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**The spatial ecology and phylogeography of the  
grand skink (*Oligosoma grande*): implications for  
the conservation of an endangered species**

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*"The matrix matters"*  
Ricketts, 2001

***Overleaf.*** A view of grand ridge looking northeast along the boundary between pasture (left) and tussock grassland (right). The large rock rising above the pasture to the far left of the photograph is study rock P1.1, and is referred to in chapters 3, 4, and 5. Study site T2 is located in tussock grassland to the immediate right of the centre of the image.

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## Abstract

Species conservation relies on determining the mechanisms that cause endangerment. This thesis documents the conservation ecology and phylogeography of an endangered lizard, *Oligosoma grande*, from southern New Zealand, and tests hypotheses that may explain its endangered status.

Grand skinks are large rock-dwelling lizards endemic to montane grasslands in central Otago, New Zealand. They are classified as vulnerable to extinction by IUCN criteria and are the subject of intensive management. The causes of their endangerment are not well understood, but changes to landscape connectivity caused by agricultural development have been implicated. I developed microsatellite and mitochondrial DNA markers, and combined them with field studies to address four key problems relevant to the conservation of this species. First, I investigated the ability of newly developed analytical tools for genetic data (assignment tests) to provide qualitative and quantitative dispersal information. I show that assignment tests can provide highly accurate dispersal information, and describe the circumstances where they perform best. Second, building on these results, I combined genetic and demographic data to provide an empirical account of how two forms of agricultural landuse affect the connectivity of skink populations. I show that the nature of the vegetation matrix between skink populations both quantitatively and qualitatively affected dispersal patterns, but also that characteristics of individual populations play a role in determining dispersal dynamics. Third, following the evidence that grand skink populations were very insular, I used parentage and kinship analysis to investigate the extent of inbreeding and inbreeding avoidance behaviours. It is often assumed that close inbreeding is harmful and animals should avoid it by either dispersing after birth, or recognising and avoiding mating with kin. However, I found no evidence for inbreeding avoidance or inbreeding depression. Finally, I used phylogeographic analyses to understand the contributions of historical and contemporary processes to *O. grande*'s rarity and fragmented distribution. I demonstrate that that the current fragmented distribution has both historical as well as recent anthropogenic origins. Some populations show evidence of recent declines that may have occurred since human settlement in New Zealand, but in addition, more ancient biogeographic processes have driven population fragmentation.

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