Biological, behavioural and life history traits associated with range expansion of common mynas (Acridotheres tristis) in Australia

by

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I hereby certify that the work embodied in this thesis is my own work, conducted under normal supervision.

This thesis contains no material which has been accepted, or is being examined, 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 the final version of my thesis being made available worldwide when deposited in the University’s Digital Repository, subject to the provisions of the Copyright Act 1968 and any approved embargo.

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Abstract

Invasive species have been recognized as the second major threat to biodiversity just following habitat destruction. Biotic invasions science over recent decades has invested substantial research efforts in identifying the factors (e.g., biologic, ecologic, behavioural, genetic) that help predict invasiveness ability in order to anticipate and prevent future invasions. A range of studies have examined the multiple stages in the invasion process from transport to invasion. However, to date, less attention has been given to an important step of the invasion process: spread. In order to enhance the scientific knowledge about invasive species and the patterns and drivers of spread, this thesis aimed to study the common (Indian) myna’s (*Acridotheres tristis*) ongoing invasion in Australia with emphasis on NSW and QLD. This case study offers an exceptional opportunity and natural experiment for studying individuals at different stages of the invasion process simultaneously and in real time. I took advantage of this setting to investigate for the first time the potential differences in both morphological and behavioural traits in long-established (>40 years; also termed source) vs recently-established (<10 years; front) common myna populations (Chapters 1 and 2). Furthermore, I studied the interactions of common mynas with native avian species around nesting resources. I focused on interactions with an important cavity-nesting competitor, the eastern rosella (*Platycercus eximius*), and a non-cavity nesting, but highly aggressive, despotic and territorial native honeyleater, the noisy miner (*Manorina melanocephala*) (Chapters 3 and 4). In my final chapter, I undertook a large-scale analysis of common myna abundance and breeding success as a function of habitat and invasion stage across two Australian states (Queensland and New South Wales). I found differences in morphological, physiological and behavioural traits of common mynas at different invasion stages and across regions. On the front of the invasion, common
mynas exhibited longer beaks, better health and a higher level of neophobia. My study of the native vs. invasive bird species revealed that contrary to common believe, common mynas in NSW did not display substantial aggression towards native parrots. In contrast, the native noisy miner exhibited high levels of aggressiveness towards common mynas. Moreover, I discovered that mynas in NSW were more abundant in urban areas than in suburban areas, whereas in QLD, mynas were equally abundant across the two environments. Finally, I found evidence that common mynas first colonise urban habitats during their range expansion. Using my thesis findings, I propose a model whereby common mynas are expanding their distribution across Eastern NSW by moving out of the urban core of coastal cities, while also by moving away from the highly urbanized NSW coastal strip towards more rural, smaller, inland townships. I propose that movement may be underpinned by a mechanism of spatial sorting by individual variation in habitat preferences, which allows mynas to spread across a spatially heterogeneous environments. This is likely be facilitated by diet preferences for natural foods, high neophobia and aggression from a despotic native bird, the noisy miner. Overall, key differences were found between source and front populations along the invasion gradient in behavioural and morphological traits, suggesting that introduced species can provide an excellent case study for examining dynamic invasion processes in real time.