fire

IN BUSHLAND CONSERVATION

the role of fire in the landscape and how we can manage it for biodiversity conservation

"Fire should not be regarded as unnatural or catastrophic, but rather as a recurring event which influences the nature of the Australian landscape and the adaptations of its unique flora and fauna and which therefore offers enormous potential as a land management tool"

Victorian Fire Ecology Working Group, 1999

Fire & Biodiversity
CONSORTIUM

Natural Heritage Trust
Helping Communities Helping Australia
A Commonwealth Government Initiative

Bushcare
A program of the Natural Heritage Trust

introduction

Those of us living in southeast Queensland inhabit one of the richest parts of Australia for native plants and animals. Our area contains a diverse mosaic of vegetation types, providing a wide array of fauna habitats. Variations in temperature, rainfall and topography have helped generate this variety; it is up to us to maintain it.

Urban expansion and clearing for agriculture and other purposes has reduced the areas in which natural ecosystems can thrive. We are fortunate in having some large areas of bushland, such as Brisbane Forest Park, Moreton Island, the Helidon Hills, and the Scenic Rim National Parks. However much of our bushland is fragmented, and needs particular care if it is to retain its conservation values. It is increasingly being recognised that *all* bushland areas, including those in private ownership, have an important role to play in preserving a landscape in which our native plants and animals can live.

Kate Kraschnefski

Remnant bushland, even in urban areas contains a diverse range of native plant species, supporting many animal habitats.

Fire plays a vital role in renewing many southeast Queensland ecosystems

Fire plays a role in many southeast Queensland ecosystems, as it does throughout Australia. Although rainforests and mangroves can be damaged by fire, eucalypt, heath and grassy communities are fire-adapted.

Neil Gourley

Fire is a natural process in the landscape. We need to manage and plan for all types of fire events.

Paul Donatiu

Planchon's Stringybark (Eucalyptus planchoniana) *resprouting after fire.*

Contents

Fire is an important element in maintaining the diversity of native plants and animals. This does not mean, however, that fire-adapted ecosystems will thrive under any burning regime. Although plants and animals in these ecosystems have mechanisms for keeping their place in the community in the face of fire, there are limits. Both too frequent, and too infrequent fire can cause species to decline, or even become locally extinct.

What do we know about the ways in which plants and animals adapt to fire?

What does this tell us about how we can manage fire to retain southeast Queensland's biodiversity?

How can we put these ideas into action in a multi-use landscape?

This booklet will address each of these issues

Bernice Sigley

Eastern Spinebill (Acanthorhynchus tenuirostris) *on a* Xanthorrhoea *flowering after fire.*

Acknowledgements and Authorship

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Cover: (front) background photo courtesy of Queensland Parks & Wildlife Service, (foreground), Queensland Rural Fire Service, (back) Queensland Rural Fire Service.

how do native plants respond to fire?

Fire plays an important and positive role in the lifecycle of many plants that occur in fire-adapted communities.

Fire opens up the canopy, allowing life-giving sunlight to reach ground level. Ashes left in the wake of a fire are rich in nutrients, helping seedlings off to a head start. Fire may also eliminate insects and fungal diseases which might otherwise slow seedling growth.

Many plants are stimulated to flower just after a fire. Grass Trees (*Xanthorrhoea* spp.) flower profusely in the year following a fire. Crinkle Bush (*Lomatia silaifolia*) and Christmas Bells (*Blandfordia* ssp.) follow a similar pattern.

Queensland Parks & Wildlife Service

Christmas Bells (Blandfordia spp.) *are stimulated into flower shortly after fire.*

Some plants, such as *Banksia* and *Hakea* species, release seeds from woody cases after a fire. Heat can also activate seeds, particularly for legumes such as wattles and pea flowers. Smoke contains chemicals that trigger germination in other species. All of these mechanisms allow species to establish a new generation through taking advantage of the favourable conditions for seedling growth which follow a fire.

Mark Daly

The ash bed left behind after a fire contains nutrients which encourage seedling growth.

Paul Donatiu

Following a fire, Xanthorrhoea *flowers provide a good source of nutrients for butterflies.*

Penny Watson

Hakea *fruits will open if there is sufficient heat in a fire. This is just one mechanism that plants have adapted to incorporate fire into their life cycle.*

Plant species in fire-adapted ecosystems keep their place in the community in one of two ways ...

