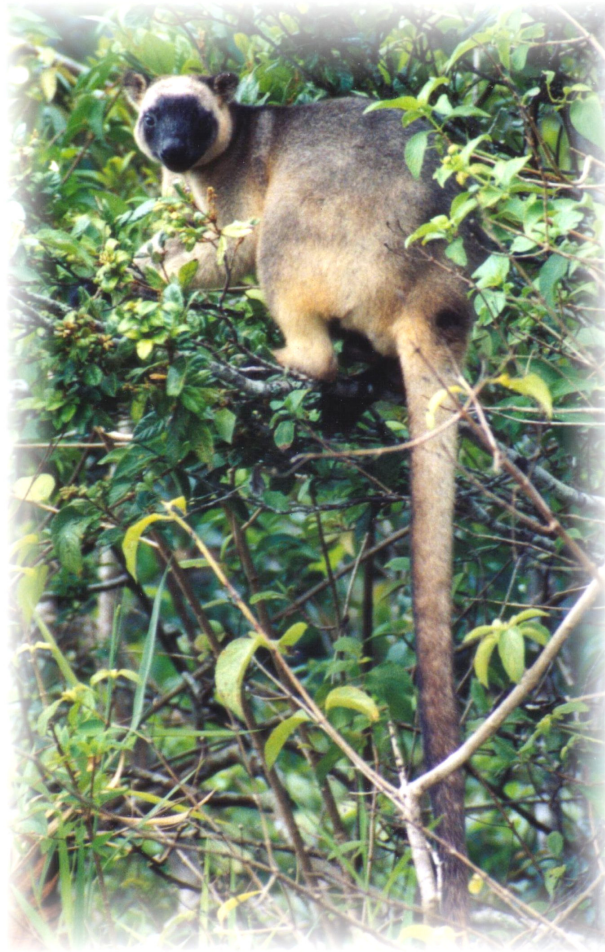


The ecology and habitat utilisation of Lumholtz's Tree-kangaroos, *Dendrolagus lumholtzi* (Marsupialia: Macropodidae), on the Atherton Tablelands, far north Queensland.



Thesis submitted by
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In January 2005

for the degree of Doctor of Philosophy
in Zoology and Tropical Ecology
within the School of Tropical Biology
James Cook University

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.....

Karen Coombes

.....

Date

Dedication

I would like dedicate this thesis to four very special people in my life which were lost to us during the time of this study and I wish could have been here for its completion.

To my brother Steve, my father Cec, Aunty Nancye

and good friend Doug Clague.

You will all be missed deeply and I hope to make you all proud.

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Abstract

Lumholtz's tree-kangaroo (*Dendrolagus lumholtzi*), one of Australia's largest folivores and one of only two tree-kangaroo species endemic to Australia and far north Queensland's Wet Tropics. *D. lumholtzi* are most commonly found in the fragmented rainforests that remain within an agricultural matrix in a relatively small area on the Atherton Tablelands. Unfortunately the majority of these fragments are on privately owned land and are not totally protected from clearing, therefore their long-term persistence is threatened by land clearing, further habitat fragmentation and mortality from dogs and cars.

Although there have been a few studies on the ecology and habitat use of *D. lumholtzi*, our current knowledge is limited. A more comprehensive understanding of spatial and floristic habitat use is essential for the conservation and management of *D. lumholtzi*.

This study examined the spatial organisation and habitat utilisation of Lumholtz's tree-kangaroos in a Type 1b rainforest fragment on the Atherton Tablelands and compared this to earlier studies (Procter-Gray 1985, Newell 1999). The two previous studies were both undertaken on the same spatially restricted rainforest type (Type 5b) only a couple of hundred metres apart, so this study has provided an important expansion of our understanding of *D. lumholtzi* ecology across space and rainforest types.

There were no significant effects of rainforest type on the home range sizes of *D. lumholtzi* (Procter-Gray 1985, Newell 1999, This study). Male *D. lumholtzi* in this study held home ranges of 2.1 ± 0.7 ha (90% HM) overlapping that of several females but not other males, and females had exclusive home ranges of 2.1 ± 0.8 ha (90% HM) of a similar size to males. However, there was a large amount of variation in female home range sizes (0.1 – 4.9 ha). Body weight did not explain this variation in home range sizes.

This study also examined structural and floristic characteristics of the habitat and investigated if these could be used to model *D. lumholtzi* habitat usage. The structural and floristic characters measured in this study could not be used

to determine the focus of habitat usage. This study has shown that there is a more complex association between *D. lumholtzi* and its use of habitat other than the structural characters of the habitat. *D. lumholtzi* do select specific tree species, but there are strongly expressed individual preferences, similar to other arboreal folivores. The reasons for these specific choices are currently unclear but *D. lumholtzi* are likely to choose trees for foliage characters, such as the levels of nutrients or plant defences, rather than for the species at a taxonomic level. This is also consistent with other arboreal folivores such as koalas and leaf-eating monkeys. The determination of which foliar characters are driving tree species or individual tree choice will require further research.

This study tested and rejected a number of previous hypotheses regarding the characteristics determining *D. lumholtzi* habitat use. They are not edge specialists, do not prefer regrowth or areas with a large variation in canopy height, or areas with high species diversity or density.

The gastrointestinal morphology of *D. lumholtzi* shares a number of features with other foregut fermenting folivores. Compared to other macropodids, *D. lumholtzi* has a large sacciform forestomach and a large overall stomach capacity, and more similar in size and morphology to that of other arboreal foregut fermenting folivores, such as colobine monkeys. It is likely that these characteristics are adaptive for its diet of rainforest leaves.

Lumholtz's tree-kangaroos can be simply aged using a tooth wear index developed during this study. Aging is essential for establishing demographics, such as age specific mortality and fecundity of populations, currently unknown in *D. lumholtzi*. Without the ability to age populations we cannot reliably undertake valuable estimations such as population viability analysis, which require these parameters.

Additionally, this study has highlighted that not only one rainforest type is important to *D. lumholtzi* and that more emphasis should be made on the preservation and restoration of all rainforest types. Furthermore, it is vital that all rainforest fragments including riparian zones, regrowth and corridors and stepping stones, should be conserved, rehabilitated and areas replanted as *D. lumholtzi* habitat, as they are crucial to the species long term survival.