



The effects of fire on the environment

Changes to biodiversity

The plants, animals, insects, and fungi that form a vegetation patch before a fire may not be the same species that recolonise it afterwards. Certain species respond well to fire, not necessarily as adaptations, but due to life-form and reproductive opportunities. These species are becoming more dominant in areas that are frequently affected by bushfire.

Specialist features

Many plants in Australia have developed to a point where scientists can classify them as 'adapted to fire'. For example Yakka, or grass trees, (*Xanthorrhoea* spp.) are particularly fire adapted as they rapidly re-grow from protected buds. Fire also stimulates their flowering. Eucalyptus, Banksia and Hakea have their seed protected from bushfires in woody capsules. These seeds are released to germinate in nutrient-rich ash, left by the bushfire.

Climate change

Australia has been experiencing bushfires for the last two million years. 8000 years ago the last ice age reached its coldest point and Australia has been warming since. Under current global warming trends, Australia can expect an increase in bushfire activity. Recovery will prove more difficult during periods of drought, and biodiversity will comprise species that respond better to fire and arid conditions.

Vegetation types

South Australia hosts a range of vegetation types, from stringybark forests to arid shrublands. Most Australian habitats have evolved with regular reoccurring fires. The increasing aridity of the Australian environment has resulted in a more fire-prone flora and fauna, and an increase in fire activity will continue this trend.

Human influence and change

Aboriginal people influenced the environment by using fire to manage 'country'. The practice has similarities to the prescribed burning techniques used today. The human influence on fire has affected the Australian landscape for centuries and this, in turn, has shaped the Australian flora and fauna. The impacts of fire on the environment depend on the fire history or fire regime (the interval between fires, the time of year fires occur, how intense fires are and the amount and arrangement of burnt and unburnt patches in an area). The decision to manage fire for safety, protection, land management and regeneration does not change this.

For more information on this topic contact the Fire Management Officer in your Region.

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Fire Regimes: Factors that affect the impact of fire

Intensity

The differing amounts of heat produced as a fire burns can create a mosaic pattern on the landscape.

Frequency

Some species require a fire-free period between bushfires to flower and produce seed or ensure offspring are old enough to survive. Other species favour the habitats which result after bushfire in order to reproduce.

Seasons

Spring fires can impact on emerging plants and young animals. Fuel is wetter and burns with less intensity, and leaving more unburnt patches.

Summer fires usually occur in extreme weather conditions and can be highly destructive and cover large areas. They can be more difficult to put out.

Autumn fires occur when many plants are still under moisture stress. Fuel is very dry and fire intensity can be high.

Patchiness

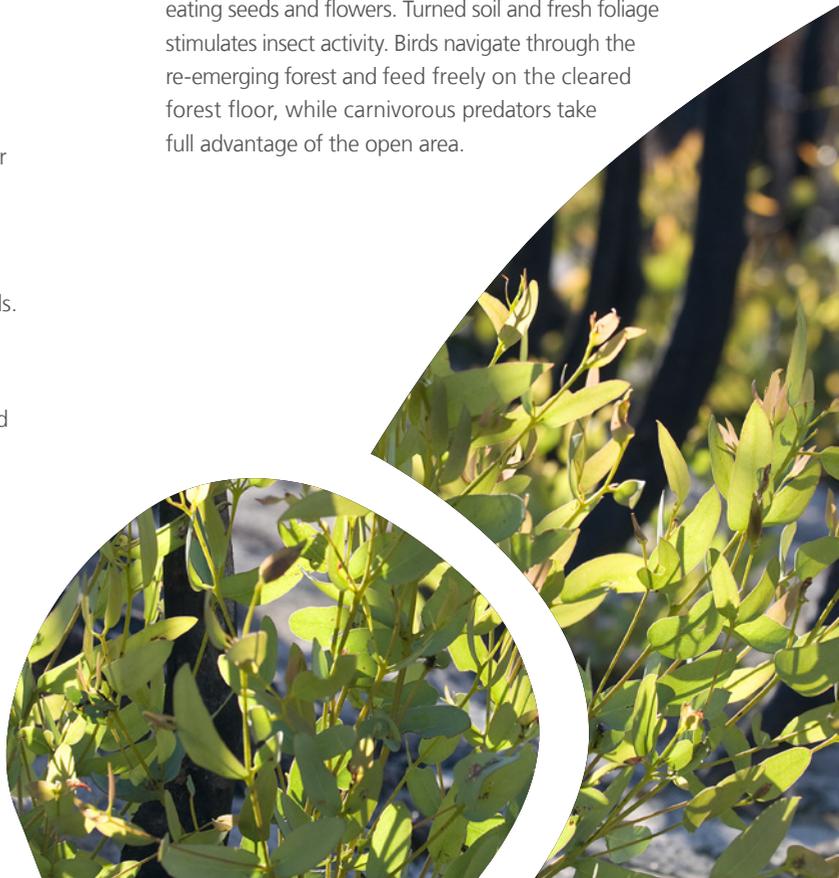
The amount and arrangement of burnt and unburnt patches in an area is important. A good mix of habitats provides a range of areas suitable for species which favour burnt conditions and those that prefer unburnt vegetation.

