

Living with fire: native wildlife

This factsheet provides some examples of how animals respond to fire and provides useful guidelines to landowners who wish to consider biodiversity conservation in their fire management practices.

Fire can be a very destructive force. Bushfires can be chaotic events that cause much panic and concern among the community. Much of the concern is for the welfare of the animals that live in the bush. It is important to remember that while some fauna will be directly killed by fire, many native fauna species are actually very dependant on fire and certain fire intervals for their long-term survival. This factsheet will present some information on the role of fire in the Australian landscape and how many animals adapt to a particular 'regime' of fire.

- Some species are avoiders, staying alive by moving out of the area or taking shelter underground or in hollow logs.
- Other species lose individuals in a fire, and recolonise from unburnt areas.

Bushland goes through various stages of recovery after a fire. Initially undergrowth and shading are bare. The first stage after a fire 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 now become shaded out. Many years after a fire the country opens out again as short lived shrubs die off.

These stages of vegetation recovery after fire provides a range of diverse habitats for many animal species.

Not enough fire: In areas that have been unburnt for many decades, intense wildfires can occur resulting in the local extinction of fauna populations due to the loss of all individuals.

Too much fire: Areas burnt too frequently can have a loss of species due to reduced habitat complexity.

Birds



The response of bird species after a fire has been well studied. Being highly mobile, many birds can avoid fire and some species of birds are observed returning to burnt areas within a few hours following the passing of a firefront. Large scale, high intensity fires can result in high mortality rates through the fire itself and reduced food availability immediately after the fire. Low to medium intensity fires result in lower mortality rates, with populations moving to adjacent unburnt areas. Starvation may occur when competition for food with birds in adjacent territories is high¹.

The ground parrot *Pezoporus wacillus* is found in heath communities and is a good example of the complexities involved in fire management for conservation. The birds require old, thick vegetation for nesting and roosting (7-12 years since fire). However, their main food source, grass-like sedges, are found in areas recently burned (1-5 years). The challenge for management is to burn sufficient heath to provide the food source, whilst protecting enough unburnt vegetation for the birds to survive and reproduce².

The eastern bristlebird *Dasyornis brachypterus* is limited to a few distinct populations along the east coast of Australia. One of the largest populations is near Jervis Bay in NSW. This area had an intense wildfire in December 2003 that burnt more than half of the eastern bristlebird's habitat. Post-fire surveys found that intensely burnt areas had the greatest reduction in numbers but the nearby unburnt areas had an increase in numbers. It was also found that the proximity to unburnt refuge areas was very important for survival of bristlebird populations after fire³.

Invertebrates



There have been few studies on the impacts of fire on invertebrates but studies have shown that fire has a large impact. There are often very high mortality rates, particularly when all ground litter is consumed by the fire. One study showed a very high recovery rate following fire, mainly in species with low numbers at unburnt sites. The recovery of invertebrates is closely connected with vegetation complexity during the regeneration process. Ants are often used as indicators of recovery following a fire. Levels of leaf litter and debris increase over time and allow opportunities for many species to return⁸.

The retention of unburnt areas is very important for maintaining healthy invertebrate populations. Ensuring there are areas with a range of post-fire stages optimises habitat for all fauna, including invertebrates. Many invertebrate species may be in a state of hibernation during the winter months (diapause), which are traditionally seen as the preferred time for planned fires. Variation in the season of burn for individual areas, in addition to ensuring a mosaic burn pattern should reduce these impacts⁹.

David McFarland



Glen Threlfo



Kathy Julian



Kathy Julian



Mammals



As a very broad generalisation smaller mammals prefer denser habitat while larger mammals prefer open habitat. Small mammals such as bandicoots, antechinus and native rats prefer dense vegetation cover to avoid predators. These species often suffer high mortality rates during a fire, relying on recolonisation from unburnt areas. Larger animals such as kangaroos require grassy open areas for food and some small wallabies require open areas for feeding and dense areas for cover when resting. These larger animals are able to avoid low to medium intensity fires and will return to burnt areas once new growth provides food.

Observations in Brisbane Forest Park have shown a loss of pretty face wallabies *Macropus parryi* following changes to fire management. A population of wallabies was regularly seen feeding in a hazard reduction zone that was burnt every two years for fire suppression and mitigation purposes. As a result of this frequent burning the area had an excellent cover of kangaroo grass *Themeda triandra*. This regular burning was stopped and as the grasses aged and became less palatable, the numbers of wallabies gradually dwindled⁴.

A recent study of bush rats *Rattus fuscipes* in southern Australia involved trapping all individuals from forest remnants and releasing them in nearby bushland to study patterns of recolonisation. Their data suggested that on average, patch populations that were initially small subsequently recovered to a similarly small size and those that were initially large were also large two years later. The authors concluded that populations of the bush rat may be able to survive disturbances such as fire if some areas of suitable habitat remain and some individuals persist⁵.

Reptiles



Reptile abundance and diversity is closely linked to habitat complexity. As a result, recovery rates can be low as it may take many years for leaf litter and other habitat features such as branches and logs to accumulate. Some species shelter underground and can survive the fire itself. These species can be susceptible to starvation in the early stages of recovery, due to a lack of food, although they may persist if there are sufficient unburnt areas to occupy⁶.

