Land for Wildlife Queensland: Note F1

Fire in the Australian Landscape

This is the first of four Notes in the Land for Wildlife fire series. This Note looks at the history of fire in the Australian landscape and also introduces key terms and concepts regarding fire ecology and fire management in Southeast Queensland.

People have been using and managing fire in Australia for thousands of years. Today, people still use and manage fire in different ways depending on what they value and what they are trying to achieve. Shown above is a low intensity planned burn that aimed to reinstate a diversity of native understorey plants.

Fire in the Australian Landscape

Fire was part of the Australian landscape long before humans came to Australia. Most fires would have started with lightning strikes and could have burnt large areas of vegetation. With the arrival of Aboriginal people approximately 50,000 years ago it is believed that fire use became more planned in most regions. Some areas were frequently burnt to aid hunting and movement. Other areas were thought to have been protected from fire or infrequently burnt, and these areas could have been managed to encourage food plants or animals that were sensitive to fire. Indigenous fire management is still an important and prevalent land management practice in some parts of Australia today.

Since European occupation, the frequency and extent of fires has changed due to changing land uses, cessation of indigenous fire regimes in some regions and government policies around fire suppression and planned burning. This has resulted in some areas being burnt too frequently whereas other areas are not burnt at all. Today's landscape consists of fragmented bushland interspersed with different land uses. This can make fire management challenging especially where people live, work, recreate or travel near bushland areas.

Today's landscape is generally made up of fragmented patches of bushland interspersed with housing, industry, agriculture and grazing, as shown here from Mt Emu on the Sunshine Coast. Managing fire in these bushland areas can be challenging as competing priorities require fire management to be well planned and implemented.

Fire Regimes

Australian vegetation is broadly categorised as either fire sensitive or fire-adapted (see *Land for Wildlife Note F2* for more detail). Fire sensitive vegetation will contract or die with fire, whereas fire-adapted vegetation survives or responds to fire by germinating, flowering, setting seed or resprouting.

In areas of fire-adapted vegetation, it is important that fire is used appropriately: not too frequently, and not too infrequently. The term 'fire regime' is used to define four key attributes of fire that are important when managing vegetation communities:

1. **Fire frequency** - the number of years between fires or the number of fires over a period of time.
2. **Fire extent** - how much of an area has been burnt by a fire.
3. **Fire season** - the time of year that a fire occurs.
4. **Fire intensity** - how hot a fire is. This varies depending on factors such as wind speed, temperature, slope, soil moisture and vegetation.

It is recommended to have variability in the fire regime (frequency, extent, season and intensity) so an area isn't always burnt in the same way. It is also recommended that spring burns be avoided as this is when many native animals are breeding. If possible, record the season, extent and intensity of any fire that occurs on your property to help inform your vegetation management.

A set of recommended fire regimes for broad vegetation types in Southeast Queensland has been developed by the South East Queensland Fire and Biodiversity Consortium (SEQFBC) and is available from your Land for Wildlife Officer or via www.fireandbiodiversity.org.au

*Recommended fire regime for **Regional Ecosystem 12.9-10.7** (Narrow-leaved Ironbark woodland, shown above) is:*

***Frequency:** Burn every 4-25 years, depending on the site.*
***Extent:** Aim for a 40-60% mosaic burn.*
***Season:** January to August, depending on the site.*
***Intensity:** Low to moderate.*

The recommended fire regime should maintain a mosaic of grassy and shrubby understoreys. Only burn with good soil moisture to reduce impacts on clumping grass bases, hollow trees and fallen logs.

Information from QPWS's *Planned Burn Guidelines for Southeast Queensland Bioregion* and the Queensland Herbarium's *Regional Ecosystem Fire Managment Guidelines.*

Fire Ecology

Fire ecology is the study of how fire, ecosystems and living organisms (plants, animals, fungi) interact. This broad science looks at how some organisms require fire for their survival, how some organisms adapt to fire, fire history, fire regimes and the effect of fire on ecosystems. Research on the impacts of fire on biodiversity is increasingly relevant especially when climate change is considered. Fire ecology is discussed in more detail in *Land for Wildlife Notes F2* and *F3*, and in the SEQFBCs *Living with Fire Factsheet 1: An Introduction to Fire Ecology.*

Shown below is a map of a 30 hectare Council Reserve on the Sunshine Coast that demonstrates a mosaic pattern of fire regimes and protection of refuge areas.

Site	Date	Type*	Size & Extent	Intensity
1	Aug 2007	HR & E	0.6 ha Moderate	Low-moderate
2	Sept 2007	Ecological (E)	2.5 ha Moderate (lower gully unburnt)	Mix of low to moderate
3	Sept 2008	Hazard reduction (HR)	1.5 ha Moderate	Moderate
4	Aug 2011	HR & E	5 ha Low (large areas unburnt)	Low (except felled Slash Pine area)
5	June 2014	HR & E	1.5 ha Low (50% unburnt)	Low

** Hazard reduction and ecological burns are defined in Land for Wildlife Note F4 - Fire and Your Property.*

Patchiness and Mosaics

Patchiness and mosaics are important concepts in fire management, especially when aiming to manage biodiversity. Patchiness and mosaics aim to create areas of unburnt vegetation, in which wildlife can take refuge, and recolonise from, after a fire has passed.

Areas that are left unburnt within burnt areas creates **patchiness**. Unburnt areas are important refuges for invertebrates, reptiles, plants and small mammals. While unplanned fires will have some patchiness depending on the intensity of the burn, generally low intensity (cool) planned burns will have more patchiness. Patchiness can be achieved under the right conditions by burning when it is not too dry, not windy and there is good soil moisture. Also ensure that winter burns have a high level of patchiness as some animals are in diapause or hibernation over winter.

