Case study: Threatened plant translocation

Leichhardtia coronata (Slender milkvine), Apocynaceae

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The Species

- Wiry, inconspicuous vine that exudes a milky white latex.
- Most commonly found in open eucalypt forests and rainforest margins.
- Endemic to south-east Queensland (Vulnerable under the Queensland *Nature Conservation Act 1992*).

Plate 1. *L. coronata* at impact site; Flowering specimen (bottom). Photos: Jennifer Coleman

Threatening Processes

- Habitat loss and degradation from mining, urban development and timber harvesting.
- Weed invasion.
- Inappropriate fire regimes.

Deciding to translocate

The Queensland Department of Transport and Main Roads (TMR) has commenced works to upgrade and realign a 26 km section of the Bruce Highway, east of Gympie. Flora surveys conducted during the early planning stages identified several occurrences of *Leichhardtia coronata* within the project footprint. Translocation of impacted individuals was proposed as complete avoidance of the species was not possible due to design constraints and the species prevalence in the local area.

Aim of the translocation

The overarching objective of the translocation was to maintain the existing viability of the local population by re-establishing impacted individuals within a nearby suitable recipient site.

Translocation working group and key stakeholders

- TMR
- Queensland Department of Environment and Science (DES)
- Red Ash Consulting
- Noosa District Landcare Group (NDLG)

Biology and Ecology

- Perennial vine thought to be insect pollinated. Typically flowers between November and March, with seed pods produced three to four months later (Forster 1996). Local observations suggest that pods are produced infrequently. Seed is wind dispersed.

- Capable of regenerating from rootstock comprising a fragile string of interconnected water-storage tubers.
- Commonly inhabits open eucalypt forests on hillslopes and ridges; also grows in rainforest and rainforest margins. Soils are generally well drained, shallow and derived from sandstone or acid volcanic rocks.

Plate 2. Fragile string of connected tubers (left); mature seed in pod (right). Photos: Jennifer Coleman

Site selection

All documented locations of *L. coronata* within a 10 km radius of the impacted occurrences were assessed for their potential suitability as recipient sites. Factors considered included:

- Supporting habitat attributes (landform, soil type and vegetation), patch size and degree of disturbance.
- Confirmed presence of *L. coronata.*
- Connectivity to larger intact parcels of land.
- Potential impacts to the existing occurrence and supporting habitat from translocation.
- Security of land tenure and existing land use.
- Site constraints (access and/or terrain).

The chosen site was considered the best on offer with supporting habitat closely matching that of the impact sites. The site also supported a healthy occurrence of *L. coronata* and was readily accessible for translocation activities. The site was also owned by TMR and will be managed in perpetuity for the purposes of conservation.

Translocation proposal

A translocation plan (GHD 2018) was submitted to DES for approval as part of a protected plant clearing permit application (Permit Number WA0014813v3). The purpose of the plan was to document the roles, responsibilities and actions to be taken to maximise the long-term success of the translocation program. A technical memo was also provided to prospective translocation contractors with additional guidance on translocation works and potential constraints.

Pre-translocation preparation, design, implementation and ongoing maintenance

A total of 1603 plants were translocated from October 2019 to July 2020. On-ground translocation works were undertaken by NDLG staff together with trainees employed through the TMR Indigenous Traineeship program. Key steps undertaken are outlined in the following subsections.

Pre-works survey

Given the inconspicuous nature of the species, the first step was to mark out all plants at the impact sites so that plants were not missed during salvage operations. When a plant was found, a blue flag with a metal identification tag was placed at its base and the location recorded using the Avenza mapping program.

