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Developing models to predict the effects of fuel reduction burning on habitat complexity, ground-dwelling mammals and understorey birds

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Developing Models to Predict the Effects of Fuel Reduction Burning on Habitat Complexity, Ground-dwelling Mammals and Understorey Birds.

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Certification

I, Gillian E. Basnett, declare that this thesis, submitted in fulfilment of the requirements for the award of Master of Environmental Science – Research, in the School of Earth & Environmental Science, University of Wollongong, is wholly my own work unless otherwise referenced or acknowledged. The document has not been submitted for qualification at any other academic institution.

Gillian E. Basnett

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Abstract

The variation in vegetation structure is often recognised as one of the main factors attributing to the wide diversity of wildlife supported by Australian *Eucalyptus* forests. Disturbances that affect the vegetation structure can have repercussions to the animals that rely on certain compositions of plants. Many plants and animals are able to survive under certain disturbance regimes. However, changing the regime can threaten the flora and fauna species within a community.

Inappropriate fire regimes are one such threatening process. Yet fuel reduction is a key element of fire management. There is often a conflict between the fire regime needed to keep fuel loads at a level thought to be adequate to assist in managing unplanned fire, and those that would maintain vegetation structure and therefore wildlife diversity. Therefore, in areas where the protection of biodiversity is particularly important there is a need to predict the ecological effects of a fuel reduction burn regime.

A number of studies had shown that abundance and distribution of ground-dwelling mammals and understorey birds can be estimated from measures of habitat complexity and is has been demonstrated that the effects of fire on these groups can be predicted by changes to vegetation structure. This study uses fuel levels and habitat complexity scores to develop a model to predict the impacts of prescribed burns with different intensities and extents on distribution and abundance of ground-dwelling mammals and understorey birds in 6 different vegetation communities at Coolah Tops National Park, NSW.

Within each of the six vegetation communities 25 survey sites were randomly selected. Fuel loads were estimated using litter depth, the dominant plant species were identified and both mammal and bird habitat complexity scores established using revised tables from the literature. The model, devised using the data collected in the field, was used to calculate the change in habitat complexity scores after four different fire scenarios. These modifications were then used to predict the likely affects of the different fire models on ground-dwelling mammals and understorey birds and to produce some implications and recommendations for management.

Fire extent had a larger impact on ground-dwelling mammals then fires intensity, with fires that left fewer patches unburnt reducing overall vegetation structure regardless of intensity. Birds however, were predicted to be affected by both intensity and extent, with the greatest impact being seen in the high intensity low patchiness burn models and the lowest impact in the low intensity high patchiness model.

The implications for management of this study is that, at least for mammals, fire extent needs to be controlled more then the intensity in order to maintain some refuge areas. Overall, at least temporarily, mammal diversity may be expected to decline by 50-100% and bird diversity by half in the sort of fuel reduction burns that may be applied in a fire management program. Small ground-dwelling mammal abundance is likely to be reduced to zero, while medium to large ground-dwelling mammal abundance is likely to increase dramatically from zero under this fire management program. Understorey bird species likely to be promoted are those able to tolerate open vegetation while those that need dense understoreys will be disadvantaged.

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