1 Some plants are able to survive fire. They may look completely dead immediately after being burned, but shortly afterwards new shoots appear. These plants are called "resprouters". For example, most eucalypt species are resprouters, shooting from buds protected by bark on branches, or from a store of buds at the base of the plant, called a lignotuber.

Rayelene Brown

An example of a plant community resprouting—coastal woodlands.

2 In other species, adult plants are actually killed by fire. These species rely on regeneration from seed, which they generally produce in large quantities. They are called "obligate seeders", as they have no choice but to grow from seed. Usually, this seed is stored either in the soil, or in woody seed cases on the plant, and is ready to germinate after a fire. Some species, however, rely on seeds blown in from unburnt areas.

Paul Donatiu

Numerous seedlings of Sprengelia sprengelioides *in wallum appearing after fire.*

Keryn Hyslop

False Sasparilla (Hardenbergia violacea) *regenerates vigorously after fire.*

Wendy Drake

Grass Trees have mechanisms to protect their buds during fires. In this photo Xanthorrhoea fulva *is shown with new growth and flowering spikes following a recent fire.*

how do native animals respond to fire?

Animals also exhibit a range of strategies for maintaining their presence in fire-adapted communities. Some species are "avoiders", staying alive either by moving out of the burning area, or by taking shelter underground or in hollow logs. Other species lose substantial numbers of individuals in a fire, and rely on recolonisation by populations from unburnt areas.

Many animal species in fire-adapted ecosystems prefer a particular stage of post-fire regeneration

It is important to realise that bushland goes through various natural stages of recovery after a fire. **Initially**, undergrowth and shading are low, and grasses, orchids and short-lived herbs grow and flower. **After a few years**, the shrub layer gets thicker, shrubs start flowering, and their fruits become readily available. Smaller plants such as grasses and herbs may be shaded out. **Many years after a fire**, the country often opens out again, as short-lived shrubs die off.

Dave Kington

The Whiptail Wallaby (Macropus parryi) *prefers the open grassy understorey of Eucalyptus woodlands. Changes to fire frequencies, causing the undergrowth to thicken, have resulted in a decline in their numbers.*

Queensland Museum

*The New Holland Mouse (*Pseudomys novaehollandiae) *flourishes in the early to mid stages of post-fire regenerating forest or heath, preferring the openness ...*

Queensland Museum

... whereas the Brown Antechinus (Antechinus stuartii) *is more suited to the thicker undergrowth that develops many years after a fire.*

Many animal species in fire-adapted systems exhibit a preference for a particular stage of post-fire regeneration, depending on their feeding and breeding needs. For example, the New Holland Mouse (*Pseudomys novaehollandiae*) likes open forests and heaths in the early and middle stages of post-fire regeneration. It begins to recolonise burnt areas about one year after fire, and decreases in abundance when litter and understorey vegetation build up. Brown Antechinus (*Antechinus stuartii*) on the other hand, prefer sites with the thick undergrowth that develops some years after a fire.

Birds exhibit a similar pattern. The early post-fire years provide bountiful resources for ground-feeding birds. Some bird species such as honeyeaters and parrots may be attracted to plants with fire-stimulated flowering, or to the seeds of grasses that flourish post-fire. In a few years as the vegetation becomes more dense, the bird species composition changes. Birds that feed on the fruits of regenerating trees and shrubs appear, as do those that need the thick vegetation cover for nesting and shelter. Long-unburnt vegetation may lose its productivity, providing fewer food resources, thus forcing some bird species to move elsewhere.

There are various lizard and invertebrate species which prefer particular stages of post-fire regeneration. Habitat complexity increases with time-since-fire, opening up possibilities for specialist species that are not available in the years immediately after a fire.

Glen Threlfo

The Eastern Bristlebird *(Dasyornis brachypterus)* is threatened by too frequent fires changing the structure of its optimal habitat. High intensity wildfires are also quite damaging to this species habitat.

Luke Hogan

Southern Spotted Gecko *(Oedura tryonisouthern)* is a common species in southeast Queensland's dry sclerophyll forests. It shelters by day in crevices on the ground and in trees, under bark on trees or between slabs of rock. The species feeds on small arthropods. In a study near Gympie, the species was absent from forestry plots burnt annually or periodically with frequencies every 2-5 years, but was present in areas where fire was excluded. Fires burn the bark from trees and reduce ground litter, thus reducing available shelter and in the short term reduce arthropod abundance, thus affecting the feeding habits of this gecko.

