

Walpole fine grain fire mosaic

by Allan Wills; Department of Biodiversity, Conservation and Attractions; allan.wills@dbca.wa.gov.au

Background

In fire-prone environments, prescribed burning achieves many public land management objectives, including protecting communities and the environment from damaging bushfires. There is evidence that for some taxa in some biomes, reducing the size of burnt patches and creating a fine-scale mosaic of vegetation at different times since last fire (seral stages) may benefit biodiversity. An experimental approach to planning and implementing an ongoing burning program provides information on the response of biota to a fire mosaic. A novel experimental management trial that created and quantified a fine-scale fire mosaic was implemented in a south-west Australian forest landscape in London forest block about 35 km northwest of Walpole. The project aimed to advance an understanding of the factors affecting burn patch size and seral diversity metrics and quantify effects on a range of taxa including fungi, plants, cryptogams (mosses, lichens, and liverworts), invertebrates, vertebrates, and birds.



Aerial ignition of the fire mosaic in London forest block. *Annoselix dolosa* a short-range endemic land snail from London forest block.

Findings

In this trial, the frequent introduction of fire under low to moderate Forest Fire Danger Indices resulted in a landscape comprising a quantifiably higher diversity of seral stages and smaller burnt patches than adjacent areas treated by fuel reduction prescribed burns and by a high intensity bushfire. The 10-year trial demonstrated that the fire mosaic characteristics, including diversity of seral stages, burnt patch size, patch distribution and patch connectedness, can be managed to a large extent by ignition frequency, which affects landscape fuel flammability, and the timing of the introduction of fire with respect to weather conditions.

Different taxa responded in different ways to the mosaic and is summarised in following Table.

Responses of different taxa to the mosaic	
Plants	Mosaic sites tended to be slightly richer in plant species than wildfire sites. Mosaic sites had an intermediate richness of obligate seeders compared to early post wildfire seral stages that were richer, and later seral stages, which were poorer.
Fungi	Early seral stages were less diverse and fruiting body diversity increased with vegetation age. The mosaic was more diverse than young post wildfire seral stages but not older, post-wildfire seral stages.
Cryptogams	Compared to wildfire where there was extirpation of species from large areas, the mosaic retained species and provided a source for recolonisation of burnt areas. Liverworts tend to be slow colonisers.
Invertebrates	The mosaic was richer in comparison to early post-wildfire seral stages. Later post-wildfire seral stages were richer in comparison to the mosaic.
Vertebrates	Too few data to provide trends and comparisons. Honey possums were probably favoured by mosaic burning compared to wildfire.
Birds	Slight enrichment of the mosaic in comparison to the wildfire but not enough data to test for significance. Nine of 53 species encountered showed preferences for seral stages, indicating that some bird species are favoured by mosaics.

Management implications

Attempting to create patchiness in prescribed burns by utilising seasonal moisture differentials (landscape patterns of varying fuel moisture) is becoming increasingly difficult and risky in a climate that is trending warmer and drier. The frequent and targeted introduction of fire under mild early spring or late autumn weather conditions provides an opportunity to create a fine-scale fire mosaic and to protect fire sensitive habitats such as riparian zones, peat swamps and rock outcrops from frequent fire by surrounding them with light, patchy fuels that will not sustain high intensity fire. Fire management on public lands that aims to create fine-scale mosaics also presents an opportunity to meaningfully engage Aboriginal people, incorporating them and their traditional fire knowledge, to deliver a range of environmental, social and economic benefits. Biodiversity benefits stem from mosaics providing continuity of habitat in at least some part of the mosaic and retaining late seral stages. Cryptogams and honey possums, which are extirpated by wildfire can colonise burnt habitat from nearby older patches within the mosaic. Some species of birds show preferences for seral stages and may benefit from the complexity of mosaics.

Further information

Burrows, N., Stephens, C., Wills, A. and Densmore, V., 2021. Fire mosaics in south-west Australian forest landscapes. *International Journal of Wildland Fire*, 30(12), pp.933-945.

Wills, A.J., Liddelow, G. and Tunsell, V., 2020. Wildfire and fire mosaic effects on bird species richness and community composition in south-western Australia. *Fire Ecology*, 16(1), pp.1-15.

Wills, A.J., Cranfield, R.J., Ward, B.G. and Tunsell, V.L., 2018. Cryptogam recolonization after wildfire: leaders and laggards in assemblages?. *Fire Ecology*, 14(1), pp.65-84.