The term **mosaic** is similar to the term patchiness but on a larger landscape scale. At the landscape scale some vegetated areas will be long unburnt, some areas will have been burnt in the last 10-20 years, and other areas will have been burnt more recently. This patchwork of times since last fire is also known as a mosaic pattern. Micro-mosaic burns of 1-2 hectares have been suggested as being preferrable for some regions of Southeast Queensland as these small scale burns allow quick colonisation from surrounding areas by wildlife.

Habitat Trees and Logs

Protecting old, hollow habitat trees and fallen habitat logs from fire is important for wildlife, given that many animals use standing and fallen hollows as homes and breeding sites. Raking away leaf litter from the base of habitat trees or logs before a planned burn can help prevent the tree or log from igniting. Refer to *Land for Wildlife Notes F3* and *F4* for more information and photographs.

Certain wildlife, plants and fungi rely on refuge areas for protection during fires and for recruitment after fires. Shown to the right are examples of refuge areas found throughout Southeast Queensland, such as rocky outcrops (top image), a gully (dark vegetation shown in the middle of middle image) and a swamp or dam (lower image).

Refuge areas are predicted to become even more valuable under modelled climate change scenarios. An Individual Property Fire Management Plan (IPFMP) can help you identify and work to protect refuge areas on your property (see Land for Wildlife Note F4 for more details about IPFMPs).

Refuge Areas

Refuge areas are places in the landscape where fire either does not reach, or fire does not burn so frequently or intensely. Refuges may be small or large in scale. Gullies, gorges, creeks, swamps, cliffs and rocky outcrops are common refuge areas. Low intensity fires will generally not enter these areas because there are insufficient fuel loads or high soil moisture. Refuge areas often contain threatened or uncommon plants such as orchids and ferns and can be important habitat areas for wildlife. As the name suggests, refuge areas can act as safe places for wildlife, if the animal has the ability to move into them during fires.

Fire and Climate Change

Australia's average temperature has risen by nearly 1°C since 1910. This increase in average temperature coupled with a decrease in rainfall in south-eastern Australia has led to an increase in the duration, frequency and intensity of heatwaves across much of Australia.

It is predicted that the number of days with severe, extreme or catastrophic fire danger ratings will increase due to climate change[1]. This increase is likely to result in larger, more frequent and less-controllable bushfires. The fire season is also widening, meaning that there is less time to undertake hazard reduction burns. How climate change will affect Australian bushfires and biodiversity is an emerging topic of fire research.

What you can do

- ✓ Identify the appropriate fire regimes for vegetation on your property by asking your Land for Wildlife Officer, or:
  - Referring to SEQFBC's *Factsheet 3: Recommended Fire Regimes*,
  - Referring to QPWS's *Planned Burn Guidelines*, or
  - Referring to the *Regional Ecosystem Fire Management Guidelines*.
- ✓ Develop an Individual Property Fire Management Plan by attending a SEQFBC fire and biodiversity workshop (for more detail, see *Land for Wildlife Note F4 - Fire and Your Property*).
- ✓ Identify and protect refuge areas on your property.
- ✓ Subscribe to SEQFBC's free enews at www.fireandbiodiversity.org.au
- ✓ Visit www.fireandbiodiversity.org.au for more information.

References and Further Reading

1. Steffen W & Fenwick J (2016) *The Hottest Year on Record Again*. Climate Council of Australia.

Queensland Herbarium (2014) *Regional Ecosystem Fire Management Guidelines, Sept 2014*. DSITIA. See www.qld.gov.au/environment/plantsanimals/plants/ecosystems/fire-management/

Queensland Parks and Wildlife Service (2012) *Planned Burn Guidelines: Southeast Queensland Bioregion*. DNPRSR. www.nprsr.qld.gov.au

South East Queensland Fire and Biodiversity Consortium (SEQFBC):

- *Living with Fire Factsheet 1: An Introduction to Fire Ecology*.
- *Living with Fire Factsheet 3: Recommended Fire Regimes*.
- *Fire in Bushland Conservation: The role of fire in the landscape and how we can manage it for biodiversity conservation*.

Fire, Soil and Leaf Litter Layers

Just as fire affects living organisms, it also affects soil and leaf litter layers. Leaf litter layers are extremely important for biodiversity, nutrient recycling and protecting soil from erosion. Well-developed leaf litter layers can help insulate soil organisms and soil organic matter from the effects of fire. Soil and leaf litter layers are also vital for storing carbon. For more information see *Land for Wildlife Note S1: Healthy Soil and Leaf Litter Layers*.

The more intense a fire, the greater the impact on soil and leaf litter layers. Burning when there is good soil moisture helps to retain organic matter on the soil surface and also in the soil. Conversely, lower soil moisture levels will result in more of the leaf litter layer being consumed by fire. Therefore, it is recommended to conduct planned burns when there are high soil moisture levels. This will help create patchiness in a burn. Burning in a mosaic pattern will also assist soil organisms and invertebrate populations to survive and recolonise after a fire.

Heavy rainfall after an intense fire can lead to erosion so for this reason it is important to protect leaf litter layers by trying to conduct planned burns with high levels of patchiness.

Land for Wildlife is a voluntary program that encourages and assists landholders to provide habitat for wildlife on their properties. For more information about Land for Wildlife South East Queensland, or to download *Land for Wildlife Notes* free of charge, visit **www.lfwseq.org.au**

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Information in *Land for Wildlife Notes* is not necessarily endorsed by any of the supporting agencies, nor should it be taken to constitute professional advice or a recommendation of land management.

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