (i.e. where your objective is to protect life and property) may be shorter than those needed to protect biodiversity.

Burning native vegetation on your property usually requires environmental assessment and consent. Landholders should apply to the NSW Rural Fire Service (RFS) for a *Bush Fire Hazard Reduction Certificate* in order to burn. Applications for a Bush Fire Hazard Reduction Certificate are assessed under the Bush Fire Environmental Assessment Code for New South Wales. In processing an application to carry out a burn in a Strategic Fire Advantage or Land Management Zone, the RFS will consider the vegetation type in which the burn is to be carried out, the fire history and the recommended fire frequency intervals for that vegetation type.

A range of RFS brochures are available that provide detailed information about how to undertake a low intensity burn safely and how to maintain Asset Protection Zones.

5.3 Some key messages in planning for biodiversity conservation

The relationship between fire and biodiversity is complex, and there is still much for scientists and fire managers to learn.

Don't, however, let this put you off. Fire management planning for biodiversity conservation need not be a complex or difficult process. You can take the information in this book away with you, think about it and decide for yourself how you might be able to apply it on your own property.

Based on existing knowledge, and on the information contained in this book, the following key messages provide simple guidelines for fire planning to protect biodiversity on your property.

THE KEY MESSAGES - SIMPLE PRINCIPLES FOR MANAGEMENT

- Different vegetation types are adapted to different fire regimes.
- Both too frequent and too infrequent fire can trigger negative impacts that throw systems 'out of balance' e.g. loss of species, weed invasion.
- Even within a single vegetation type, different species have different needs in relation to fire. To address this, vary fire frequency over time and space to allow for the full range of species.
- The bush looks different at each stage of growth after fire.
- Don't burn the whole place at once. Patchiness provides refuges for animals and a seed source for plants to recolonise burnt areas.
- Fires occur in a landscape context. It's useful to think about how the different vegetation types in a landscape are related in terms of fire.
- Coordinate fire activities with neighbours to provide a mosaic of vegetation in different stages of post-fire development, as different animals use different stages.
- When planning how often to burn, think about unplanned as well as planned fire. Unplanned fires may happen often enough to fulfil the needs of the bush.

When making decisions on issues such as fire frequency it helps to be very clear about what your land management objectives are in different areas of your property.

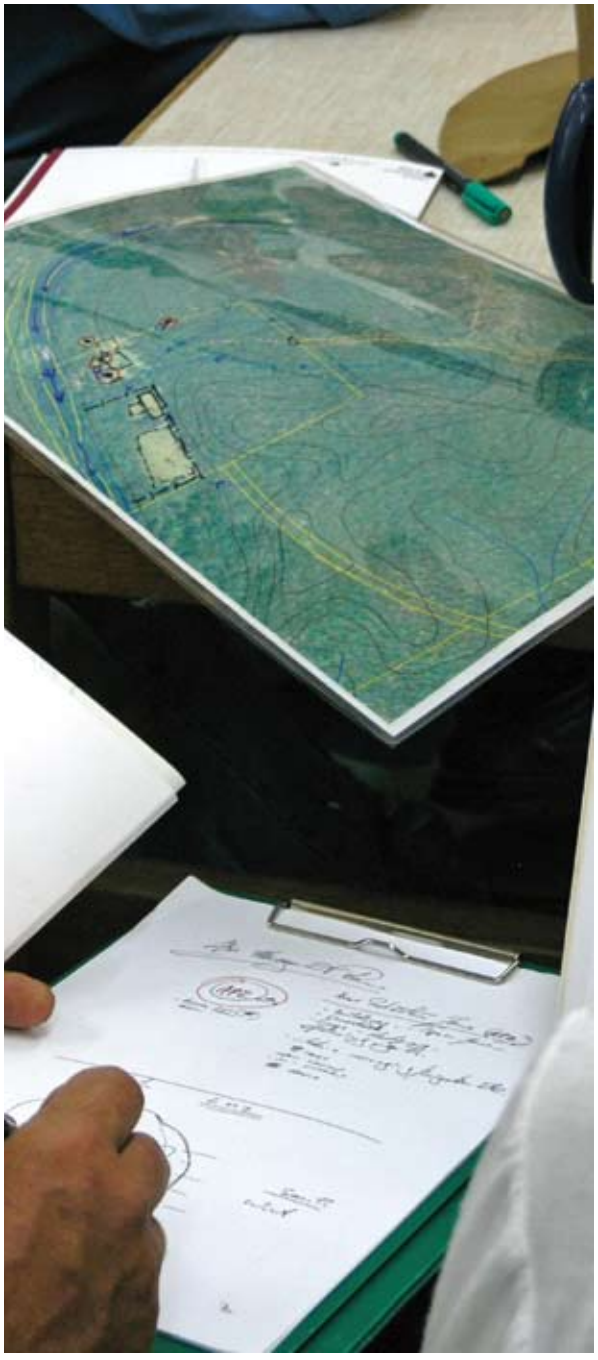
If you decide to incorporate some trial and error, you should anticipate the need for flexibility with regard to your management actions. For many landholders, this forms part of an overall adaptive management approach to biodiversity on their property.