David McFarland

Ground Parrot (*Pezoporus wallicus*) which is considered vulnerable to extinction, prefers the mid-stages of post-fire regeneration in coastal heaths, moving in at about three years post-fire, and reaching a population peak at 8 to 10 years. This species appears to depend on the increased levels of flowering and fruiting at this stage, as well as needing relatively dense vegetation for nesting.

Damian White

Lively Skink (*Carlia vivax*) a four-fingered skink which is common in intact bushland and fragments of reasonable size and condition. It occurs in drier sclerophyll habitats and tends to prefer an understorey and ground layer which is not too dense. Too infrequent fire may be detrimental to the continued survival of this species.

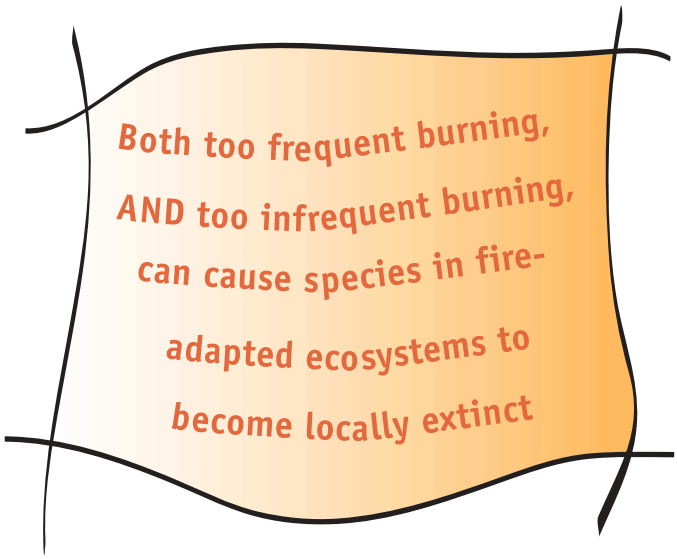
Damian White

Burnett's Skink *(Lygisaurus foliorum)* is a common species in southeast Queensland's wet and dry sclerophyll forests. This skink is a litter-dwelling species that is most active during the daylight hours. The species appears generally resilient to fire, occurring in similar numbers in annually burnt and unburnt forest areas.

implications for management

What are the practical implications of the ways in which native plants and animals respond to fire? One way to consider this question is to consider each aspect of the *fire regime* in turn. This term refers to the four characteristics of fire that are particularly important for conservation. They are:

- *fire frequency* — how often fires 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



If you live in the bush, you also need to consider how to protect non-bushland assets, such as your house from fire.

Contact your local Rural Fire Brigade or the Queensland Fire and Rescue Authority to find out how best to do this. The Fire and Biodiversity Consortium's Individual Property Fire Management Planning Kit may also assist. *(see back page for contact details)*

fire frequency

The time between fires is a key factor in ensuring we retain the range of plants and animals that currently exist in our fire-adapted communities.

"Obligate seeder" plant species (whose adults are killed by fire) need a fire-free period long enough for seedlings to grow to maturity and produce seeds. Even resprouting species can be lost if fire is too frequent, as adult plants become weakened, and seedlings often take quite a few years to reach the stage where they can live through a fire. On the other hand, if fire is excluded for too long, short-lived plant species may become locally extinct. A plant species that only regenerates after fire cannot survive if adults have died and viable seed is no longer available.

Frequent burning tends to reduce shrub cover, and encourage grasses. While some open-country fauna will find a place in this habitat, species that need undergrowth for nesting and shelter will not. Animals that rely on shrub flowers and seeds for food will also be lost. Long-term fire exclusion will also disadvantage these species as shrubs become old and die.

fire frequency & variability

Some vegetation types in southeast Queensland may be taken over by a different vegetation type if fire is excluded.

In these circumstances, we need to consider what values we want to foster or retain. For example, tall eucalypt forests often have an understorey of rainforest species, which effectively prevent eucalypt regeneration. Without fire, the rainforest species will become dominant. To retain the eucalpyt forests, periodic fires are needed to open the country up and allow eucalypt seedlings to establish and grow. Where tall eucalypt forests are replaced by rainforest, plants and animals that rely on them will also eventually be lost from the area. This includes gliders which feed on eucalypt sap, and creatures which rely on eucalypt flowers, such as honeyeaters and little red flying-foxes (*Pteropus scapulatus*). Rainforest-dependent species, however, may find a new home.

