



BUSHFIRE FRONT

mild fires not wild fires

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Fire and Biodiversity

Prescribed burning is the deliberate, planned use of mild-intensity fire, the aim being to “innoculate” the forest against future uncontrolled bushfires. Prescribed burns do not prevent bushfires, but they make them easier, cheaper and safer to control and ensure they do less damage. The WA government has a program in which about 6-8% of southwest forests are prescribed burned every year.

A persistent criticism of the prescribed burning program is that it is “decimating our precious biodiversity, destroying native plants and animals” and will lead to the extinction of species and permanent loss of forest ecosystems. After more than 60 years of prescribed burning, the Bushfire Front has seen no evidence of this. On the contrary, we observe that frequent mild-intensity fire enhances biodiversity. Scientific research has shown that our plants and animals are not just adapted to fire, but flourish in its presence. Many species would disappear if fire was excluded.

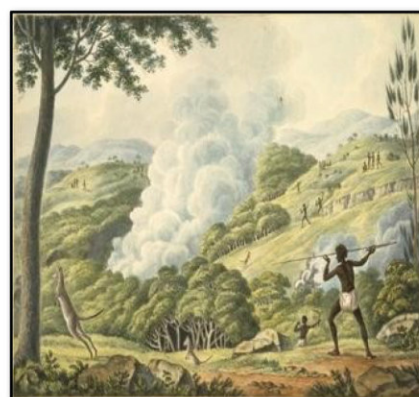
AN HISTORICAL PERSPECTIVE

Before the arrival of humans, Australia was a wilderness where fire was ignited not by the hand of mankind, but by Mother Nature in the form of lightning strikes. Charcoal in ancient lake-bed sediments demonstrates fire preceded the arrival of humans by millions of years.



Lightning strikes have ignited fires for millions of years

Aboriginal people, with the capacity to make and transport fire, arrived in Australia at least 60,000 years ago. They used fire skilfully and purposefully for hunting, cooking, access, winter warmth, signalling and ritual purposes. Burning the bush was essential to their physical and spiritual well-being. With their arrival, fire frequency increased. In the south-west, Noongar people burned mostly in the summer months, the Birak season. Oral, historical and scientific evidence indicates that their fires, although lit in summer, were low intensity, relatively small and patchy, but all-encompassing. Thousands of years of Noongar burning, overlain by fires caused by lightning, maintained south-west forests in a safe, beautiful and healthy condition.



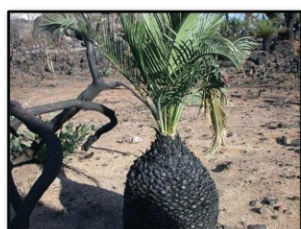
Aborigines using fire to hunt kangaroos. Joseph Lycett, NSW, c. 1820 (National Library of Australia)

Thus, for millions of years, fire shaped the evolution of plants and animals in our forests. Over this time a range of amazing physical and behavioural adaptations evolved. These adaptations not only enable the forest biodiversity to co-exist with fire, but it has largely come to depend upon fire for regeneration and refreshment.

FIRE AND PLANTS

Native plants are beautiful and botanically interesting, but also provide fauna habitat and become fuel for a bushfire. Adaptation of plants to fire fall into two broad categories: 'resprouters' and 'seeders'. About 60-70% of plant species in the jarrah forest and about 20-30% of plant species in the karri and tingle forests resprout following fire, putting up new shoots from buds protected beneath bark, or from below-ground organs such as lignotubers, corms, rhizomes and bulbs. Other plants do not re-shoot after fire, but regenerate from seed. This is stored in the soil or in the plant's canopy in fire-resistant woody fruit or 'cones'. Some plants, including most of our native forest trees, will both re-sprout and regenerate from seed after fire.

For many non-sprouting plants heat and smoke is necessary to start the regeneration process, for example the cones of many Banksia species need to be burnt before they will open and release seed. Fire also prepares the ideal seed bed and growing conditions for regenerating plants.



