

**Green-leaved Rose Walnut Rehabilitation Plan – W2B Project,
Section 4. Monitoring Report (August 2021- May 2023)**



Prepared for:

Andrew Davies, Golding, PO Box 1643, Milton QLD 4064

Prepared by:

**Ecos Environmental (Dr Andrew Benwell)
PO Box 641, Mullumbimby NSW 2482**

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Introduction

As part of threatened flora management for the W2B project, a Rehabilitation Plan was prepared in 2019 to carry out remediation works for the threatened species Rusty Green-leaved Rose Walnut (*Endiandra muelleri* subsp. *bracteata*) at the southern Maclean exit on Section 4 of the W2B project. The remediation plan titled *Green-leaved Rose Walnut Rehabilitation Plan – W2B Section 4* was prepared by Geolink and Ecos Environmental (1/4/2019, updated 10/12/2019). The plan describes methods for translocating Rusty Green-leaved Rose Walnut to a recipient site in the road reserve adjoining the southern Maclean interchange, close to where an in-situ tree of this species was accidentally cleared during highway construction.

The Rehabilitation Plan forms an addendum to the updated Woolgoolga to Ballina Flora Translocation Strategy (RMS 2015) approved by NSW Planning, Industry and Environment on 1 May 2020.

Methods

The translocation was carried out by propagating Rusty Green-leaved Rose Walnut (*Endiandra muelleri* subsp. *bracteata*) from seed collected on Section 10 of the W2B project and introducing seedlings to a cleared site adjoining remnant forest next to the South Maclean interchange.

Site rehabilitation work was also carried out at a single, in-situ individual of Rusty Green-leaved Rose Walnut (RGRW) located in the road reserve on the eastern side of the highway about 400 m north of the translocation site.

The Rehabilitation Plan involved the implementation of 4 Actions:

Action 1 – 2019-2020.

Targeted surveys for RGRW in the Maclean area to assess local extent of species and to collect seed or cuttings for propagation (2019-2020)

Action 2 – 2020.

Collection and propagation of seedlings/cuttings (sourced north of Maclean as the local survey was unsuccessful in finding more plants of RGRW)

Action 3 – 2021-2023.

Introduction of propagated RGRW and associated habitat plantings to recipient site adjacent to Maclean interchange - Management Zone 1

Action 4 – 2021-2023

Vegetation management at the in situ RGRW location in the road reserve to the north - Management Zone 2.

The Threatened Flora Translocation Strategy for the W2B project (RMS 2015) requires maintenance, monitoring and reporting on translocated threatened plants for a minimum of five years. This is considered to be the minimum period necessary for translocated threatened species to establish on a field site and have a reasonable chance of persisting after the translocation project is completed.

The recipient site covering approximately 30 m x 20 m was prepared for introduction of RGRW by installing a wire mesh fence to demarcate the area and prevent possible wallaby grazing. Exotic

plants consisting mainly of Crofton Weed (*Ageratina adenophorum*), Broad-leaved Paspalum (*Paspalum mandiocanum*) and Vasey Grass (*P. urvillei*) were sprayed with Round-up (frog friendly).

In January 2021, twelve seedlings of RGRW approximately 18 months old, with an average height of 40 cm were planted in the receival site. Heavy rain had recently fallen and most of the site was covered by shallow standing water, except for the more elevated northern side of the fenced area at the base of a slope. This was fortunate as RGRW would have been planted on the flat part of the site prone to extended soil waterlogging, which would have killed the RGRW seedlings. Instead they were planted along the northern boundary of the fenced area on the slightly higher ground where test holes didn't fill up with water. The plants were mulched with cane mulch and chicken wire tree guards installed around each plant to deter wallaby grazing.

The locations of introduced RGRW individuals were recorded with a gps and tagged plants monitored to record plant survival, growth and condition including any evidence of grazing by mammals or insects, or symptoms of disease. Habitat condition was also recorded including sun and wind exposure, exotic and native species abundances and competition, and any other site factors that may be influencing growth of RGRW. Monitoring reports would be prepared each year.

This is the second monitoring report since planting in 2021 and documents results to 15/5/2023.

Monitoring reports prepared to date include:

- Ecos Environmental (27/10/2020 – pre-introduction progress of seed collection and propagation, site preparation). Annual Report (April 2019 to July 2020) Green-leaved Rose Walnut Rehabilitation Plan – W2B Project, Section 4. Prepared for NRW (formerly BGC) Contracting Pty Ltd.
- Ecos Environmental (3/9/2021). Green-leaved Rose Walnut Rehabilitation Plan – W2B Project, Section 4. Annual Monitoring Report (July 2020 – August 2021). Prepared for: NRW (formerly BGC) Contracting Pty Ltd
- Current report - Ecos Environmental (30/5/2023). Green-leaved Rose Walnut Rehabilitation Plan – W2B Project, Section 4. Monitoring Report (August 2021- May 2023). Prepared for Golding.

Results and Discussion

Action 2 - Seed collection and propagation

As Action 1 was unsuccessful in locating any further RGRW trees near Maclean, a small quantity of seed was collected in late 2019 from a known population of RGRW located within the project boundary near Coolgardie Rd (Wardell) on Section 10 of the W2B project.

