

**The “Strzelecki Koala”:
Assessing vulnerability and developing management strategies**

2 x PhD projects available – Monash University Gippsland Campus
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The national status of the Koala is currently under assessment. The Strzelecki Koala population in Gippsland, Victoria, may have higher genetic diversity compared to other south-eastern Australian populations and may, therefore, warrant consideration as a special management unit. This population has been affected by recent fires and its habitat is largely managed by a production forestry company which is represented as partner organisation in this research proposal.

Pressure from production forestry operations taking place within koala habitat together with the predicted increasing frequency and intensity of fires predicted for Gippsland under climate change scenarios are likely to be key management issues for the Strzelecki Koala population, now and into the future. Establishing accurate base-line data for the Strzelecki Koala population, and clearly identifying its genetic relationship to other south-eastern Australian Koala populations is paramount.

Key information to inform the management of Koalas into the future, including reliable estimates of population size and genetic diversity, are not currently available due to high costs of field research (for observational studies) and a requirement for invasive sampling to obtain DNA (for genetic studies). This research proposes the use of faecal DNA (removing the need to observe, capture and obtain tissue samples from animals in the wild) and a novel method of collecting, storing and preparing Koala faecal samples for DNA analysis, previously established by the research team.

This research will develop and use a novel approach to conservation genetics which will provide information regarding population size and genetic diversity of this and other south-eastern Australian Koala populations. The use of non-invasive sampling techniques, permitting sample collection in remote and difficult terrain, will enable genotyping studies to be performed in a wide range of natural locations. Such information is necessary for the generation of future policies and strategies for the ongoing management of Koala populations in Australia.

Thus, validation and application of the method proposed in this research will provide important information for the management of a key population of one of Australia's iconic species. The techniques, approaches and methods that will be refined during this research project will be applicable to other species of conservation interest in Australia and internationally.

A second aspect of the project will focus on understanding the effect of recent fires on the extent and quality of Koala habitat and on the distribution of remaining Koalas in the Strzelecki Bioregion. Spatial data will be managed in Geographical Information Systems (GIS) to produce maps and data layers which can be overlain in order to understand the past and present distribution and abundance of Koalas and the likely effect of fires and silvicultural practises into the future.

The range and genetic diversity of the Strzelecki Koala population will be compared to other south-eastern Australian Koala populations to test Houlden's (1999) hypothesis regarding the potentially high conservation value of the Strzelecki population for Victoria and south-eastern Australia.

Research plan and proposed timelines:

| Year | Quarter | Student A: genetic study | Student B: ecological study |
|------|---------|--|---|
| 1 | 1 | Recruit postgraduate students, ethics approval etc. | |
| | | Validate methodology (Karsa et al., 2007) : <ul style="list-style-type: none"> • Confirm reproducible & can distinguish between individuals • Collection of faecal samples from captive Koala population | Obtain or create GIS data layers for the Strzelecki Ranges Bioregion: <ul style="list-style-type: none"> • Previous extent & condition of Koala habitat (from HVP Plantations Pty Ltd) • Previous abundance and distribution of Koalas (from HVP Plantations Pty Ltd) • Extent, severity & timing of recent fire events (from DSE) • Nature, extent and timing of future silvicultural activities • Predicted future fire ‘hotspots’ |
| | 2 & 3 | Validate methodology : <ul style="list-style-type: none"> • Microsatellite analysis to investigate relationships between individuals & families and to identify geographically isolated populations (will use Koalas of known pedigree – Phillip Island Koala Park) | Field surveys of post-fire extent & condition of Koala habitat; create GIS map layer |
| | 4 | Field surveys to establish distribution of Koalas across the Strzelecki Ranges Bioregion; collection & storage of faecal sample | |
| 2 | 1 | Field surveys to establish distribution of Koalas across the Strzelecki Ranges Bioregion; collection & storage of faecal sample | |
| | 2 & 3 | Analysis of samples: <ul style="list-style-type: none"> • Microsatellite analysis to identify scats from individual Koalas | Analysis of fieldwork data: Estimate Koala abundance & distribution using traditional methods |
| | 4 | Estimate Koala abundance, distribution & home ranges in the Strzelecki Ranges Bioregion from microsatellite data; compare to estimates from field data; match with habitat data. | |
| 3 | 1&2 | Determine uniqueness (or otherwise) of Strzelecki Koala population: <ul style="list-style-type: none"> • Microsatellite/ haplotype analysis to compare Strzelecki Koalas with other Koala populations: <ul style="list-style-type: none"> • within Gippsland • within SE Australia & with other Australian populations | Create GIS data layers for current distribution & abundance of koalas; also map any genetic groupings. Compare GIS data layers for: <ul style="list-style-type: none"> • Koala habitat extent & condition • Koala distribution and abundance • Genetic grouping of Koalas • Future silvicultural activities • Predicted fire ‘hotspots’ |
| | 3&4 | Data synthesis and reporting: <ul style="list-style-type: none"> • Provide advice to land managers & government regarding: • Genetic importance & future management of the ‘Strzelecki Koala’ • Best practice for the conduct of silvicultural activities in key Koala habitat • Thesis preparation | |