Resprouting from a lignotuber after fire



Banksia seed pods open to release seed after fire

Plants can be further categorised according to how readily they are killed by fire, and their juvenile period (how long it takes them to regenerate, flower and produce seed). Some plant species are designated "fire sensitive" because they are easily killed by fire, have canopy-stored seed rather than soil-stored seed, and have a relatively long juvenile period. However, it has been shown that 'fire sensitive' species persist in areas subject to frequent, cool fires because they occur in habitats such as rock outcrops and creek lines that are unlikely to burn under mild weather conditions (unless the vegetation is long unburnt). On the other hand, these habitats can burn fiercely during a summer bushfire.

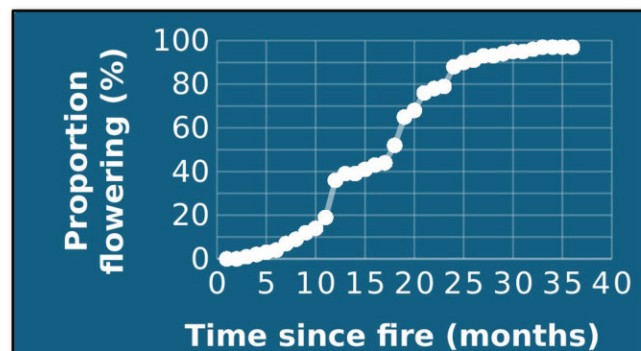


FIGURE 1 Proportion of plants in a jarrah forest that have reached flowering age with time since fire

Research has shown that prescribed burning in spring and autumn does not cause any loss of plant species because burnt plants recover or regenerate. Indeed, at the regional scale, the number of different plant species is optimized by prescribed burning that maintains a mosaic of different times since fire.

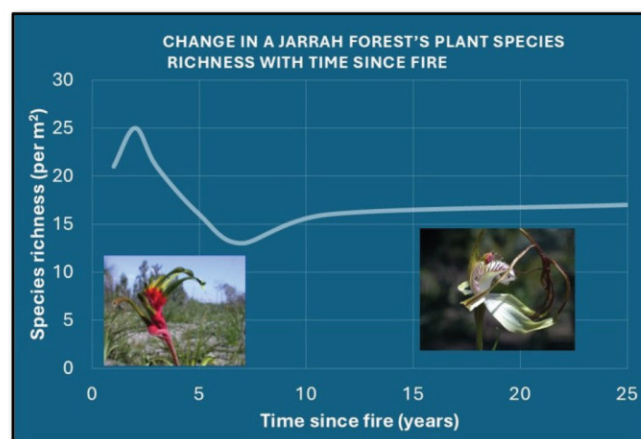


FIGURE 2 Changes in species richness in a jarrah forest with time since fire

FIRE AND MAMMALS

The extent to which fire effects a native mammal depends on the animal's habitat requirements, its life history, and the intensity and size of the fire. Some animals, such as kangaroos and brush wallabies, prefer recently burnt forest because it provides fresh green shoots. Other animals, such as mardo, prefer longer unburnt forest because the deep litter provides habitat for a greater variety of food insects. On the mainland, quokkas inhabit intermediate-age swamps and gullies in the higher rainfall forests because the denser vegetation provides cover. In lower rainfall forests, tammars wallabies occupy intermediate age thickets in gullies and broad valley floors. However, when the vegetation begins to senesce and collapse due to old age, the quokkas and tammars will move out in search of more suitable habitat, or will be predated because they are exposed. Infrequent small summer or autumn fire is needed to regenerate these habitats.

Termite-eating numbats do not require fire to regenerate their habitat but they can persist with low intensity patchy fires that retain a high proportion of hollow logs and other dead and downed woody material.

