



To whom it may concern: letter of recommendation for Dr Faith Walker in the field of wildlife management research and molecular population biology

Dr Walker is extremely hard-working, dynamic, self-motivated, organized and competent in field, laboratory and molecular population analysis, and has a lifelong passion and concern for wildlife and wild places. Faith showed supreme determination in finding the most appropriate location and collaborators for her work and obtaining funding. She worked fantastically hard, and was highly independent in the extremely demanding field logistics and large scale laboratory screening. She was very receptive to guidance where appropriate, but then worked independently on very complex and novel population genetic analyses. She gives extremely engaging and imaginative public presentations, writes with precision in high quality English, and has an excellent eye and strong skills in data/image manipulations and communication. She is utterly committed to her work.

These attributes have led to excellent outcomes. Dr. Faith Walker's PhD research comprised an enormous effort in the field and laboratory. The dissertation was assessed by three external expert examiners, whose comments reflect the great extent to which the large body of data and analyses have added to the field of molecular population genetics, as well as knowledge of the population biology and genetics of the target species, Southern Hairy-nosed wombats. The project was executed very much according to plan, and it is a great achievement that the very ambitious, multiple goals were all met. The work presents some great advances in molecular population biology, and below I lay out some specific enduring impacts it will have.

Outputs so far include three excellent quality, major data papers:

Walker FW, Sunnucks P & Taylor AC (2006) Genotyping of 'captured' hairs reveals burrow use and ranging behavior of southern hairy-nosed wombats. *J. Mammalogy*. 87, 690-699.

Walker FW, Taylor AC & Sunnucks P. (2007) Does soil type drive social organization in southern hairy-nosed wombats? *Molecular Ecology*, 16, 199-208.

Walker FW, Taylor AC & Sunnucks P. Female dispersal and male kinship-based association in southern hairy-nosed wombats (*Lasiiorhinus latifrons*). *Molecular Ecology*. accepted 18/10/07

Faith's work has made three main contributions to the field broadly, while also making critical contributions to knowledge and approaches in wombat biology and conservation:

1. Development of remote sampling in molecular ecology

This work shows with unprecedented completeness and breadth that significant insights into the ecology and socio-biology of appropriate species can be made (1) using genetic markers and (2) by applying non-invasive approaches that do not disrupt the organism and are likely to reduce biases in data collection.

It was an extraordinary achievement to sample and screen a high proportion of populations in a broadly-distributed large mammal species, while also assessing seasonal changes in space-use and demography in a detailed 'close-up' examination of one population. The approaches developed in Faith's PhD research have significance at several levels – they show what can be achieved for suitable species worldwide, they increase the range of techniques available to study three species

wombat including the highly endangered Northern Hairy-nosed wombat, and they greatly increase the knowledge of the biology of the Southern Hairy-nosed wombat.

2. Advances in habitat fragmentation biology

The question of what comprises barriers to migration and gene flow in populations of organisms inhabiting fragmented habitats is one of the most taxing and important questions in conservation biology. Assessments made by traditional ecological methods coupled with guesswork based on knowledge of individual species have often proven very misleading. Faith's PhD research yielded novel applications of molecular genetics to yield broad-scale and rapid identification of demographically and genetically isolated populations. In the present case, a population of wombats in a steep-sided, blind-ended canyon tens of kilometres from the nearest source of migrants was clearly not genetically isolated.

Owing to the precision and depth of data obtained on several focal populations, the research showed that wombats responded to habitat fragmentation and increased demographic isolation by stepping up their avoidance of inbreeding, and altering their kin associations reflecting changed optima of kin organization. These phenomena in response to habitat fragmentation have very rarely been shown.

3. Specific advances in the knowledge of wombat biology

Wombats are of particular interest in a number of ways including the fact that they show female-biased dispersal, which is extremely uncommon in mammals. The present research goes a long way towards understanding this phenomenon, in terms of provision of tools to examine it, and patterns in the present data. Dr Walker's research shows that female wombats tend not to associate with their close female relatives, in contrast to males. Thus female social relationships seem to be characterized by competition rather than mutually-beneficial cooperation or at least tolerance. Peaks of female relatedness revealed by spatial genetic analysis were consistent with the previously-proposed idea that females 'bequeath' their burrows to their daughters by migrating at least to the next warren.

Overall, this is one of the most thorough and multifaceted studies of non-invasive molecular ecology. When the work is all published (at least 4 major papers), the novelty and depth of its conclusions will demonstrate to an international audience the benefits of applying molecular population genetics, particularly to species that are hard to study by traditional techniques. The fact that this present work has developed new approaches as well as investigated significant ecological questions (population responses to habitat fragmentation and to substrate type) make it extremely impressive. The approaches developed, and the skills and experience attained by Dr Walker are extremely transferable to other biological systems.



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