The seed was germinated and 12 plants grown-on for approx. 18 months. For a high survival rate the seedling plants needed to be a good size and the root system well developed before planting out.

The propagated plants are likely to be very similar genetically to the Maclean population as the Wardell population is the closest population of RGRW to the Maclean site. No obvious differences in

leaf morphology or other traits were evident between the two locations. Small genetic differences if present are unlikely to influence long-term survival of the seedlings introduced to the Maclean receival site.

Action 3 – Management Zone 1 (translocation receival site) - introduction of propagated RGRW

By May 2023, two years and four months after introduction, survival rate of RGRW was 100% and plants were in reasonable condition, although yellowing of leaves was common, indicating nutrient deficiency due to low soil nutrient levels and stressful growing conditions. Seedlings increased in height from a mean of 0.72 ± 0.05 cm in August 2021 (the last monitoring) to 0.94 ± 0.08 cm in May 2023 (Table 1), an average increase in height of 22 cm over a period of one year and 9 months. This difference is statistically significant ($t = -2.175$; $p=0.020$).

The yellowing of leaves is an indicator of stress likely from weeds and lack of nutrients. The weed control, mulching and addition of slow-release fertiliser in May 2023 should improve the plant health.

The soil in the recipient site, formed on sedimentary geology, is very low in nutrient and maintenance is essential if the RGRW seedlings are to have any chance of establishing successfully.

Table 1: Height and condition of twelve Rusty Green-leaved Walnut (*Endiandra muelleri* subsp. *bracteata*) introduced to the recipient site in 2019.

Waypoint	Co-ordinates (GDA, decimal minutes)	Height (m) 2021	Height (m) 2023	Plant Condition May 2023	New Shoots
192	S29 28.169 E153 12.359	0.5	0.56	fair, leaves yellowish	no
193	S29 28.172 E153 12.355	0.6	0.6	healthy, no insect damage	no
194	S29 28.171 E153 12.353	0.9	1.11	healthy, no insect damage	no
195	S29 28.171 E153 12.351	0.6	0.78	fair, leaves small	no
196	S29 28.172 E153 12.351	0.7	0.8	healthy, no insect damage	no
197	S29 28.174 E153 12.349	0.8	0.94	fair, yellowish, coppice shoot	yes
198	S29 28.177 E153 12.349	1	1.6	healthy, no insect damage	yes
199	S29 28.177 E153 12.350	0.6	0.77	fair, yellowish	no
200	S29 28.178 E153 12.349	0.6	0.92	healthy, no insect damage	few
201	S29 28.177 E153 12.347	0.9	1.3	fair, insect grazing, yellowish	few
202	S29 28.174 E153 12.346	0.9	0.97	healthy, no insect damage	no
203	S29 28.176 E153 12.344	0.5	0.82	fair, yellowish	no

	Mean height (m) (\pm standard error)	0.72 \pm 0.05	0.94 \pm 0.08		
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Action 4 – Management Zone 2 (in situ RGRW site) – vegetation management

A single RGRW sapling occurs in-situ (naturally) within the road reserve on the eastern side of the highway a few hundred metres north of the translocation site at the southern Maclean turnoff.

A dense infestation of the exotic vine Dutchmans Pipe (*Aristolochia elegans*) poses a significant threaten to the RGRW sapling by smothering it. Weed control carried out by Ecos Environmental involved spraying Dutchmans Pipe with glyphosate and metsulfuron (Brush-off). The cut-and-paint method was not applied as copious white sap exuded by cut stems of the vine is reported to be highly toxic and a serious health hazard.

Weed control work has substantially reduced the density of Dutchmans Pipe within 10-15 m of the RGRW sapling, however, a large area of the vine extends out 20-30 m, possibly more as it is spreading. The RGRW sapling is in good condition and has increased in height since management began.

Proposed Work Schedule 2023-24

Action	2023-2024 Year 3 since introduction
Maintenance	
Management Zone 1 <ul style="list-style-type: none"> Control grass and weed growth, apply mulch and slow-release fertiliser to plantings 	Oct-Nov/23 & May/24
Management Zone 2 <ul style="list-style-type: none"> Spray Dutchmans Pipe 	Oct/Nov/23 & May/24
Annual Monitoring and Report	May 2024

To complete the 5 years establishment period required under the W2B threatened flora translocation strategy (RMS 2015), as implemented for other threatened plant species translocated on the W2B project, two more years of maintenance and monitoring are required after 2023-2024 (ie. 2024-2025 and 2025 – 2026). From the condition of plants recorded in 2023, maintenance for the full five-year establishment period is considered necessary for the Rusty Green-leave Rose Walnuts introduced to the recipient site to have a reasonable chance of long-term survival.



Plate 1: Rusty Green-leaved Rose Walnut inside a chicken wire tree guard showing growth 2 years and 9 months after planting out. May 2023.



Plate 2: Translocation recipient site for RGRW adjacent to the Maclean interchange. Twelve RGRW were planted near the tall fence on the uphill side of the site. May 2023.



Plates 3-6: RGRW showing yellowish foliage, indicative of nutrient deficiency and low soil nutrient status. Slow release fertiliser and cane mulch were applied in May 2023.



Plate 7: In situ RGRW in the road reserve about 400 m north of the recipient site, May 2023.