Honey possums are small, sedentary mammals that have a specialized diet of pollen and nectar. They are most abundant in long-unburnt vegetation, but also live in young vegetation. They nest in elevated shrubby plants so are readily killed by fire. However, if fires are cool and patchy, as will normally be the case with a prescribed burn, they quickly recolonize burnt areas from unburnt patches, as soon as the vegetation in the burnt patches begins to flower. On the other hand, intense bushfires kill all or most honey possums, and if the fire is large, recolonization can take many years.

The outcome of fifty years of research and observation of the impact of fire on our native animals is this: large, hot summer bushfires kill most ground-dwelling and arboreal mammals, but most of these animals survive cool patchy fires in spring or in late autumn after the opening rains.



Quokka



About 500 quokkas died in the 2015 Northcliffe bushfire, reducing the local population by more than 90%

FIRE AND FOREST BIRDS

Some birds use tree hollows for nesting and feed on insects, pollen and seed in the tree canopy. Others nest and feed in the mid-canopy strata, while some nest and feed only in the low shrubs or on the forest floor. Still other birds are generalists and can utilize vegetation throughout the forest structure. The extent to which fire impacts a bird species depends upon the extent to which fire impacts their habitat, the vegetation, and how quickly their habitat regenerates. Large, hot summer bushfires can completely remove all bird habitat, from the forest floor to the top of the trees. Low, cool, patchy fires have a much lower impact on the forest vegetation, usually only affecting patches of ground level shrubs.

For birds that breed in spring, fires at that time of year may interrupt breeding, although studies have shown that most spring-breeding species have finished breeding by the time prescribed burning commences. Moreover, the effect of cool patchy fires on bird populations is relatively short and is temporary, with populations recovering to pre-fire levels as the vegetation recovers. Studies have also shown that recovery is much slower following large, hot summer bushfires than after a mild-intensity prescribed burn.

FIRE AND FROGS AND REPTILES

Forest frogs mostly burrow into the soil during dry periods when fires are likely to occur. Living on insects also enables frogs to be little affected by cool, patchy fires. However, intense summer fires can significantly impact frogs, especially those that inhabit peat swamps, and it can take many years before populations recover. Reptiles, especially lizards, are more resilient to fire than mammals because most live in burrows and have a generalized diet. Skinks often inhabit cracks in logs, so are usually little affected by cool fires. However, they are significantly impacted by hot summer and early autumn fires because these fires burn away a high proportion of logs and other dead and downed woody material.

FIRE AND INVERTEBRATES

The numbers of most invertebrate species decline immediately after fire, but then recover as the vegetation recovers. The extent of decline depends on the species' life history, its habitat requirements and the extent to which its habitat is damaged or destroyed by fire. The rate of post-fire recovery will depend on the size, intensity and patchiness of fire. Recovery is relatively rapid following cool, patchy fires, but much longer following large hot fires. Some species are more sensitive to fire than others. For example, long-lived sedentary species like trap-door spiders are highly susceptible to fire, so recolonization can take a long time if fires are large and intense. Repeated large hot fires could extirpate local populations of trap door spiders. Their survival is enhanced by mild-intensity prescribed fire that leaves unburnt patches and mitigates the extent of summer wildfires.

CONCLUSION

The most harmful fire regime for forest biodiversity is a cycle of large, hot, dry season bushfires because mortality and injury rates are high and recolonization is slow. On the other hand, most native plants and animals survive the impacts of cool, patchy prescribed fires, and recovery is rapid. It is impossible to exclude fire from the forests. The most effective way to mitigate the harmful impacts of a cycle of large hot bushfires on both human communities and the environment is to maintain an effective bushfire management system. This will encompass efficient fire detection, a firefighting capability, plus a fuel reduction prescribed burning program that will reduce the severity of bushfires and render them easier and safer to put out.



Monitoring a low intensity prescribed burn in jarrah forest...



...and the result

The Bushfire Front comprises trained and experienced fire scientists and bushfire managers. Our aim is to minimise the damage resulting from large, high-intensity bushfires in Western Australia.



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