When your objective is biodiversity protection:

1. Think about the key messages listed here; and

2. Use the recommended fire frequency intervals for the different vegetation types on your property as a guide.

6. PREPARING A PROPERTY FIRE MANAGEMENT PLAN



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The following steps can help you prepare a property fire management plan:

Identify your property and productivity assets and map them.

- Talk to the NSW Rural Fire Service about setting up and maintaining Asset Protection Zones and Strategic Fire Advantage Zones.

Identify and map the vegetation types in your Land Management Zones.

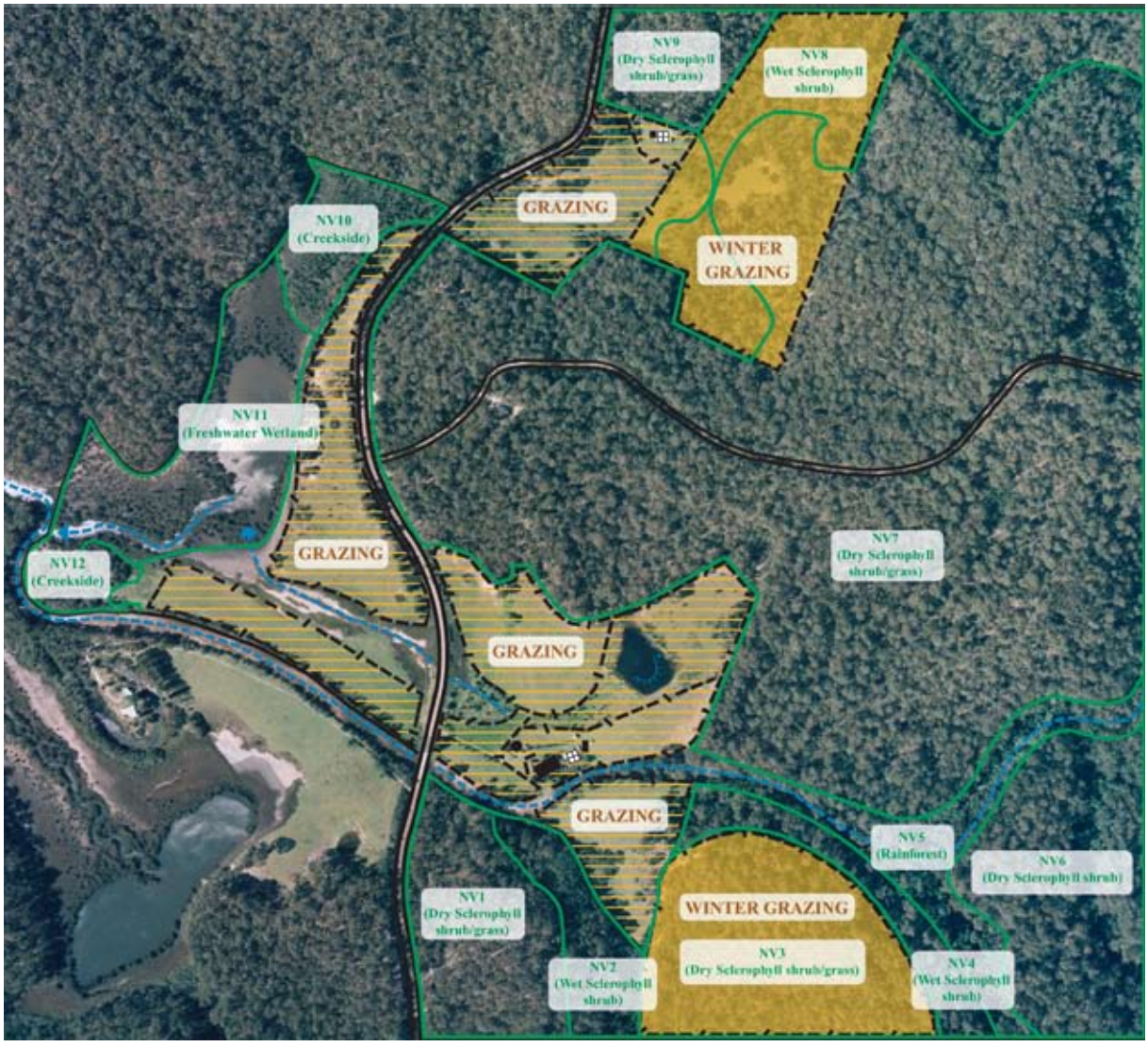
- Make a note of the fire frequency intervals recommended for the vegetation types on your property.
- How often have these vegetation types burned in the past? Note when and where fires have occurred.
- Are past fire regimes consistent with recommended regimes? Make a note of vegetation areas on your property that don't meet recommended fire regimes.
- Think about actions you could take to bring fire frequency into line with the recommendations.

