LAND FOR WILDLIFE
VOLUNTARY WILDLIFE CONSERVATION

Fire, Flora and Fungi

This is the second Note in the Land for Wildlife fire series and looks at the effects of fire on plants, fungi and vegetation communities. Plants and fungi respond in different ways to fire; some species regenerate quickly after fire, others undergo mass flowering and fruiting, some germinate, and others contract or perish from exposure to fire. For some plant and fungi species, fire plays an important role in their lifecycle. At a broader scale, fire can be an important determinant of vegetation communities and can help form boundaries between vegetation communities.

Fire and Vegetation Communities

Vegetation in Southeast Queensland (SEQ) can be broadly divided into two main categories, those that are fire sensitive, and those that are adapted to certain fire regimes (see *Land for Wildlife Note F1* for an explanation of fire regimes). Vegetation types that are adapted to certain fire regimes contain plant species that have evolved characteristics that assist their survival in a fire-prone environment. The main types of fire-adapted vegetation communities in SEQ are eucalypt forests, woodlands, paperbark forests, grasslands and heathlands.

Vegetation types that are fire sensitive generally contain plant species that have few or no adaptations to fire; therefore, fire will damage or destroy these plants and may change the vegetation community over time. The main types of fire sensitive vegetation communities in SEQ are rainforest, dry vine scrubs, Brigalow forests, riparian or creekside vegetation, foredunes, mangroves and saltmarshes. It is recommended that fire is excluded from these vegetation types and that buffer zones be established around them (e.g. a fuel reduced zone around a dry vine scrub).

This micro-mosaic fire aimed to stimulate germination of the nationally threatened shrub, Zieria bifida, *near Nambour.*

Fire-adapted vegetation communities

Grassy eucalypt woodland

Banksia heathland

Fire sensitive vegetation communities

Subtropical rainforest

Dry vine scrubs

Some plants like Wallum Banksia (Banksia aemula) *and Swamp Banksia* (B. robur) *respond to fire by reshooting from the lignotuber at the base of the plant (above left), and have their seeds released by fire (above middle). These seeds can then readily germinate in the ash bed (lower middle).*

Most eucalypt species have specialised epicormic buds underneath the bark on both trunks and branches. After fire, these epicormic buds sprout new foliage.

Fire-adapted Plants

In general, most plant species that occur in fire-adapted vegetation communities have developed mechanisms to aid their survival after fire. Some species either depend on, or benefit from, fire during some stage of their lifecycle. These plant species can also be referred to as fire-adapted.

Fire-adapted plants have two main ways that they respond to fire. The first is to resprout with new leaves after fire and the second is to produce seeds that germinate after fire. These plants are therefore called either resprouters or seeders, and some plant species can be both.

Resprouters. Mature resprouter species tend to survive fire even when all their leaves have been burnt. They either re-sprout at ground level from lignotubers (large woody underground bases that store nutrients), or from epicormic buds (buds that are highly protected deep under the surface of the bark on most gumtree trunks or branches), or from rhizomes (modified underground stems that store nutrients). Heathlands, open forest and woodlands often contain plants with lignotubers. Plants with rhizomes include some grasses, sedges and rushes. Resprouters generally produce less seed than seeders and their seedlings tend to grow more slowly and may take some years to reach maturity.

Seeders. These plants rely on building up a store of seeds in the soil by producing seeds with hard seed coats, or by holding seeds on the plant (inside seed pods or fruit capsules) until a fire triggers the capsules to open, releasing the seeds. For example, Purple Pea Bush (*Hovea acutifolia*) produces many hard seeds that lie dormant in the soil for years. The heat and smoke from a fire can break these hard seed coats, allowing mass germination given the right soil and moisture conditions. Banksias and Hakeas hold their seeds in protective woody seed cases on their branches. After fire, these woody seed cases are triggered to open, releasing the seeds. In addition to heat from fire, chemicals in smoke and ash can also trigger germination of some plant species. Examples of seeders include legumes such as Acacias and pea flowers (Pultenaeas, Daviesias, Hardenbergias).

Gumtrees

Gumtrees (Eucalypts, Corymbias and relatives) are one of the most widely recognised fire-adapted native plant groups. Gumtrees accommodate fire in a variety ways. The bark of most gumtrees is densest at the base and conducts heat poorly. Low intensity fires char the exterior but do not wound the living cambium beneath it. Epicormic buds are a key mechanism used by fire-adapted gumtrees and play an important role in helping some gumtrees survive bushfires. Many eucalypt species also have lignotubers to help them survive droughts and bushfires.

A few eucalypt species, however, are killed by hot fires. These species tend to be generous seed producers and may hold their seeds in woody capsules in the canopy, which are released after fire, enabling a new generation to regenerate.

Native Sarsaparilla (Hardenbergia violacea) *germinates readily after fire from seeds stored in the soil. Photo by Sandra Gallienne.*

Fire Sensitive Plants

Broadly, most plant species found in fire sensitive vegetation communities are themselves also sensitive to fire and have few or no mechanisms to ensure their species survival after fire. These species are therefore called fire sensitive. Most rainforest plants are fire sensitive, however some rainforest plants may resprout after fire.

