Invasion Science & Wildlife Ecology Group

Assoc Prof Phillip CASSEY
phill.cassey@adelaide.edu.au | www.cassey-invasion-ecology.org

The ***Invasion Science & Wildlife Ecology Group*** brings critical analytical techniques to the study of applied ecology, wildlife conservation, and biosecurity risk management; areas characterised by complexity and uncertainty.

Human actions have contributed to pervasive changes in biodiversity at a variety of scales. Many of our projects use vertebrate populations as models for studying the flexibility in behavioural and physiological traits during the invasion (or extinction) process. In all of our research we endeavour to present and translate our results in exciting and innovative ways.

We collaborate extensively with local and national government environment and biosecurity agencies, non-government conservation organisations, and international wildlife enforcement agencies. All of our projects will be well-supported logistically, and the development of individual research projects, to match a students' interests, will be particularly encouraged. Suitable candidates should be prepared to undertake a project with both **intensive field** and **quantitative desktop** components.

A number of projects are available in global change biology; invasive species pest management; illegal wildlife trade; and the prioritisation of evidence-based biosecurity decision making. Examples of some of these are listed below:

- Distribution and habitat preferences of overabundant vertebrate pests
- Overgrazing and biodiversity loss in the Mount Lofty Ranges
- Social acceptance and risk analyses for next generation vertebrate pest control
- Alien species provenance and validation using novel isogeochemical tools

Distribution and habitat preferences of overabundant vertebrate pests

South Australia has a number of over-abundant (exotic and native) vertebrate pest species. These species include native marsupials and exotic mammals (e.g., Kangaroo Island and Mount Lofty Ranges). These projects will work with local Government agencies and stakeholder groups to determine the distribution and habitat preferences of over-abundant species and the impacts that these populations have on other species and native communities. Guidelines for their future management will be developed.

Overgrazing and biodiversity loss in the Mount Lofty Ranges

Overgrazing of remnant woodlands by native and exotic herbivores is a critical conservation issue. However, the spatial distribution of grazing pressure, and flow-on effects for biodiversity are poorly understood. This project will map current grazing pressure throughout the Mount Lofty Ranges using rapid vegetation assessments and, using comprehensive data available from the woodland bird monitoring programme, quantify relationships between grazing pressure and bird diversity. This project will inform herbivore-management approaches and links strongly with currently funded research seeking woodland management strategies that optimise conservation outcomes.

Social acceptance and risk analyses for next generation vertebrate pest control

Invasive vertebrate pests are an insidious element of human-induced global environmental change. Considerable success has been achieved eradicating a limited number of ‘common’ taxa from contained environments, particularly offshore and oceanic islands. Recent theoretical (and laboratory) developments in inheritance biasing gene-editing technology (particularly “gene-drives” and the CRISPR-Cas9 system) have attracted considerable attention and discussion; both scientific and public/political. Overall, this project aims to: (i) provide a set of clear assertions/guidelines for rationally evaluating gene drive systems, and any new vertebrate pest control innovation more generally; (ii) conduct a comprehensive risk analysis; and (iii) provide data to inform the debate around political and social acceptance.

Alien species provenance and validation using novel isogeochemical tools

Using novel biogeochemical analyses this project will develop a set of best-practice methods for determining the provenance of alien wildlife specimens in Australia; either captured at-large or confiscated from illegal-keeping. A number of key alien vertebrate species, with different incursion/seizure histories in Australia, will provide initial case studies (e.g., red-eared slider turtle, corn snake, boa constrictor, pygmy African hedgehog). For example, using turtles, trace elements and stable isotopes (i.e., carbon, nitrogen and oxygen) will be measured along turtle shell growth transects to reconstruct the life history of each specimen. The primary focus will be to develop procedures to accurately determine the time, relative to lifespan, that the specimens have either: (i) been in Australia; or (ii) at large in the environment.