

## Using Hierarchical Modelling to Understand the Role of Plantations in the Abundance of Koalas, *Phascolarctos cinereus*

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**Abstract :** Forest cover is decreasing globally, chiefly due to the conversion of forest to agricultural landscapes. In contrast, the area under plantation forestry is increasing significantly. For wildlife occupying landscapes where native forest is the dominant land cover, plantations generally represent a lower value habitat; however, plantations established on land formerly used for pasture may benefit wildlife by providing temporary forest habitat and increasing connectivity. This study investigates the influence of landscape, site, and climatic factors on koala population density in far south-west Victoria where there has been extensive plantation establishment. We conducted koala surveys and habitat characteristic assessments at 72 sites across three habitat types: plantation, native vegetation blocks, and native vegetation strips. We employed a hierarchical modeling framework for estimating abundance and constructed candidate multinomial N-mixture models to identify factors influencing the abundance of koalas. We detected higher mean koala density in plantation sites (0.85 per ha) than in either native block (0.68 per ha) or native strip sites (0.66 per ha). We found five covariates of koala density and using these variables, we spatially modeled koala abundance and discuss factors that are key in determining large-scale distribution and density of koala populations. We provide a distribution map that can be used to identify high priority areas for population management as well as the habitat of high conservation significance for koalas. This information facilitates the linkage of ecological theory with the on-ground implementation of management actions and may guide conservation planning and resource management actions to consider overall landscape configuration as well as the spatial arrangement of plantations adjacent to the remnant forest.

**Keywords :** abundance modelling, arboreal mammals plantations, wildlife conservation

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