

Concept Plan SP 2016-015

Is restoration working? An ecological assessment

Plant Science and Herbarium

Project Core Team

Supervising Scientist	Dave Coates
Data Custodian	Melissa Millar
Site Custodian	

Project status as of Aug. 16, 2017, 11:45 a.m.

Approved and active

Document endorsements and approvals as of Aug. 16, 2017, 11:45 a.m.

Project Team	granted
Program Leader	granted
Directorate	granted

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Science and Conservation Division Program

Plant Science and Herbarium

Parks and Wildlife Service

Service 3: Conservation Partnerships

Aims

The recognition of poorly defined success criteria and a lack of long term monitoring have highlighted the need for the development of post implementation empirical evaluations of the quality of restoration activities. This recognition has led to the hypothesis that the most ecologically and genetically viable restored populations will be those where reproductive outputs, plant pollinator interactions, levels of genetic diversity, mating systems and patterns of pollen dispersal most closely mimic those found in natural or undisturbed remnant vegetation. These populations are more likely to persist in the long term and contribute to effective ecosystem function through integration into the broader landscape. This project aims to assess the success of restoration in terms of ecological and genetic viability for plant species in the Fitzgerald River-Stirling Range region of Western Australia, where significant investment is being made in restoring connectivity at a landscape scale. The project intends to compare mating systems, genetic diversity and pollen dispersal in restored sites with those of undisturbed natural vegetation. Significantly, the project moves measures of restoration success beyond that of population establishment and survival to incorporate the evolutionary processes that provide long term resilience, persistence and functional integration of restored populations into broader landscapes.

Expected outcome

A number of ecological and genetic assessments will be made for each of six target species (*Banksia media*, *Hakea nitida*, *Hakea laurina*, *Melaleuca acuminata*, *Eucalyptus occidentalis* and *Acacia cyclops*) at up to three Gondwana Link restoration sites established with differing seed and seedling establishment regimes and for differing lengths of time and in nearby natural remnant populations. Assessments will include,

- measures of reproductive output including seed viability and vigour,
- levels of genetic diversity as measured by nuclear microsatellite markers,
- mating system parameters and
- for two proteaceous target species (*Banksia media*, and *Hakea nitida*), the presence and behaviour of animal pollinators and how well pollinator services effect pollen dispersal within and among populations.

Benchmarking of ecological and genetic processes in restoration populations against plants in reference populations of remnant natural vegetation will allow determination of

- when population reproductive output is sufficient to maintain outcrossing and combat inbreeding,
- if comparable amounts of genetic variation has been captured,
- when augmentation of numbers and genetics is no longer required, and
- when plant-pollinator interactions and pollen dispersal are sufficient to maintain genetic health and connectivity within and across populations for animal pollinated plants.

Monitoring these processes for differing restoration establishment regimes allows for assessment of the usefulness of specific restoration activities and the determination of adaptive management and future restoration actions that would be beneficial and most cost effective.

Strategic context

This project intends to apply advanced knowledge of how ecological and genetic viability of restored plant populations perform under differing establishment regimes and to provide improved guidelines to assist in adaptive management of future restoration activities that are cost effective, achieve long term resilience and persistence, integrated functionality of restored populations at regional landscape scales and greater restoration success.

Expected collaborations

This project is a collaboration involving The University of Western Australia, the Botanic Gardens and Parks Authority and Gondwana Link Limited. The involvement of students from a range of institutions is envisioned.

Proposed period of the project

June 1, 2016 – July 1, 2019

Staff time allocation

Role	Year 1	Year 2	Year 3
Scientist	1.1	1.1	1.1
Technical			
Volunteer			
Collaborator			

Indicative operating budget

Source	Year 1	Year 2	Year 3
Consolidated Funds (DPaW)			
External Funding	173,000	173,000	173,000