

# **Sociobiology Inferred from Relatedness Structure via Remotely-collected DNA in Southern Hairy-nosed Wombats, *Lasiorhinus latifrons***

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## **Abstract**

Sociobiology of the southern hairy-nosed wombat (*Lasiorhinus latifrons*) is poorly understood despite this species' prominence in terms of size (it commonly attains 30 kg) and popularity (it is South Australia's faunal emblem). This is in part because this burrowing species is nocturnal, shy, and difficult to capture. The present study employed novel approaches for the dual purposes of understanding the species' sociobiology under normal conditions and under perturbation. The latter involved resource structure deviations and demographic isolation from fragmentation of habitat. Novel approaches entailed employing high-intensity and longitudinal, non-invasive sampling of hairs to secure genetic data, coupled with application of recently-developed analytical tools to elucidate relatedness structure, and use of relatedness structure to infer sociobiology. This thesis presents the rationale, results, and implications of this work.

Between 1999 and 2004, populations across this South Australian species' distribution were studied. A population in continuous habitat (BCP) was examined over multiple seasons to characterize sociobiology. Another population in continuous habitat (Nullarbor) was studied to determine whether soil properties altered sociobiology. The impact of habitat fragmentation on within-population processes was addressed by screening a set of small populations for genetic signatures of demographic isolation, and then assessing sociobiological modifications in two promising candidates (Kulpara and Scrubby Peak).

In continuous habitat, dispersal was female-biased. It appeared to be performed by adult females after breeding, possibly as a form of maternal investment. There was a female demographic bias, and female relationships were, by all evidence, characterized by competition. Conversely, males were philopatric, and the foundation of sociality, of unknown complexity. Male kin relationships were characterized by cooperation or tolerance, as suggested by burrow-sharing by male relatives and preferential association between closely related males. The sexes did not differ in activity or space-use, and these did not consistently change with season. Parent-offspring and previously mated pairs tended to share warrens.

Burrow and warren distribution varied with soil type, supporting the hypothesis that sheet calcrete close to the surface is an ecological constraint, promoting an inflation of warren and group size. Relaxed digging constraints and low population density coincided with reduced clustering of males, perhaps due to easing of pressures favouring tolerance or affiliative behaviours. Female-biased dispersal occurred under these conditions, but breeding dispersal was not detected.

Habitat fragmentation was associated with inhibited female dispersal and high population density, which profoundly altered female relationships. Female relatives preferred to coexist, possibly as a means to minimize the costs of sociality and/or

maximize indirect fitness. While all study populations exhibited evidence of inbreeding avoidance, such avoidance appeared to be stronger in fragmented habitat, perhaps reflecting increased risk of inbreeding under inhibited dispersal.

These findings are discussed in terms of implications for this species and for its endangered congener, the northern hairy-nosed wombat (*Lasiorhinus krefftii*). This study's non-invasive protocol and breadth of scope can serve as a model for investigations of other mammalian species, particularly burrowers.