Photos: (1) The eastern bristlebird is threatened by too frequent fires changing the structure of its optimal habitat. High intensity wildfires are also quite damaging to this species habitat. (2) The ground parrot prefers the mid-stages of post-fire regeneration in coastal heaths, moving in at about three years post-fire. 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. (3) This koala was able to shelter from a low intensity burn in the canopy but might not be so fortunate during an intense wildfire. (4) The ash bed left after a fire contains nutrients which encourage seedling growth. (5) Various reptiles 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. (6) Changes in fire regimes (too little fire) may have impact on the food resources of the pretty face wallaby. Changes to fire frequencies, causing the undergrowth to thicken, have resulted in a decline in their numbers. (7) Amphibians like this emerald spotted tree frog are not affected greatly by fire as they live in moist places.

References: 1. Woinarski, J.C.Z. (1999) "Fire and Australian birds: a review" in Gill, Woinarski, York (eds) *Australia's Biodiversity – Responses to Fire- Plants, Birds and Invertebrates*. Biodiversity Technical Paper No. 1. Environment Australia; Canberra. (<http://www.dch.gov.au/biodiversity/publications/technical/fire/index.html>). 2. Tasker, E. & Baker, J. (2005) "Fire and feathers, Managing fire-sensitive birds on a flammable continent" in *Fire and Birds: Fire Management for Biodiversity*. Olsen & Weston (eds). Supplement to Wingspan 15.9: 28-30. 3. Tasker, E. & Baker, J. (2005) "Fire and feathers, Managing fire-sensitive birds on a flammable continent" in *Fire and Birds: Fire Management for Biodiversity*. Olsen & Weston (eds). Supplement to Wingspan 15.9: 28-30. 4. Dave Kington, Ranger – Brisbane Forest Park (personal communication). 5. Lindenmyer, D.B., Cunningham, R.B. & Peakall, R. (2005) "The recovery of populations of bush rat *Rattus fuscipes* in forest fragments following major population reduction". *Journal of Applied Ecology*. 42: 649-658. 6. Hannah, D.S., Smith, G.S. & Agnew, G. (1998) "Reptile and Amphibian Composition in Prescribed Dry Sclerophyll Forest, Southern Queensland. *Australian Forestry*, 61, 1:34-39. 7. Tran, C. & Wild, C. (2000) *A Review of Current Knowledge and Literature to Assist in Determining Ecologically Sustainable Fire Regimes for the Southeast Queensland Region*. Southeast Queensland Fire and Biodiversity Consortium, Griffith University. 8. York, A. (1999) "Long-term effects of repeated prescribed burning on forest invertebrates: management implications for the conservation of biodiversity" in Gill, Woinarski, York (eds) *Australia's Biodiversity – Responses to Fire- Plants, Birds and Invertebrates*. Biodiversity Technical Paper No. 1. Environment Australia; Canberra. (<http://www.dch.gov.au/biodiversity/publications/technical/fire/index.html>) 9. Whelan, R.J., Rodgerson, L., Dickman, C.R. & Sutherland, E.F. 2002. Critical life cycles of plants and animals: developing a process-based understanding of population changes in fire-prone landscape. Chapter 5, pp. 94-124 in Bradstock, R.A., Williams, J.E. & Gill, A.M. 2002. *Flammable Australia: the fire regimes and biodiversity of a continent*. Cambridge University Press. 462 pp. ISBN 0 521 80591 0

Amphibians



In general, amphibians are immediately impacted less than other fauna, due to their preference for wet habitats. Intense fires that burn these wet habitats will have a direct impact in mortality and they may also suffer from reduced food availability. Burning these areas in a mosaic pattern should ensure that species can persist in the long term⁷.

Conclusion: The examples given in this factsheet have demonstrated a range of issues in the management of fire for fauna. Animal species respond in numerous ways to fire and this complexity means there is no simple rule for managing fire to conserve fauna. Ensuring that sufficient areas remain unburnt is vital for allowing fauna to recolonise areas as they regenerate. Applying a range of fire frequencies throughout the landscape can increase habitat diversity and in turn the diversity of fauna populations.

Points to remember

- Ensure there are adequate areas left unburnt during a planned fire. Any planned burn should aim to cover between 30-60% of the area, allowing for refuge areas to remain unburnt.
- Remove fuel from around fallen hollow logs, the base of dead trees and other habitat features to provide refuges for fauna during the fire.
- If you are managing a range of ecosystems, have areas on different fire regimes to provide different habitats (eg. higher fire frequency for grassy woodlands and lower frequencies for shrubby woodlands).
- Plan your burns to create a mosaic of areas at different stages of post-fire regeneration.
- Observe the fauna on your property and consider their habitat requirements before undertaking a fire.
- Monitoring over time to address a specified question/objective is vital.
- If you have a large property or work with your neighbours – don't burn off the whole area in one fire or season. Remember varying the size of a fire and the number of years between fires has been shown to maximise biodiversity.

For more information please contact:

Cuong Tran
Project Coordinator
SEQ Fire & Biodiversity Consortium
School of Environmental and Applied Sciences
Griffith University
PMB 50 GCMC Bundall QLD 9726, Australia
Ph: (07) 5552 8259
Fax: (07) 5552 8067
Email: c.tran@griffith.edu.au
Website: www.fireandbiodiversity.org.au

State Winner: 2003 Emergency Management Australia's, Safer Community Awards



www.fireandbiodiversity.org.au/

ISBN 0 9580714 5 4

Photos Kathy Julian. Fire photo Neil Gourley

Printed on recycled paper.