INFLUENCE OF FIRE REGIME VARIABLES AND GROWTH STAGE DISTRIBUTIONS ON BIODIVERSITY IN VICTORIAN FOOTHILLS FOREST

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Introduction

The Foothills Fire and Biota project aims to enhance understanding of the relationships between fire and biodiversity in the foothills forests, and hence inform fire management. Large, intense fires occur periodically in this system, while less-severe/smaller fires and planned burns occur more frequently.

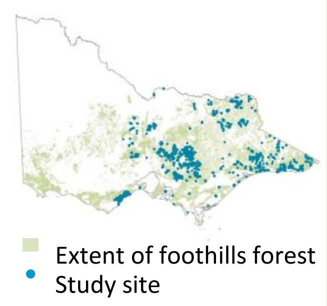
In these analyses, we examined the relative influence of fire regime parameters on biota, as well as examining the proportional distribution of vegetation growth stages (time since fire categories) that maximise geometric mean abundance of species

Methods

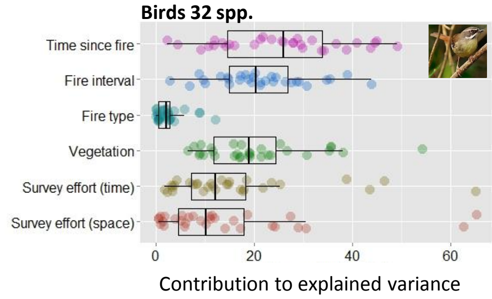
We compiled empirical data from six projects undertaken by our organisations. The combined dataset provided comprehensive geographic coverage of the system.

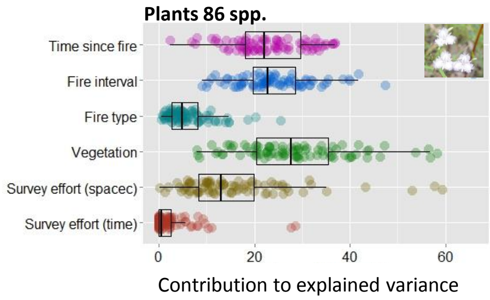
Boosted regression tree modelling was used to model species occurrence in relation to time since fire, inter-fire interval, fire type (bushfire/planned burn, a surrogate for fire intensity), fire frequency, vegetation type and survey effort.

On the basis of these models, an optimisation routine was used to determine the proportional distribution of vegetation growth stages within foothills forest types that maximised geometric mean abundance (GMA) across all species. GMA has been found to be negatively related to extinction risk.



Species vs fire regime modelling

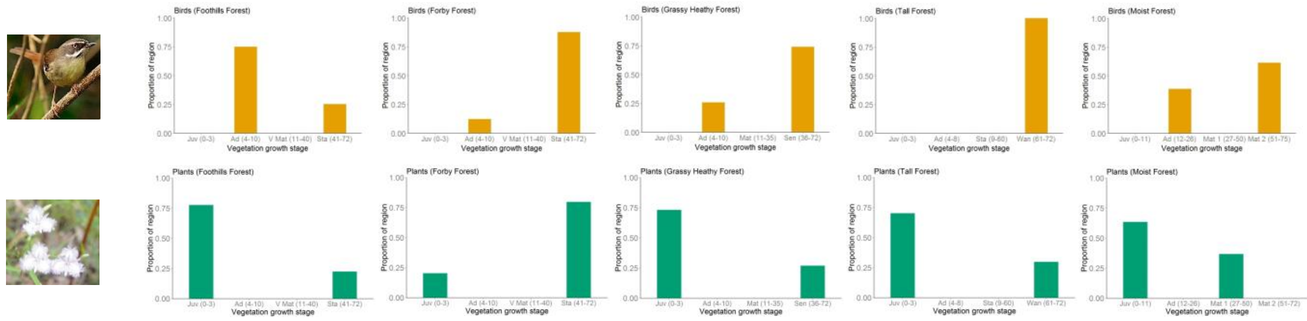




Time since fire and inter-fire interval were, on average, the most influential fire regimes variables for both birds and plants. Fire type and frequency were generally much less important.

Coloured dots represent contribution to variance explained by the model for a particular species. Figures from Kelly et al. in prep.

Growth stage optimisation



Geometric mean abundance of both birds and plants was generally maximised with a mix of early and late growth stages. For birds, this mix tended to have a greater proportion of old than young vegetation, while for plants the reverse was true.

Discussion and implications

Our results show that time since fire and inter-fire interval tend to be the most influential fire regime variables affecting bird and plant species relative abundance. These variables, in the form of growth stages and tolerable fire intervals, form the basis of the ecological resilience measures within DELWPs current approach to ecological fire management. Therefore our results indicate that, overall, this approach has merit. However further work is required around defining biologically meaningful growth stage classes and appropriate tolerable fire intervals.

The GMA optimisation results appear to be driven by a relatively small number of species that are strongly associated with either early or late growth stages. Most species, while they may show a response to time since fire, occur across growth stages and so do not influence the optimisation outcome as strongly as these 'growth stage specialists'. The results confirm the importance of long unburnt sites for fauna. Our results also suggest a need for a relatively high proportion of young vegetation, especially for plants. However many of the species driving this pattern are common 'weedy' (though native) species. However, it is likely that these species' requirements will be met incidentally by bushfire and planned burning, as well as other disturbances, and so burning specifically to cater for them is unlikely to be necessary.