

Threatened plant translocation case study:

Pomaderris delicata (Delicate Pomaderris), Rhamnaceae

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The Species

- Upright perennial shrub.
- Endemic to New South Wales.
- Only known at two sites: a nature reserve south-west of Goulburn and a roadside at Boro South (east of Tarago).

Threatening Processes

- Excessive herbivore browsing (native and feral).
- Climate change – especially prolonged drought.
- Accidental damage to the roadside population during verge maintenance, from spray drift and weed incursion.

Deciding to translocate

Supplementation planting was reasonably successful at the roadside site but plant survival was poor at the nature reserve site, where naturally growing plants had declined greatly in number in the previous decade. With the long-term security of the roadside population uncertain, a decision to create a third population was made.

Aim of the translocation

The aim of creating a new population was two-fold: to reduce the risk of extinction for the species overall and to learn more about how to successfully establish plants (both for future translocations and for supplementation of the existing nature reserve population).

Translocation working group and key stakeholders

- NSW Office of Environment & Heritage (OEH) – to oversee the development and implementation of translocations and the ongoing monitoring and management of translocation sites.
- Australian National Botanic Gardens (ANBG) – to supply plants with known origins and traceable genetic lineages using the Genome Collection Method, and to advise on timing for translocation planting.



Figure 1. *Pomaderris delicata* under cultivation at the Australian National Botanic Gardens. This species was grown from cuttings, flowered and set seed within 18 months. Photo: Joe McAuliffe

Biology and Ecology

Pomaderris delicata grows in dry open forest dominated by *Eucalyptus sieberi* with either *E. macrorhyncha* or *E. agglomerata* with an *Allocasuarina littoralis* mid-storey on shallow, sedimentary soils. Plants grow to 1.5 m in height. The species regularly flowers in September/October but to date its seed output has been observed to be poor. *Pomaderris delicata*, like other species of the genus, is an obligate seeder. The reason for the rarity of *P. delicata* is uncertain as it occurs in an area with a high diversity of *Pomaderris* species. There may be some impediment to seed production, although regeneration from seed does occur and the populations at both sites are not even aged.

Site selection

Nadgigomar Nature Reserve is the closest protected area to the roadside population where propagation material was obtained, and contained similar vegetation and soils. Management of the reserve was consistent with the translocation because it focussed on flora and fauna management, and plans for prescribed burning could accommodate translocated plants while they established. In addition, park staff were supportive of the work

Translocation proposal

In early 2014, ANBG was contracted by OEH under the Saving our Species program to attempt the production of 200 plants from as many genetically different individuals as possible. An enhancement proposal was then prepared for both sites following the Australian Network for Plant Conservation's (ANPC) Translocation and Germplasm guidelines (Vallee *et al.* 2004, Offord and Meagher 2009). Following the near failure of the supplementation planting at the nature reserve (where only 3 of 44 plants survived), two additional plantings occurred at an alternative site within the reserve, which was more sheltered than the first. Survivorship was improved at that site, plants have flowered and produced seed, but occasional deaths of established plants still occur.

The techniques developed from the enhancement planting were used to produce plants for the translocation sites. Cutting material to establish the new translocation site was obtained from the roadside population, which was larger and healthier than the nature reserve population.

A translocation plan was prepared as a necessary requirement of licensing for the project – it was peer reviewed.

Pre-translocation preparation, design, implementation and ongoing maintenance

In situ

The planting was done in August, at a time when soils were moist and stress on plants was presumably low. Two sites were chosen within the reserve, encompassing a range of microhabitats (slope, aspect and tree cover). Guards were placed around plants to restrict browsing by macropods and deer. Plants were watered by hand every two weeks until substantial rain occurred in spring.

Ex situ

The following issues influenced the design of the enhancement planting and plant production:

- Every wild plant was assumed to be a genetic individual. *Pomaderris delicata* is not known to reproduce from root suckers, and work by a CSIRO summer student confirms that the species is diploid (i.e., has two complete sets of chromosomes, one from each parent).
- The autumn-winter period was likely to be best for obtaining cuttings, based on ANBG production history and previous experience.
- The field collecting method was influenced by the number and size of plants in each population.
- Ensuring each genotype collected was traceable from the propagation and production phase through to translocation ready plants.