Variability in the intervals between fire is a key principle of managing fire for biodiversity

Although both too frequent and too infrequent burning can cause problems, there is some scope between these two extremes. In fact, *variability* in the intervals between fires is a key principle of managing fire for biodiversity.

This is because, even within the one community, different plants and animals have different life history strategies for coping with fire. While one species may thrive under quite frequent burning, another from the same community will do better when the intervals between fires are relatively long. By aiming for a range of different intervals, within limits, we can cater for the full range of species in the community.

Of course, different ecosystems need different fire frequencies. Researchers are still working to find out what frequency limits apply to southeast Queensland's various systems. However we know enough to make some educated estimates for broad vegetation types.

Fire in bushland can be planned or unplanned. Bushland managers need to consider both. Sometimes, unplanned fire ie wildfires may fulfil ecological needs.

At other times active management may be needed – either through planned burns, or strategies to *lower* fire frequency – eg where there's a high rate of arson.

Queensland Parks & Wildlife Service

Research has shown that excluding fire from tall wet eucalypt forest will cause some plants and animal species to become locally extinct.

Penny Watson

Planned high-intensity fires helped reinvigorate Lepidozamia peroffskyana *in Springbrook National Park, opening up the canopy and removing parasitic ferns.*

rainforests, scrubs and creekside vegetation

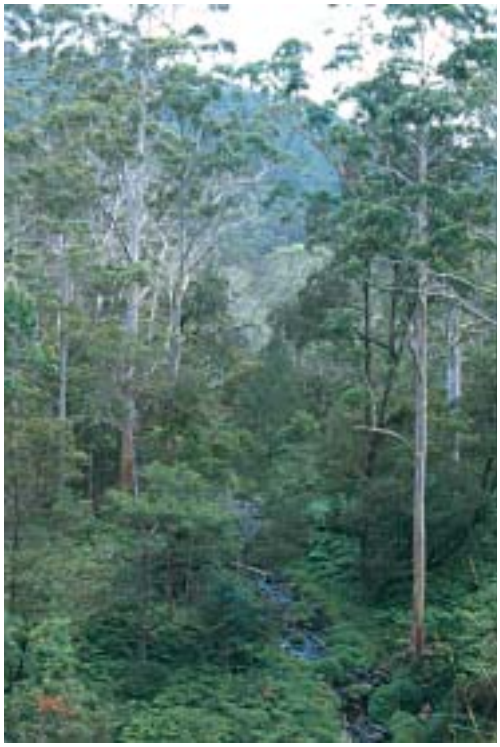
Rainforest vegetation is not fire-adapted and should not be burned.

Glen Threlfo

Rainforest like this magnificent moss-covered Nothofagus moorei *are not fire adapted and should not be burnt.*

Creekside vegetation, particularly gullies with scrub species, is also best left unburnt, in part because these strips provide a buffer against erosion. This can often be accomplished, in a planned burn, by burning downhill when the moisture conditions on the lower slopes are such that the fire stops before reaching vegetation you want to protect. Even wildfires often skip over gullies. Mature rainforest in southeast Queensland is generally fire-resistant, however vine-scrubs will burn, particularly where weeds such as green panic and lantana have increased their flammability.

In extreme conditions, both rainforest and creekside vegetation will burn. The verges between rainforest and eucalypt forest may be maintained by fire, and will naturally shift back and forth over many years.



Paul Grimshaw

Creekside vegetation should also be left unburnt.

tall eucalypt forests

Different vegetation types need different fire frequencies

Queensland Parks & Wildlife Service

Tall eucalypt forests in southeast Queensland often have a rainforest understorey.

As noted above, these forests can be taken over by rainforest if fire is excluded. We therefore know that fire is important to the survival of these forests, however the intervals between fires that will encourage eucalypt regeneration while suppressing the rainforest understorey are fairly speculative at present. Long intervals of 20 to 100 years have been suggested, perhaps with some less intense understorey fires to complement large crowning wildfires. Obviously, managing for intense fire will be difficult, if not impossible, in developed areas.

