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The Distribution and Ecology of Invasive Ant Species in the Pacific Region

Darren Francis Ward

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Abstract

Invasive ant species represent a major threat to biodiversity through their detrimental impacts on native ecosystems. An important step to managing invasive ant species is determining the factors responsible for their current and potential distribution. This thesis examines the spatial distribution of invasive ant species at a range of scales.

The focus is on the Pacific region, specifically Fiji and New Zealand, which have a relatively high number of invasive ant species. Taxonomic checklists of the ant fauna of Fiji and New Zealand are presented.

Climate variables were used to model the distribution of, and predict suitable areas for, particular invasive ant species. In general, models had high evaluation success, especially for models that were built and tested within a region. However, the utility of models was far less when transferred and tested in new regions. A better understanding of how climate variables directly and indirectly affect a species is needed to improve the utility of species distribution modeling.

On a finer spatial scale, habitat partitioning was evident at Colo-i-Suva Park in Fiji, where distinct ant communities were sampled from litter and canopy habitats. Results suggested that body size, habitat and resource utilisation interact to create opportunities for invasion, and influence the susceptibility of different habitats. Habitat also shaped the assembly of ant communities and mediated inter-specific competition in the Yasawa Islands, Fiji. Similarly, habitat was important in partitioning ant communities in New Zealand; endemic ant species were in forest, and invasive species in scrub and urban habitats. However, there was no evidence that inter-specific competition influenced community composition or the distribution of invasive ant species at regional or local scales in New Zealand.

The extent and diversity of exotic ant species arriving at the New Zealand border was also investigated. A high proportion (>64%) of intercepted ants originated from the Pacific. The effectiveness of detecting exotic ant species at the New Zealand border ranged from 48-78% for different pathways, indicating a number of species remain undetected. Future work on invasive ants should focus on species-specific tolerances, and how the physical environment and small scale abiotic conditions influence distribution.

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