Develop and maintain a mosaic of different stages of post-fire development.

- Do you have the resources to maintain parts of your property at different stages of development after fire?
- Could you work with your neighbours to make this happen?

Monitor and review.

- Keep a record of when fires occur and what areas they cover.
- Observe what happens to the vegetation, and to different species. Like all land management planning, fire planning is partly a matter of observation and responding to the needs of the land.
- Review your plan as you learn more.



Sample Map. © Photo supplied by the Department of Lands Panorama Avenue Bathurst 2795. www.lands.nsw.gov.au.

7. WORKING TOGETHER TO MANAGE FIRE ACROSS THE LANDSCAPE

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7.1 Cooperation in the Central West

Fire management planning to protect life, property and the environment requires collaboration within communities, between agencies and across tenures.

In the Central West, this is already happening. Fire management planning, using a risk management approach, is being undertaken across the wider landscape; in national parks, state forests and on public lands.

A great example of collaboration between agencies and communities is happening in the Canobolas Zone.

By working together, individual landholders can be part of a much broader process of fire management, whilst being able to make independent choices about fire management on their own land.

This process has a number of individual and potentially far reaching benefits. Among other things, it encourages landholders to:

- Plan and talk together about assets and how best to protect them;
- Listen to others with knowledge and ask them challenging questions; and
- Protect all of the aspects of the landscape most valued by landholders.

7.2 Where to go for help

Refer to the list of organisations provided at the end of this booklet for more information about fire management, fire and biodiversity, and other related issues.

7.3 Partners and collaborators

This booklet has been compiled for the Hotspots Fire Project, with input from and in consultation with a wide range of stakeholders. The information contained herein reflects our understanding at the time of publication. We are learning more about fire and the environment every day and anticipate that some recommendations may change as new information comes to hand.

For further information on this initiative contact the Hotspots Project Coordinator on (02) 9279 2466 or visit the project website at www.hotspotsfireproject.org.au

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- NSW Rural Fire Service
- Department of Environment and Climate Change (NSW)
- Catchment Management Authorities
- NSW Farmers Association
- Southeast Queensland Fire and Biodiversity Consortium

The following agencies have indicated their willingness to assist in managing fire on private property:

- NSW Rural Fire Service at www.rfs.nsw.gov.au
- Central West Catchment Management Authority at www.cw.cma.nsw.gov.au

You might also find the following websites useful:

- Hotspots Fire Project at www.hotspotsfireproject.org.au
- Nature Conservation Council of NSW Bushfire Program at www.nccnsw.org.au/bushfires
- NSW Department of Primary Industries at www.dpi.nsw.gov.au
- Southeast Queensland Fire and Biodiversity Consortium at www.fireandbiodiversity.org.au
- NSW State Emergency Services at www.ses.nsw.gov.au

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Landholders and Forest NSW staff working together at a Hotspots Fire Project workshop. © Never Never Resources.

HOTSPOTS FIRE PROJECT

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This project has been assisted by the New South Wales Government through its Environmental Trust.