Peter Lehmann

Tall eucalypt forests contain unique species of plants and animals and require specific fire management. More research is needed in this vegetation type, but evidence suggests that fires between 20-100 years are required.

open eucalypt forests and woodlands

Appropriate fire frequency for dry sclerophyll forests and woodlands depends on the nature of, and management aims for, the understorey.

The problem here is that, at least in some cases, the type of understorey we have now is almost certainly a reflection of management since European settlement. Frequent burning will encourage a grassy understorey, while lack of fire may allow shrubs and trees to take over what was once a grassy woodland. This seems to have happened in Brisbane Forest Park, where grassy ridges and slopes now carry more Brushbox (*Lophostemon confertus*) than previously seen.

Paul Grimshaw

Fire frequencies of between 3-6 years are needed to maintain a grassy understorey in the Wide Bay Burnett region.

Queensland Parks & Wildlife Service

Grassy woodlands will require specific fire management regimes if they are to be maintained.

Queensland Museum

Queensland Parks & Wildlife Service

Queensland Parks & Wildlife Service

Fauna species that use woodlands for food and shelter include:
Red-Backed Fairy-Wren (Malurus melanocephalus)*(top),*
Rufous Bettong (Aepyprymnus rufescens) *(middle),*
Echidna (Tachyglossus aculeatus) *(bottom).*

Penny Watson

Neil Gourley

Grassy eucalypt ecosystems are adapted to more frequent burning than shrubby systems. Fire frequencies of between 7 to 25 years are appropriate for shrubby forests and woodlands, such as those found in sandstone regions like the Helidon Hills. The lower limit should be sufficient to allow most shrub species to mature and set seed; the upper limit should be within the tolerance range of short-lived species. Even grassy systems should not be burned every year. The aim is to retain a mixture of native species: 3 to 6 year intervals are recommended.

Woodlands with shrubby understorey such as Toohey Forest (top), and Mt Mee (bottom), require fire frequencies between 7-25 years. The thicker understorey will support plant and animal species which differ to those that occur in a grassy understorey.

heathland

Coastal heaths support a number of rare bird species, such as Ground Parrots, which need the shelter provided by vegetation some years after a fire.

Researchers have found that plant productivity peaks at around 4 to 8 years post-fire, as does the abundance of birds that breed in the heath. Fire frequency intervals between 7 and 20 years, with an emphasis on intervals in the 8 to 12 year range, are recommended to maintain overall biodiversity. Planned burns in wet heaths should be conducted when the soil is wet, to avoid the risk of destructive peat fires.

Paul Grimshaw

*The larvae of the Black & White Tiger Butterfly (*Danaus affinis affinis*) is specific to a native vine,* Cynanchum carnosum,*which occurs in coastal areas. Frequent fires could threaten its habitat.*

Heath growing on rocky domes and platforms also needs fire, but is probably adapted to longer interfire intervals than its coastal counterpart. The fire regimes within heath are determined by its neighbouring vegetation. Where the heath adjoins the surrounding forest, it will tend to burn at the same time. However where it's in isolated rock gardens, only some fires from the surrounding forest will be intense enough to sweep across the intervening rocks. Intervals are likely to range between 15 and 50 years.

Paul Grimshaw

This heath on a rocky shelf at Broadwater State Forest near Stanthorpe has remained unburnt despite fire in the surrounding forest.

Queensland Parks & Wildlife Service

Coastal heaths require fire frequencies between 7 to 20 years to provide suitable mature shelter and habitats for a number of rare species.

melaleuca (paperbark) forests

Melaleuca forests are fire-adapted, however, too frequent burning can prevent paperbark regeneration.

We do not know a great deal about these forests, however it has been suggested that intervals of 15 to 30 years may be appropriate.

Paul Grimshaw

The stunningly beautiful paperbark forests are often burnt too frequently and we suggest frequencies between 15 and 30 years.

The table below summarises suggested frequencies for the different vegetation types. These guidelines will no doubt be refined as we learn more about our regional ecosystems and the plants and animals within them.

summary

Vegetation types and suggested range of intervals between fires

Rainforests, scrubs

Manage to exclude fire.

Melaleuca forests

Vary intervals between 15 and 30 years.

Brisbane City Council

Creekside vegetation

In general, don't burn.

Brisbane City Council

Coastal heath

Vary intervals between 7 and 20 years, (emphasis on 8 to 12 years).