New opportunities

The Australian landscape has been recovering from fire for millions of years. Every bushfire has an influence on fauna and flora, resulting in frequent localised changes to habitat.

The changes that follow a fire are dramatic. Green vegetation turns to white ash, brown timber turns to black charcoal, and the shade of gray that remains opens new doors of opportunity. The ash bed is full of nutrients which greatly enhances a proliferation of seedling germination. Tree trunks and roots shoot with buds capturing newly available light.

The rejuvenating growth attracts wildlife that feed on the fresh shoots. Foragers explore with the easy access, digging for fungi, eating seeds and flowers. Turned soil and fresh foliage stimulates insect activity. Birds navigate through the re-emerging forest and feed freely on the cleared forest floor, while carnivorous predators take full advantage of the open area.



Fire recovery in SA woodlands

Fire

Seeds release from pods/stored in soil. Germination is stimulated through exposure to smoke and heat. A thin layer of ash, rich in nutrients covers the ground making a perfect bed for raising new seedlings.

Birds and foragers move through the open area finding seeds and insects to eat. Ground living fungi species fruit and start their reproductive cycle. Predators and scavengers capitalise on animals with few places to hide.

One month

Young seedlings cover the open ground, soaking the abundant light, water and nutrients. Species that have not been present for years may appear as the fire initiates their life cycle. Eucalypt species shoot growth from buds hidden under bark and lignotubers under the soil. Other species shoot from roots out away from the main trunk (eg Acacias, Allocasuarina spp.). Ferns and grass trees shoot from burnt trunks, and grasses produce fresh shoots from their bases. Nutrients that are not used by plants are leached into the soil.

A few months

Grazing animals are able to move through opened forest feeding on the new shoots. Foraging animals move through open areas browsing fresh foliage and digging for fungi and insects. Predators can select their prey, unable to find cover in the open space.

One year

Development continues with seasonal conditions influencing recovery. Ground cover plants have re-established, protecting the soil from erosion. Plant and animal succession (the altering dominance of species with time and changing conditions) favour different species than before the fire. Competition between different plants is strong in the emerging shrub layer.

A few years

Fuel levels are still low and the occurrence of a second fire is unlikely. The number of species has increased since fire event and is still increasing. Animal species that prefer the open habitat created by the fire start to move out as the shrub layer begins to close.

10-20 years

Reaching a transition point between the early colonising species and the species that prefer older habitat. There is enough near-surface and elevated fuel to carry a fire through the under story again. A fire now, will have a major influence on biodiversity as some species have not produced seed yet. Habitat has recovered for many animal species to return (eg Bandicoots).

20 years

The fight for understory dominance is ending and competition between taller trees and shrubs causes the under story to thin. Most plant species have matured and will be able to reproduce if burnt again. Lichens and mosses have started covering soil, rocks, and fallen timber again. Decomposing fungi proliferate on the forest floor. High levels of fuel has accumulated in the surface, near-surface layers and on tree trunks as fallen dead material builds up, and as bark re-grows. A few species which prefer long unburnt habitat are beginning to return and will increase if the area remains unburnt.

60 years

The few species which benefit from a lack of fire now dominate. Fuel levels have been stable for many years. Most plant species have seed stored in the soil or in buds and capsules on the plant. A fire now, will re-start the cycle again.