Two sampling methods were employed:

1. Individual samples: Robust individual wild plants with more than 10 removable cuttings were sampled and managed separately from all others by allocating a unique alpha-numeric identifier (collection number). Due to the low number of plants in this category and non-suckering habit, no minimal distance between plants was employed.
 2. Multiple samples: Individual wild plants with less than 10 removable cuttings that were less than 10 m from adjacent plants were sampled and managed as one collective accession. When these plants were separated by more than 10m they were given a separate collection number.
- As per standard threatened species collecting protocols, we restricted the total material taken from an individual to 10% of the plant's vegetative growth.
 - Throughout the sampling, protocols were employed to ensure key hygiene practices were in place to avoid the risk of pathogen transfer.

As additional insurance, the ANBG retained representatives of all clones in the Living Collection, in case of failure of the enhancement plantings, further decline in extant populations and as stock plants for future production for subsequent plantings.

Subsequent actions

The plantings have been monitored regularly, fortnightly after planting and approximately monthly thereafter. Surviving plants were watered in the weeks after planting and during summer if unusually dry.

Subsequent survey has revealed an additional wild population of about 60 plants, which have been guarded with wire and stakes to restrict browsing by macropods and deer.

Outcomes

Enhancement plantings at both sites are surviving, flowering and producing seed, despite occasional deaths. The best survival and subsequent growth occurred when new plants were placed within the existing population at the roadside site, although survival was also surprisingly good on an exposed roadside batter comprising B horizon soils. No recruitment has been observed yet.

The translocation into Nadgigomar Nature Reserve failed rapidly. All plants had died by early October, two months after planting, despite favourable conditions for plant growth (i.e., soils were not especially dry during that time). The roots of five plants were sent to the Royal Botanic Gardens Sydney for testing for *Phytophthora* but all were negative.

What we learned

Finding a suitable planting site has been challenging. Survival seems to be better within existing sites in sheltered situations, but has also been very good on an exposed road batter made up of subsoil. For a second translocation attempt at Nadgigomar Nature Reserve we will choose a site that already has at least one species of *Pomaderris* growing on it. We have noticed that where one *Pomaderris* species grows there are often several. Mycorrhizal associations have not been recorded, to our knowledge, for this genus, but perhaps cannot be ruled out.

References and further reading

McAuliffe, J., Taylor, D. and McDougall, K. (2016). A non-seed based method for enhancement planting of the critically endangered *Pomaderris delicata*. *Australasian Plant Conservation* 25(2): 14-16.

NSW Office of Environment and Heritage (undated). *Threatened species profile Pomaderris delicata*. Available at: <http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10649>.

Threatened plant translocation case study:

Prostanthera eurybioides (Monarto Mintbush), Lamiaceae

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The Species

- Low spreading shrub growing to less than 1 metre.
- Endemic to South Australia.
- Twelve extant natural populations that occupy an area of approximately 466 hectares.

Threatening Processes

- Small isolated populations.
- Lack of recruitment.
- Inappropriate disturbance regimes (e.g. infrequent fire).
- Grazing by kangaroos and pest herbivores.

Deciding to translocate

Prostanthera eurybioides has a limited distribution in two disjunct areas separated by 160 km, Monarto (near Murray Bridge) and the Mt Monster area in the south east of South Australia. The population size is estimated at 2,084 individuals; 1,175 at Mt Monster (152 planted) and 909 at Monarto (682 planted). There is very little evidence of recruitment at Monarto, with this population experiencing senescence and decline. By comparison, in 1992, an estimated one-third of individuals in Mt Monster Conservation Park were juveniles (Davies 1992).

Genetic and seed germination studies (Ainsley *et al.* 2008a, 2008b) were undertaken to investigate the lack of recruitment at Monarto. Genetic work showed



Figure 1. *Prostanthera eurybioides* flower. Photo: Chris Obst

that Monarto populations maintain high diversity and low inbreeding and are not at risk of extinction due to genetics. Germination studies found the seed to have low viability and seed dormancy in the form of a mericarp plug which acts as a barrier to germination. (*Editor's note: You can see a great depiction of what a mericarp plug is in Figure 3*).

Previously there had been 1,454 *P. eurybioides* plants translocated in the Monarto area: 423 from seed (1996, 1998-99), 1000 from cuttings (2003) and 31 from tissue culture (2007).