Fire can determine boundaries between vegetation types. For example, rainforest may move into open forest in the absence of fire, and conversely, rainforest will retreat with repeated exposure to fire. Examples of subtropical rainforest expanding may be seen on the Sunshine Coast, whereas examples of dry rainforest retreat may be seen in the Scenic Rim and Lockyer Valley regions.

Fire Regimes, Patchiness and Mosaics

As discussed in *Land for Wildlife Note F1*, it is recommended that fire-adapted vegetation communities have an appropriate level of fire to maintain a diversity of native plants, fungi and wildlife. The appropriate, or recommended, fire regimes for fire-adapted vegetation takes into account the upper and lower limits of fire frequency, extent, season and intensity. You can investigate the recommended fire regimes for vegetation on your property by talking to your Land for Wildlife Officer or via:

- Queensland Fire and Biodiversity Consortium (QFBC) *Living with Fire Factsheet 3: Recommended Fire Regimes*. Visit www.fireandbiodiversity.org.au.
- Queensland Parks and Wildlife Service (QPWS) *Planned Burn Guidelines: Southeast Queensland Bioregion*. Visit www.nprsr.qld.gov.au.
- Queensland Herbarium. *Regional Ecosystem Fire Management Guidelines*. See References for website.

The extent of a burn, also know as patchiness, refers to the amount of area burnt versus unburnt. A burn with patchiness promotes species diversity. At a landscape scale, different areas with different fire histories create a mosaic pattern of long unburnt areas through to recently burnt areas. This creates various habitat niches and increases the diversity of plants, fungi and wildlife.

Succession

Vegetation usually responds to fire in a sequence, which is referred to as succession. Initially after fire, the vegetation structure has been reduced and is more open to sunlight. Native grasses and resprouting species respond quickly.

Once rains arrive, seedlings grow in the gaps between re-sprouting trees and shrubs. Pioneer species such as wattles (Acacias), herbs and short-lived annuals often dominate. As the time since fire increases, so does vegetation cover and structure. Over time, smaller plants may be shaded out by larger trees. Gradually the vegetation thickens up and, depending on the extent and intensity of the fire, the vegetation will eventually be similar to before the fire.

Fire and Fungi

Like plants, different species of fungi respond differently to fire. Fungi are important in Australian ecosystems and are vital for decomposing plant material and nutrient recycling. They have symbiotic relationships with plants ensuring the survival of many plants. Fungi also provide food for wildlife such as the Long-nosed Potoroo. Some fungi prefer areas of long unburnt vegetation whereas other species of fungi are fire-loving and come up in large numbers after fire. Although research into the associations between fire and fungi in Australia is limited, it would seem that a mosaic of different fire histories promotes a diversity of fungal species.

Top Right: This area has not been burnt for 40 years and has a dense understorey of grass but little or no shrub layer.

Right: In the same location as the above photo, but on the other side of a vehicle track, a planned burn occurred three years ago. This burn resulted in a thick understorey of Hairy Bush Pea (Pultenaea villosa)*, diverse native grasses and herbaceous plants, which germinated from seeds stored in the soil.*

Fire and Threatened Plants

There are many rare and threatened plants in Southeast Queensland. They occur in all vegetation communities. Some species are threatened because of inappropriate fire regimes (either too much, or too little fire). If you have threatened plants on your property, it is important to research the recommended fire regimes for these species, and to take appropriate actions. Talk to your Land for Wildlife Officer if you have any concerns about the appropriate management of threatened plants and fire on your property.

What you can do

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

References and Further Reading

Environmental Protection Agency (2007) *National Recovery Plan for the Mt Emu Sheoak, Allocasuarina emuina*. Queensland Parks and Wildlife Service.

McMullan-Fisher, SJM. et al. (2011) Fungi and fire in Australian ecosystems: a review of current knowledge, management implications and research gaps and solutions. *Australian Journal of Botany* 59:70-90.

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

Queensland Fire and Biodiversity Consortium (QFBC):

- *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.*

The coastal heathland shrub, Mt Emu Sheoak (Allocasuarina emuina), *is both a seeder and resprouter. It holds its seeds in cones until a fire triggers those cones to open (as shown above), releasing the seeds onto soil rich in ash. Seeds will generally only germinate on ground that has been burnt, as the fire removes other competing plants. If the seeds are held in their cones for too long, they may become unviable.*

This shrub can also resprout from its base after a low intensity fire.

Mt Emu Sheoak is listed as nationally threatened and is found only in parts of the Sunshine Coast. The National Recovery Plan for this species recommends low intensity (cool) mosaic burns every 5-7 years to promote successful reproduction given its complex seeding and resprouting characteristics.

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.com.au**

Citation: Land for Wildlife Queensland (2016) *Note F2: Fire, Flora and Fungi*.

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.

Land for Wildlife Notes are developed and funded by the Local Governments delivering the LfWSEQ program shown below. Reprinted in 2022.

Thanks to the QFBC for contributing to *Land for Wildlife Notes F1, F2, F3 & F4.*

Dedicated to a better Brisbane