

## Conference Proceedings – Speaker Transcript

### Managing fire for nature conservation in subtropical woodlands

**Emma Burgess**

University of Queensland

[Link to slides](#)

Good afternoon, everyone. Today I'm speaking from an ecological perspective to look at fauna responses to mosaic burning and in particular bird species' responses to mosaic burning. This forms part of my broader PhD project that's been looking at managing fire for nature conservation in subtropical woodlands.

I'll start by providing a brief background to help place this project into context. The study is being conducted on a private nature reserve that's currently managed by Bush Heritage Australia. This reserve is about 60,000 hectares in size and is located in the Brigalow Belt bioregion of Queensland. This is an area or region that has experienced extensive clearing in the recent past. Prior to Bush Heritage purchasing the reserve that we've been working on back in 2001, it was managed as a grazing property for about 150 years. Therefore, the overarching goal for Bush Heritage has been to restore the condition, functioning and dynamics of the assemblages of species that they expect would have been present prior to European settlement.

Ecological fire management represents an important tool towards achieving this goal. In fire ecology there is a common assumption that pyrodiversity will beget biodiversity (slide 3). The point of this is, if we introduce a range of burn conditions and increase the number of ignitions - so lots more small fires rather than large fires, then the resulting diversity in fire histories and the greater representation of successional stages of vegetation will accommodate a wider range of species. This approach is also known as mosaic burning, as you're probably all aware. This is what Bush Heritage have been trying to implement on the reserve since they purchased it.

Whilst we assume that pyrodiversity will give us increased habitat diversity, and therefore greater animal diversity, there is uncertainty as to the scale at which pyrodiversity might be influenced in biodiversity. By scale, we're simply talking here about the three main components of biodiversity that we've tried to represent in this diagram (slide 4). Each of the different symbols are meant to represent a different species. If we look at the local or site level, we tend to talk about alpha diversity, which is just the total number of different species within a site or habitat. When we talk about beta diversity, we're looking at the difference in species' composition between habitats or sites within a landscape or reserve. When we move out to this broader scale, we tend to refer to gamma diversity which is just the total number of different species across all sites within a habitat within a landscape.

I won't go into the methodology because of limited time but thought it might be worthwhile to give a bit of an overview of a conceptual model of what we expect is happening (slide 5). Under the mosaic

burning approach we're assuming that this heterogeneous vegetation mosaic would be influencing the beta diversity component, which would have a positive impact on gamma diversity. Also, under active controlled burning, we aim to reduce the extent and frequency of wildfires. Areas of longer unburnt habitat can be a limiting factor in fire-prone ecosystems. In our system at least, we expected that these longer unburnt patches would be supporting greater alpha diversity of woodland birds and overall having a greater positive impact on gamma diversity. Conversely, if there's no active control burning, we might expect a greater extent and frequency of wildfires which can remove key resources and give us a more homogeneous vegetation mosaic which can have an overall negative impact.

So what did we find? Well, when we looked at aggregated measures of richness, we found heterogeneity was an important driver. However, it wasn't fire-mediated heterogeneity but rather the environmental heterogeneity, in this case, range in elevation (slide 6). It's important to point out that the explanatory power did vary depending on spatial scale and the component of diversity that we looked at. We then went on to look at the response of different foraging guilds to mosaic burning, at both the site and landscape level. Here we found different correlates of richness among particular guilds and also, depending on the spatial scale that we looked at. But one important factor that did come out was that the extent of longer unburnt vegetation was having a positive impact on important foraging guilds, at both the site and landscape level (slide 7). So these were things like frugivores, insectivores and nectarivores.

So what might this mean for ecological farm management? (slide 8) Well, firstly the things we can't control are important, in this case, landscape context. Secondly, it's not part of our pyrodiversity per se that we're finding is important, at least how we measured it. What we did was look at the diversity of things like fire regimes, fire histories, spatial configuration of these fire histories. But instead it was the extent of longer unburnt vegetation. In this ecosystem these are areas that are greater than 10 years since last fire and also that have been infrequently burnt. We find that these tend to support semi-evergreen vine thicket patches which are a declining ecosystem in our study region. They're also known to be an important ecosystem for small woodland birds, which are also declining.

Therefore, it's these areas that we're looking to protect. The next stage in this research has been talking with the fire managers about how we can actually achieve this. Obviously we have these grasslands and open grassy woodlands, that need to be burnt, but how can we maintain these patches of semi-evergreen vine thicket.

Lastly, it's also important to emphasise that management approaches that are considered appropriate are dependent on the scale at which a biodiversity conservation goal is conceptualised. So a broad brush approach may not be appropriate. Thank you.

### **Questions from audience**

**Q** - Emma - you said that there was higher bird diversity in the vine thickets, the unburnt vine thickets. So is there any understanding if any of those species require both habitats because vine thickets are usually quite sort of isolated in extent. So is there any understanding if some of those birds require both the vine habitat and the burnt habitat adjacent?

**EB** - I guess we really haven't gone down to that level but another factor that's really impacting the bird diversity out there is the abundance of noisy miners. So in these areas where you have that really good mid-storey structure with the vine thicket they seem to be lower in abundance and they obviously give some shelter to those smaller birds. I guess that's what we're thinking is the reason why we're getting higher diversity there of the small woodland birds.