Concept Plan SP 2021-008

Building resilience to change for mammals in a multi-use landscape: identifying refugia and landscape connectivity for small mammals in the Pilbara

Animal Science

Project Core Team

Supervising Scientist	Kym Ottewell
Data Custodian	Kym Ottewell
Site Custodian	

Project status as of May 3, 2021, 4:19 p.m.

New project, pending concept plan approval

Document endorsements and approvals as of May 3, 2021, 4:19 p.m.

Project Team	granted
Program Leader	granted
Directorate	required

Building resilience to change for mammals in a multi-use landscape: identifying refugia and landscape connectivity for small mammals in the Pilbara

Biodiversity and Conservation Science Program

Animal Science

Departmental Service

Service 7: Research and Conservation Partnerships

Aims

This project aims to evaluate and apply novel spatio-temporal landscape genetic methods to identify refugia and dispersal corridors that build evolutionary resilience for mammal fauna, essential for best-practice conservation under global change. Our approach is applied to spatial and genetic datasets assembled for 13 small-medium sized mammal species, including four that are endangered nationally, in the multi-use landscape of the Pilbara bioregion that is a resource-rich Australian biodiversity hotspot. A key outcome is to identify strategic landscape-scale conservation priorities for habitat protection and threat management via systematic conservation planning (SCP). This project is significant in advancing new methodologies to incorporate connectivity modelling into multi-species conservation planning, identifying the major factors contributing to species landscape use and providing a framework for prioritising evolutionary resilient landscapes that can be applied to conservation management in multi-use landscapes globally. We address our aims through the following objectives:

[1] Locate core habitat (refuges) and connectivity pathways (corridors) for species and species' guilds under current environmental conditions by modelling habitat suitability and contemporary gene flow;

[2] Locate key areas for persistence under changing climates by inferring locations of evolutionary refugia from population genomic data and spatial modelling of range dynamics under historical and predicted future environments; and

[3] Using SCP, identify cost-effective conservation strategies to enhance and protect these areas for optimal combinations of threatened and other species or species' guilds.

Expected outcome

This project aims to identify evolutionarily stable refugia and dispersal corridors for a suite of mammal species in the Pilbara IBRA region using novel landscape genetic and macroecological modelling approaches. Refugia and corridors will be assessed for individual species, guilds of species and in total. The placement of conservation reserves or use of targeted threat management activities to protect or enhance stable refugia and corridors will be assessed using a systematic conservation planning framework.

Strategic context

This project will contribute to multiple strategic goals outlined in the Science Strategic Plan 2018-21, including:

- Biodiversity knowledge:
  - Conduct biological survey, including genetic survey, in priority management areas, and for key species and ecological communities.
  - Effectively acquire and share knowledge of biodiversity
- Conservation of threatened species and ecological communities:
  - Undertake research to address knowledge gaps for threatened species and ecological communities
- Pressures and threats to ecosystem composition, function and values

  - Understand the pressures and threats acting on ecosystems
  - Develop and evaluate effectiveness of mitigation strategies to inform management planning and conservation of species and ecosystems

- Impacts of climate change on biodiversity and ecosystem function:
  - Develop and evaluate effectiveness of adaptation strategies for incorporation into management planning, management of threatened species and communities, and sustainable use of natural resources

- Innovative science and effective use of technology:
  - Identify and realise opportunities for adoption of technical advances and innovative approaches for conservation.

Expected collaborations

This project is a result of a successful ARC Linkage grant involving collaborators at Murdoch University (Prof. Peter Spencer), Australian National University (Prof. Craig Moritz), CSIRO (Karel Mokany), WABSI (Dr Lesley Gibson [also DBCA]) and Western Australian Museum (Dr Kenny Travouillon). Roy Hill Pty Ltd and Biologic Pty Ltd are external partner organisations.

Multiple DBCA Biodiversity and Conservation Science staff are involved in the project including Lesley Gibson and Kym Ottewell in Animal Science, Katherine Zdunic, Janine Kinloch, Bart Huntley, Georgina Pitt from Remote Sensing and Spatial Analysis and Margaret Byrne (ED, Biodiversity and Conservation Science).

Proposed period of the project

Oct. 1, 2018 – March 31, 2022

Staff time allocation

Role	Year 1	Year 2	Year 3
Scientist	0.65	0.75	0.55
Technical	0.2		
Volunteer			
Collaborator			

Indicative operating budget

Source	Year 1	Year 2	Year 3
Consolidated Funds (DBCA)			
External Funding	194438	239367	106945