Prepare recipient site

The recipient site was divided into zones, with a separate zone allocated to each of the respective salvage sites. Existing *L. coronata* plants were marked with yellow irrigation markers to differentiate them from translocated plants and protect them from trampling during planting operations. Weed control was undertaken to supress invasive weeds, principally *Passiflora suberosa* and *Lantana camara.*

Salvage operations

Salvage operations were largely conducted between October 2019 and February 2020. Plants were excavated using hand tools and the rootstock gently teased out of the ground. They were then wrapped in moist hessian, placed in a styrofoam box and kept in the shade until being replanted later that day. Particular care was taken to not damage the uppermost tuber (primary tuber) as it contains the growing point of the plant. Loose tubers that were disconnected from the primary tuber (secondary tubers) were collected and planted at the recipient site in a separately allocated area. Plant details (unique identification number, salvage site, health and number of tubers) were recorded and tracked with each plant. Seed capsules, although infrequent, were also collected when sighted and sent to a specialised native nursery for propagation.

Planting operations

The salvaged string of tubers was carefully placed in a planting hole, with the primary tuber and growing point uppermost. Each hole was then backfilled with excavated soil. Plants were then watered and a fungicide drench (Banrot 400WP) applied using a watering can. A flag was inserted next to each plant and labelled with the unique identification number assigned at the salvage site. Each plant location was recorded with a differential global positioning system (DGPS) and a site layout plan prepared to assist with monitoring activities.

Plate 3. Excavating plants from the salvage site (left); Transporting plants in moist hessian layers (right). Photos: Jennifer Coleman

Maintenance

Maintenance was undertaken every two weeks for the first three months following planting. Activities included ongoing weed control, checking soil moisture and looking for any visible signs of stress, disease or insect attack. Watering was undertaken from December to February. Broad spectrum insecticide treatments were applied when required.

Monitoring and evaluation

Three permanent monitoring quadrats (25 x 5 m) were established at the recipient site and monitoring has been undertaken twice a year (May and November) since commencing in 2020. Parameters assessed include plant survival, plant health, reproductive output and impacts from insects, fauna and erosion. The three quadrats capture approximately 14% of translocated plants, which was considered to provide an adequate sample size for monitoring purposes.

Plate 4. Healthy translocated plants 18 months after planting. Photos: Carly Sugars

Subsequent actions

- Additional plants were salvaged and replanted following a post-translocation survey of the impact sites, approximately one month following the initial translocation activities.
- Additional maintenance activities such as watering and weed control have continued as required. Seeds continue to be collected when sighted during maintenance activities.
- Monitoring activities are continuing bi-annually, with results communicated to DES.
- Supplementary planting of up to 800 plants will be conducted over the spring/summer period using nursery stock developed from cuttings and seed to compensate for losses.

Outcomes

- Less than half (44.1%) of the translocated plants were alive at the time of the last monitoring event (November 2021) (Figure 1).
- A review of climatic data for Gympie (Bureau of Meteorology 2021) indicates that the planting period was characterised by hot and dry conditions, with November 2019 being the hottest month on record since 1979. Such conditions may have contributed in part to the survival rates recorded. The condition of the tubers was also reflective of the prolonged dry weather, with many tubers appearing soft, deflated and brownish in colour. By comparison, tubers excavated during wetter conditions appeared firm and white.
- The majority of plants (81.6%) that possessed leaves or stems during the first monitoring event have continued to survive.
- Of those plants alive, most (81.9%) were in good health and showed minimal signs of stress.

- The presence of secondary tubers at the time of translocation had only a minor influence on survival, with 52.9% of those plants possessing both primary and secondary tubers alive at the time of monitoring compared to 47.1% of plants possessing primary tubers only.
- Tuber health does not appear to substantially impact survival over time, with a similar proportion of plants alive after two years, regardless of whether tubers were in good or poor health at the time of planting.
- Most (92%) of the plants showed low levels of insect predation.
- No plants were observed flowering or fruiting.
- No plants appeared to be impacted by fauna or erosion and weeds levels were generally low (<5% cover) across the site.
- None of the loose secondary tubers sprouted during the monitoring period. Excavations indicate they have perished.

