

The effect of habitat fragmentation and population isolation on the genetic diversity, reproductive status and population viability of the southern hairy-nosed wombat (*Lasiorhinus latifrons*) in South Australia



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Abstract

A range of negative consequences associated with habitat fragmentation and population isolation have been demonstrated in a variety of animal species. Such consequences include inbreeding, reduced genetic diversity, increased mortality of young, reduced fecundity and compromised male fertility. Since the time of European settlement, many populations of the southern hairy-nosed wombat (*Lasiorhinus latifrons*) have become fragmented and isolated throughout South Australia, particularly on the Yorke Peninsula. This study aimed to examine the impact of habitat fragmentation and population isolation on the genetic diversity, seminal quality and reproductive success of the southern hairy-nosed wombat. The results showed there were very few wombats remaining on the Yorke Peninsula, with a total of 643 individuals estimated within 24 colonies all of which were geographically isolated by cleared agricultural land. Of these 24 colonies, 21 were estimated to have < 20 animals. Southern hairy-nosed wombats from two of these small isolated Yorke Peninsula colonies, namely Urania and Kulpara, were found to be genetically differentiated from one another, suggesting minimal current migration between these two colonies. These wombats were also genetically differentiated from wombats within the large population at Swan Reach, which is part of a continuous population in the Murraylands. High mean observed heterozygosity values were found in wombats from Urania and Kulpara (0.69 and 0.74 respectively), and these values did not differ significantly from that of the Swan Reach population (0.71). Allelic diversity was slightly lower in the colonies on the Yorke Peninsula; but this was not statistically significant from the population in the Murraylands. Inbreeding was not detected in any population. Despite this, wombats from the Yorke Peninsula were found to be smaller in body morphology and have larger testes. These animals also had significantly lower ejaculate volumes, with greater numbers of sperm morphological abnormalities in the ejaculate. A trend for lower sperm concentration and sperm motility in wombats from the Yorke Peninsula was also observed. The lower seminal quality in Yorke Peninsula male wombats was not reflected in a reduction in the reproductive success of the population, with all three populations examined exhibiting a similar number of females with pouch young, and in late lactation. There was, however, an unequal sex ratio within the Urania population, with a lower number of adult females in the population during the breeding season. The results from this study suggest that colonies of southern hairy-nosed wombats on the Yorke Peninsula are in danger of localised extinction if not appropriately managed and conserved. Future study directions and possible management techniques are discussed in order to minimise localised extinctions and maintain the viability of southern hairy-nosed wombats on the Yorke Peninsula and throughout South Australia.

Declaration

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution, and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. I give consent to this copy of my thesis, when deposited in the University Library, being made available for loan and photocopying, subject to the provisions of the Copyright Act 1968. I also give permission for the digital version of my thesis to be made available on the web, via the University's digital research repository, the Library catalogue, the Australasian Digital Theses Program (ADTP) and also through web search engines, unless permission has been granted by the University to restrict access for a period of time.

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