

Progress Report SP 2001-001

Mating system variation, genetic diversity and viability of small fragmented populations of threatened flora, and other key plants of conservation importance

Plant Science and Herbarium

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Context

Understanding the interaction between mating systems, levels of inbreeding and patterns of genetic variation within populations of species is a key element in assessing the viability of plant populations, particularly rare and threatened taxa, and the development of management strategies that reduce the likelihood of local extinction and increase the probability of successful establishment of restored populations.

Aims

- Assess the relationship between effective population size and levels of genetic diversity, and the minimum effective population size for maintaining genetic diversity in natural and restored populations.
- Assess the effects of population size and habitat degradation on mating system parameters that indicate inbreeding or the potential for inbreeding.
- Assess whether reduction in population size, increased inbreeding and reduced genetic variation are associated with any reduction in fitness.
- Assess whether there are differences in the levels of genetic diversity and mating system parameters between rare and common congeners, which will provide a more general understanding of rarity in this flora and how it can be managed.

Progress

- A paper has been published on significant genetic structure in *Banksia brownii* associated with three geographically distinct population groups, and the loss of substantial genetic diversity through the extinction of populations across the species distribution due to *Phytophthora* dieback.
- Seed has been extracted from collections from two translocated *B. brownii* populations and seven natural populations to assess mating system variation and benchmark mating system performance in the translocated population.
- Data on mating system variation in two sister triggerplant species (*Stylidium affine* and *S. maritimum*) with contrasting breeding systems is currently undergoing re-analysis.

Management implications

- Assessment of genetic variation will inform prescriptions for the prevention of inbreeding and maintenance of genetic variation in small fragmented populations of rare and threatened plants, and will facilitate strategies for managing inbreeding and loss of genetic diversity during translocation programs involving species such as *B. brownii* and *Lambertia orbifolia*.
- Translocation programs for *B. brownii* should continue to mix seed collections from within the three eco-geographic regions, but translocations should not yet be established with seed mixes from different regions. Further translocations using seed collected from the now extinct eastern Stirling Range populations should be considered given the high levels of genetic diversity found in those populations.

Future directions

- Complete data analysis and draft paper on the mating system in two *Stylidium* species, *S. affine* and *S. maritimum*.

- Commence mating system and genetic diversity studies on *B. brownii* translocated and natural populations.
- Carry out seed collections from translocated and natural populations, and commence genetic diversity and mating system studies on *L. orbifolia* translocated and natural populations.