

Spatial Ecology of the Tasmanian Spotted-Tailed Quoll



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Declaration of Originality

This thesis contains no material which has been accepted for a degree or diploma by the University or any other institution, except by way of background information and duly acknowledged in the thesis, and to the best of my knowledge and belief no material previously published or written by another person except where due acknowledgement is made in the text of the thesis, nor does the thesis contain any material that infringes copyright.

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Statement of Ethical Conduct

The research associated with this thesis abides by the international and Australian codes on human and animal experimentation, the guidelines by the Australian Government's Office of the Gene Technology Regulator and the rulings of the Safety, Ethics and Institutional Biosafety Committees of the University.

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Designed and undertook all fieldwork, conducted analyses, wrote and edited chapters.

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“Our collective effort to try to understand the immense diversity of interactions in living nature amounts to an attempt to navigate through a narrow passage between the Scylla of dogmatism and the Charybdis of resignation. We must be critical, see nature as it is, and pursue the limitations of our favorite hypotheses. However, we also need general ideas, showing that everything is not a hopeless maze of special cases.”

Oksanen and Oksanen (2000)

Abstract

The importance of top predators in maintaining ecosystem structure, function and resilience is increasingly apparent as predators decline worldwide. Habitat loss and fragmentation are leading causes of these declines. Therefore, knowledge of habitat preferences is needed for conservation of predators, but is often lacking.

Mainland Australia's marsupial carnivore guild is severely depleted. In south-eastern Australia, only the endangered spotted-tailed quoll (*Dasyurus maculatus*) remains, and is sympatric with the introduced red fox (*Vulpes vulpes*), feral cat (*Felis catus*), wild dog (*Canis familiaris*) and dingo (*Canis dingo*). In contrast, Tasmania retains a relatively intact guild: the spotted-tailed quoll, Tasmanian devil (*Sarcophilus harrisii*), and eastern quoll (*Dasyurus viverrinus*), as well as the feral cat. The red fox is historically and probably functionally absent. The spotted-tailed quoll is not well studied in Tasmania. Extrapolation of habitat preferences from mainland populations may be inappropriate as the predator and prey assemblages and environments differ in the two regions. This study aimed to determine the biotic and abiotic correlates of Tasmanian spotted-tailed quoll distribution, abundance, space use, and movement, at individual-, population-, and distribution-scales.

I used live-trapping and camera survey data to investigate the distribution and abundance of the spotted-tailed quoll in relation to environmental factors and competitors across Tasmania (i.e. first-order habitat selection). Abundance was best explained by climatic correlates of productivity and by mean annual net primary production. The most suitable habitat for Tasmanian quolls occurs off-reserve, highlighting the role of private landholders in

quoll conservation. Optimal habitat of quolls and foxes overlaps extensively. Spotted-tailed quoll abundance was independent of the Tasmanian devil, feral cat, or prey.

I used GPS and VHF telemetry tracking of adult females in a fragmented agricultural landscape to investigate the influence of vegetation composition on home range size, habitat selection, activity, movement and den use (i.e. second-, third- and fourth-order scales). Quolls preferred forest and avoided pasture for home range placement (second-order selection scale), within-home range movement (third-order) and non-maternal den site selection (fourth-order). Home range size increased with habitat loss and fragmentation, suggesting quolls in fragmented landscapes needed larger areas to meet their resource requirements. Activity times were unrelated to vegetation composition. Quolls moved more quickly across pasture than through forest, indicating higher risk and/or low resources in open areas, but showed similar selection of interior *versus* edge of vegetation cover. High use of foliage/grass dens (57.5%), suggests that either secure den resources are limited in the study area or that risk of predation is low.

This study provides new insights for management of spotted-tailed quolls. Habitat management in Tasmania should focus on retaining remnant forest in productive landscapes with high predicted habitat suitability, restoring forest in heavily cleared landscapes, and increasing engagement with private landholders. Habitat requirements of the Tasmanian spotted-tailed quoll are more flexible than for the south-eastern mainland populations. The differences may be attributed to competition with the red fox on the mainland. Habitat requirements of the Tasmanian spotted-tailed quoll could therefore indicate potential habitat on the south-eastern mainland under fox-control programs.

This study highlights that observed patterns of wildlife habitat associations are influenced by both bottom-up environmental factors and top-down constraints on habitat availability. Extrapolating across spatial scales or geographic regions may underestimate the

area of potential habitat and lead to ineffective conservation actions. Effective conservation of predators requires knowledge of habitat preferences across their distribution at multiple scales.

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