Mosaic burning in south-west forest ecosystems for biodiversity and community protection

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Extended Abstract

Fire management based on sound science is fundamental to the conservation of biodiversity in south-west W.A., and there is a substantial body of scientific evidence that fire diversity benefits biodiversity. At the landscape scale, a fine-grained mosaic of patches of vegetation representing a range of fire frequencies, seasons and intensities should provide diverse habitat opportunities and reduce the risk of large, damaging and homogenizing wildfires.

The Walpole Fire Mosaic Project which commenced in 2003 in forests north of Walpole is an example of science-based adaptive management to improve fire management and biodiversity outcomes. It is a landscape-scale operational trial to determine whether a fine-grained fire-induced mosaic can be created by the frequent and targeted introduction of fire into the landscape (patch-burning). This does not equate to frequently burning out the landscape, but rather, attempting to create a mosaic of patches of vegetation at different times since last fire (seral stages) by regularly burning relatively small patches across the landscape. Because of the variable nature of vegetation at the landscape scale, some patches will burn frequently, others will burn infrequently; some patches will be small, others relatively large. The resulting dynamic mosaic is being mapped through time and the responses by elements of the biota are being monitored. Monitoring is also being carried out at sites from which fire is excluded and sites experiencing fire regimes in accordance with existing management plans.

After some 8 years, and following the introduction of targeted aerial patch-burning every 3 years or so, a finer scale fire mosaic is beginning to emerge in forested parts of the landscape. Over the 4,800 ha study area, there exists a variety of seral stages, ranging from recently burnt patches to long unburnt patches. Greatest diversity of seral stages exists in forested ecosystems, with non-forested heathlands showing least seral diversity. This reflects the different characteristics of forests and heath vegetation as fuel, and the variety of topographic and edaphic conditions associated with forests compared with heaths.

As the fine scale mosaic establishes, it will become self-regulating as the nature of future fires will be determined not only by surface burning conditions (weather, topography and fuel moisture), but by the spatial and temporal distribution of past fires. Increasing the frequency of patch burning in the landscape to establish a complex mosaic of different fuel ages, will increase the landscape's resilience to severe wildfires. As the mosaic structure establishes, this proposition will be tested by simulating wildfire events.

This is a long term trial, so the patch and landscape-scale influences of mosaic burning on biodiversity are still being assessed. However, some early trends are emerging, especially for fungi and invertebrates. Many species within these groups show strong seral stage preferences, with some species only present (or present at detectable levels) in either the early, intermediate or late seral stages. Therefore, at the landscape scale and at any point in time, there exists a greater diversity of fungi and invertebrates within landscapes comprising a fine scale diversity of seral stages compared with homogenous landscapes, or landscapes of the same time since last fire.