Tall eucalypt forests

Needs an occasional hot fire to burn out rainforest understorey, possibly with some additional cooler understorey burns. Intervals between hot fires are likely to range between 20 and 100 years.

Heaths of rocky areas

Depends on relationship to surrounding vegetation. Intervals are likely to range between 15 and 50 years.

Open eucalypt forests and woodlands with a shrubby understorey

Vary intervals between 7 and 25 years.

Paul Grimshaw

Open eucalypt forests and woodlands with a grassy understorey

Vary intervals between 3 and 6 years.

The resilience of our native vegetation probably means that the occasional interval outside these limits will not cause major problems. If an interval shorter than the minimum recommended above does occur, try to ensure the next fire does not occur for some time so the system can recover.

fire extent

the area covered by the fire

Co-ordinate with neighbours to maintain a mosaic of vegetation in different stages of post-fire development

A patch-burning or mosaic approach is recommended.

To some extent mosaics occur naturally, even in wildfires. In control burns, fire managers can use weather conditions and time of day to vary fire intensity and spread. Unburnt patches provide -

- a place for animals to shelter during a fire;
- a food source in the early months after fire;
- a seed source for plant regeneration; and
- a base from which animal species can recolonise the burnt area when it again becomes suitable.

Try to wait at least a couple of years before burning adjacent patches.

Patch burning also breaks up the fuel load, and thus can help slow down wildfires.

Where possible, it's good to aim for patchiness at a range of scales. Unburnt "islands" within the area of a planned burn have many of the benefits noted above. At a broader landscape level, a mosaic of vegetation in different stages of post-fire regeneration will provide a range of habitats, and thus a home for a wide variety of fauna species, including both those that prefer open country and those that need more dense vegetation. While it may not be possible to maintain this habitat range on one small property, options open up when landholders work together at a landscape scale. Modelling studies suggest that fairly broadscale patch burning can provide better conservation outcomes than a regime based on smaller patches.

It's important when planning a burn to leave escape routes for animals. This can be particularly difficult where native vegetation is confined to isolated fragments. Here is yet another reason for linking bushland patches. Corridors may also provide avenues for recolonisation after a burn.

Wendy Drake

Patchiness (mosaics) occurs on all scales and levels. In this example there is large scale patchiness from a fire on North Stradbroke Island ...

Ross Patterson

... to this small-scale patchiness resulting from an ecological burn.

Queensland Rural Fire Service

Even during planned fuel reduction burning patchiness occurs. This benefits biodiversity by providing refuge and shelters for a number of species.

fire intensity

how hot the fire is

Intensity is related to frequency and season of burn.

The more often an area is burnt, the cooler the fire is likely to be, as there has been limited time for fuel to build up. Fires in hot, dry weather are likely to be more intense than fires in cool, humid weather.

There is no one answer as to what is best in terms of fire intensity. From an ecological perspective, some variability in intensity is desirable and will often occur by default.

Hotter fires are more destructive, and will kill more individual plants and animals. Cool burns are generally more patchy, and have corresponding benefits. Cool fires also remove less of the litter layer, and therefore limit erosion. However as we have seen, the seeds of some plants need a hot fire to break their dormancy, and these species may be disadvantaged by frequent cool burns.

It is, of course, much easier to incorporate a relatively high intensity fire in a large natural area with no human habitation than it is in rural residential and farming districts where life and property issues are paramount. Expert input is a must when planning and carrying out any control burn.

If you have the time and resources, fire intensity can be managed in particular areas by raking fuel away from key habitat features, such as large trees and hollow logs.

Queensland Rural Fire Service

A fuel reduction burn usually involves low-intensity fires as seen here.

Neil Gourley

High-intensity fires that can reach the crown are certainly more destructive, but overall, many plants will fully recover. In the longer term variable fire intensities help conserve biodiversity.

Queensland Rural Fire Service

Rural Fire Service volunteers conducting a burn. Expertise is essential when planning and implementing a fire.

Neil Gourley

Given time and resources, removing fuel around habitat logs and trees, before fuel reduction burning, will be beneficial to species diversity.

fire season

what time of year the fire occurs

So far, scientists have not identified any hard and fast rules in relation to season of burn, although there is some evidence that grassy woodlands, may be adapted to fire in autumn or winter.

