

***Eucalyptus wandoo* crown decline and its influence on wildlife.**



This thesis is presented for degree of Doctor of Philosophy of Murdoch University

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Submitted by

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I declare this thesis is my own account of my research and contains work which has not previously been submitted for a degree at any other tertiary education institution.

Tracey Moore

Statement of contribution of others

Some data chapters in this thesis include work published in collaboration with my supervisors Dr Trish Fleming, Dr Leonie Valentine, Dr Michael Craig and Prof. Giles Hardy. Dr Halina Kobryn advised and helped perform the DMSI data preparation and collation in chapter 2. While undertaking this research, I was responsible for the project design, obtaining research funding, collecting all field data, statistical analysis and interpretation, and synthesis and preparation of manuscripts for submission to peer reviewed journals.

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Declaration on ethics

All data collected adhered to the legal requirements of Murdoch University's Animal Ethics Committee (R2270/09) and Department of Parks and Wildlife animal ethics committee (Regulation 17: SF007629).

Signature _____

Date _____

Preface

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Photo credits: Tracey Moore, Trish Fleming and Tegan Douglas

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Abstract

A decline in the condition of forests and woodlands is a worldwide phenomenon. In the south west of Western Australia, declines of *Eucalyptus wandoo* have been noted since the 1980s and more recently in the 2000s. There is a knowledge gap regarding the relationship between the effects of tree decline and wildlife. This study aimed to help close this knowledge gap and provide insight to the effects of tree decline on fauna. At two reserves in Western Australia (Dryandra Woodland and Wandoo Conservation Park) 24 sites of pure *E. wandoo* stands were used to investigate this relationship.

Firstly, on-ground and remotely sensed methods of canopy assessment in *E. wandoo* were compared. The open canopy of *E. wandoo*, the spatial heterogeneity and cyclic decline, as well as the expression of recovery symptoms (e.g. epicormic growth) has meant that remote sensing methods are limited in their ability to reflect the on-ground changes noted and were not used in the following chapters.

Reptiles, mammals, birds, vertebrate foraging activities and reproductive efforts of *E. wandoo* were related to *E. wandoo* condition and the changes in the surrounding habitat. Healthier patches of *E. wandoo* that were longer unburnt with higher levels of site litter had more reptile species and higher abundances. Site litter cover, crown dieback, understorey vegetation cover and tree density influenced the abundance and species richness of small mammals. Three focal bird species weebills (*Smicrornis brevirostris*), rufous tree creepers (*Climacteris rufa*) and yellow-plumed honeyeaters (*Lichenostomus ornatus*) were influenced by *E. wandoo* condition according to their individual ecology. Vertebrate activities and the tree and habitat characteristics were related, with more diggings and scats present underneath healthier *E. wandoo* trees. Lastly, *E. wandoo* condition, weather, time since last fire and tree size were factors related to the reproductive cycle of *E. wandoo* trees from this study.

Eucalyptus wandoo decline aetiology differs to other eucalypt species in Western Australia such as *Eucalyptus marginata* and *Eucalyptus gomphocephala* by its lack of severity, cyclic recovery and spatially heterogeneous nature. These features of *E. wandoo* decline meant that wildlife were influenced by the changes in their habitat as a result of the decline but no species were absent from declining sites. It is not certain that *E. wandoo* declines will maintain a heterogeneous, cyclic pattern, particularly as the causes of the decline are undetermined and many exacerbating factors such as a warming climate, reduced rainfall, land clearing and competing land uses are ever present.

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