

## **Progress Report SP 2016-015**

# **Is restoration working? An ecological assessment.**

**Plant Science and Herbarium**

### **Project Core Team**

**Supervising Scientist**

Dave Coates

**Data Custodian**

Melissa A Millar

**Site Custodian**

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**Project Team**

granted

**Program Leader**

granted

**Directorate**

required

## Is restoration working? An ecological assessment.

D Coates, M Byrne, MA Millar, Prof SD Hopper (The University of Western Australia), Dr S Krauss (Botanic Gardens and Parks Authority)

### Context

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.

### Aims

- Evaluate levels of genetic diversity for each of six target species, at each of the restoration sites at which they occur and in equivalent remnant reference sites. 20 individuals will be sampled. This will include the 10 mother plants utilised in the second aim. DNA will be extracted from all samples and all individuals will be assessed for genetic variation at 12 SSR markers developed for these species.
- Evaluate mating system parameters for each of six target species, at each of the restoration sites at which they occur and in equivalent remnant reference sites. 10 mother plants will be sampled and seed collected from each. DNA will be extracted from all samples and all mother plants will be genotyped at 6 SSR loci. 20 progeny from each mother plant will be genotyped. Mother and progeny data sets will be analysed.
- Evaluate patterns of pollen mediated gene dispersal in two Proteaceous species. For each of two Proteaceous species all plants within a given area will be sampled as potential father plants (these will be inclusive of some individuals sampled for the first aim). Up to 200 progeny per species will be collected from sampled mother plants. DNA will be extracted from all samples and potential fathers and progeny genotyped with 12 SSR loci. The spatial position of all mother and potential father individuals will be recorded via GPS. Paternity of all progeny with known mothers will be analysed.
- Ecological and genetic processes in restoration populations will be benchmarked against reference populations of remnant natural vegetation.

### Progress

- Microsatellite libraries have been constructed for six target species.
- Leaf and seed material has been sampled from *Hakea nitida*, *Hakea laurina*, *Melaleuca acuminata*, *Eucalyptus occidentalis* and *Acacia cyclops* from restored and remnant populations
- DNA has been extracted and primers developed or under development for *Hakea nitida*, *Hakea laurina*, *Melaleuca acuminata*, *Eucalyptus occidentalis* and *Acacia cyclops*.
- Analysis of genetic diversity, mating systems and pollination biology is underway for *Hakea laurina* in restored and remnant populations

### Management implications

This project will provide practical recommendations on how the ecological and genetic viability of restored populations may be affected by different establishment regimes.

## Future directions

- Field work collecting leaf and seed material, and mapping individuals in four restoration sites will continue.
- Genetic and mating system studies will continue on six target species.