Damian White

Common Crow (Euploea core), *a common butterfly (inset) often aggregates in quiet shady sites during autumn and winter. These overwintering aggregations can number in the thousands and fires during the cooler months may threaten these gatherings and their habitat.*

Damian White

Southeast Queensland does not have the large variations in seasonal conditions found in some other parts of Australia. Even in places with a strongly seasonal climate, research has found that some plant species appear to be favoured by autumn burns, and others, in the same community, by a spring burn. Variability in season of burn may also be appropriate here. A mix of late summer, autumn and winter planned burning, together with some spring wildfire, could provide this variability at a landscape level.

Some factors to consider when deciding when to burn include:

- **Breeding times of birds and animals.** For instance, it may be a good idea to wait until young birds have learned to fly competently.
- **Insect dormancy.** Many invertebrates are dormant in winter, and may be particularly vulnerable to the effects of fire.
- **The availability of seed.** A late winter/early spring burn will knock out a year's flowering and seeding for many shrub species. This may not be a problem, if sufficient time has elapsed since the last fire to enable a good store of seeds to have built up.

Queensland Museum

The numbers of some animals and plants, such as this Eastern Chestnut Mouse (Pseudomys gracilicaudatus) *could be diminished if burning always occurs in the same season. Variability of season of burn is recommended.*

fire in a multi-use environment

In southeast Queensland, some of us have chosen to make our homes amongst the gum trees where fire is a natural part of the environment.

Many councils are now limiting housing development in fire-prone areas. For those of us who have made this choice, the challenge is to minimise risk – to life and property *and* to biodiversity.

One of the best ways to ensure biodiversity conservation is by reducing hazards to life and property in and around houses. If buildings are constructed and maintained to minimise the risk of catching fire and appropriate buffer zones are in place, then bushland areas can more confidently be managed in line with the regimes that will benefit the plants and animals within them.

Similarly, where production areas are well-protected by constructed fire lines, there is less risk of wildfire damaging pasture or crops. Fire control lines also help stop pasture management fires straying into the bush.

Queensland Rural Fire Service

Always treat fire with respect and always ensure expert input when planning and implementing a burn.

Your local Rural Fire Brigade may be able to assist, in return for a donation.

If you wish to conduct a planned burn, a written permit from a Fire Warden is essential.

Queensland Rural Fire Service

Be realistic. Our options for fire management will need to consider certain constraints, so it may not be possible to manage fire exactly as we might like.

However, if we keep the basic concepts outlined above in mind, we can work towards using fire in a way which supports the conservation of southeast Queensland's amazing biological diversity.

Queensland Rural Fire Service

Managing your property for protection and conservation

Sometimes, burns for ecological purposes may contribute to property protection goals. However, often the interfire intervals appropriate for conservation will be longer than those appropriate for property protection. It is therefore, important to identify areas which need to be managed to protect life and property and areas that can safely be managed for conservation. We have produced a kit which helps landowners develop a fire management plan for their property. This kit balances the need for property protection and biodiversity conservation values.

Other Consortium publications include—

- **a kit to assist landholders develop a fire management plan for their property, Individual Property Fire Management Planning Kit: Balancing Fire Safety with Conservation of Bushland Plants and Animals.**
- **Operational manual - which provides guidelines for planning and conducting fuel reduction or ecological burning on your property.**
- **referenced guidelines for natural resource managers, The Role and Use of Fire for Biodiversity Conservation in Southeast Queensland: Fire Management Guidelines Derived from Ecological Research.**
- **a four-page fact sheet, Fire and Nature Conservation in Southeast Queensland: an Introduction.**

For further information, or to obtain copies of our products, please contact:

Queensland Parks and Wildlife Service
Regional Bushcare Facilitator
on (07) 3202 0223

Useful Websites

FIRE AND BIODIVERSITY CONSORTIUM | www.fireandbiodiversity.org.au
RURAL FIRE SERVICES | www.ruralfire.qld.gov.au
ENVIRONMENTAL PROTECTION AGENCY | www.env.qld.gov.au
DEPARTMENT OF NATURAL RESOURCES AND MINES | www.dnr.qld.gov.au
DEPARTMENT OF PRIMARY INDUSTRIES | www.dpi.qld.gov.au
ACT EMERGENCY SERVICES | www.esb.act.gov.au/esb.htm
GREENING AUSTRALIA | www.qld.greeningaustralia.org.au