What we learned

- The number of plants to be translocated was substantially underestimated. It appears that ground disturbance and follow-up rainfall following the pre-works survey may have initiated resprouting of dormant tubers. Sites should be rechecked one month after completing salvage works.
- Tubers are typically found within the top 30 cm of soil and can grow horizontally or vertically. Excavating the entire string of tubers is time consuming and is unlikely to assist survival in a material way.
- Translocation should be avoided in hot, dry conditions where possible.
- Plants have a climbing habit and should be planted next to small shrubs or branches which they can use for scaffolding.
- Collection and planting of loose secondary tubers is not warranted.
- Further investigation is required to determine causes of plant mortality, particularly those plants that failed to resprout or grow in the first growing season after translocation. Supplementary planting should be allowed for to compensate for potential losses.

References

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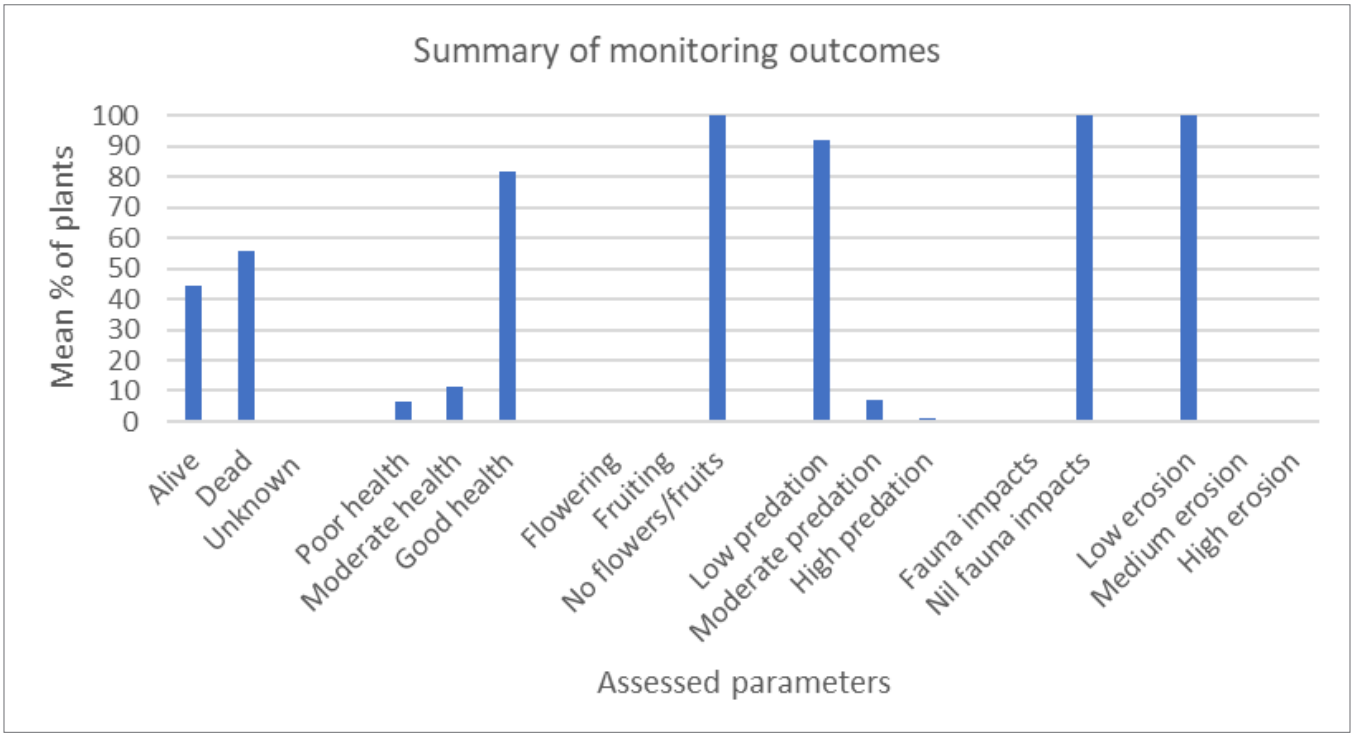

Figure 1. Event 4 monitoring results for each measured parameter.