FINAL REPORT

Annual Report for the Caroline Springs Railway Station Grassland – Year 1

PREPARED FOR

Public Transport Victoria

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Ecology and Heritage Partners Pty Ltd

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- *Pimelea spinescens* Recovery Team (PsRT).

GLOSSARY

Acronym	Description
CMP	Conservation Management Plan
DELWP	Victorian Department of Environment, Land, Water and Planning
DoE	Commonwealth Department of Environment
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999* (Commonwealth)
NTGVVP	Natural Temperate Grassland of the Victorian Volcanic Plain
OMP	Offset Management Plan
PsRT	*Pimelea spinescens* Recovery Team
PTV	Public Transport Victoria
SLL	Striped Legless Lizard *Delma impar*
SRF	Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens*
WLS	Western Land Services

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1 INTRODUCTION

1.1 Background

Ecology and Heritage Partners Pty Ltd was commissioned by Public Transport Victoria (PTV) to undertake and oversee management and monitoring works relating to a 2.04 hectare conservation reserve area, and associated areas of retained grassland at the site of the Caroline Springs Railway Station, located on Christies Road, Caroline Springs (Figure 1).

The management, monitoring and auditing works required to be undertaken at Caroline Springs are detailed in the Conservation Management Plan (CMP) (Ecology and Heritage Partners 2014a) and Offset Management Plan (OMP) (Ecology and Heritage Partners 2014b) prepared for the site, and approved by the Commonwealth Department of the Environment under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC 2010/5463), and the Victorian Department of Environment, Land, Water and Planning (DELWP) (formerly the Department of Environment and Primary Industries [DEPI]).

Specifically, the works relate to the protection and ecological monitoring of the quality of the EPBC Act-listed community Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP), weed and pest control works, biomass control methods such as prescribed ecological burns, and management and monitoring of the existing populations of the EPBC Act-listed Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens* and Striped Legless Lizard *Delma impar*.

Ecology and Heritage Partners subcontracted Western Land Services Pty Ltd (WLS) in June 2014 to implement pest plant and animal control, biomass reduction, revegetation and fencing works for the first two years of the ecological management works.

The annual monitoring report presented below, outlines the management and monitoring actions undertaken throughout the conservation area (referred to herein as the offset site) and the other areas of retained grassland during 2014-2015 (i.e. the first year of the overarching CMP), with the beginning of Year 1 being 24 June 2014 (being the date of approval of the CMP and OMP) (Figure 2). The methods utilised for the monitoring and management actions follow those set out in the CMP (Ecology and Heritage Partners 2014a) and the OMP (Ecology and Heritage Partners 2014b).

Sections 2.1 and 2.2 predominately relate to the monitoring and management of the Striped Legless Lizard and Spiny Rice-flower as prescribed by the CMP, while Section 2.3 relates to the monitoring and management of the offset site as a whole as required by the OMP.

1.2 Vegetation and Site Condition

Biomass is very dense across the offset site and retained grassland and vegetation ranges from poor to good condition. With exception of the eastern section of the offset site, which is dominated by Kangaroo Grass *Themeda triandra*, the remainder of the offset site and retained grassland consists of a mosaic of native and non-native vegetation, with weed cover and native vegetation cover comprising approximately 50% respectively. Several weeds of national significance have high cover, including Chilean Needle-grass *Nassella*

neesiana, Serrated Tussock *Nassella trichotoma* and African Boxthorn *Lycium ferocissimum.* Also present throughout is Galenia *Galenia pubescens* var. *pubescens,* which is effectively closing inter-tussock spaces and smothering native herbaceous species. Spear Thistle *Cirsium vulgare,* Common Sow-thistle *Sonchus oleraceus*, Patterson's Curse *Echium plantagineum* and Artichoke Thistle *Cynara cardunculus* are present throughout in lower abundance, but still pose a threat to the long-tern ecological values to the site.

Despite the high cover and density of weeds within sections of the conservation reserve and retained grassland, a range of native herbaceous flora species persist throughout, including the nationally significant Spiny Rice-flower, Smooth Rice-flower *Pimelea glauca,* Slender Bindweed *Convolvulus angustissimus* subsp. *omnigracilis*, Cotton Fireweed *Senecio quadridentatus*, Narrow-leaf Plantain *Plantago gaudichaudii*, and Blue Heron's Bill *Erodium crinitum*. In addition to Kangaroo grass, other native grasses present throughout include Kneed Spear-grass *Austrostipa bigeniculata,* Rigid Panic *Walwhalleya proluta* and Common Wallaby-grass *Rytidosperma caespitosa*.

1.3 Security

Condition 1 of the EPBC Act approval specifies that the land identified in Annexure 1 of approval 2010/5463 (the protected land) adjacent to the clearing site must be protected in perpetuity to compensate for impacts to the nationally significant Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP), Spiny Rice-flower and Striped Legless Lizard using a conservation covenant under the *Victorian Conservation Trust Act 1972*. This conservation covenant was agreed between the Public Transport Development Authority and Trust for Nature (TfN) and signed on 27 June 2014.

The offset site is a total of 2.04 hectares, comprising 1.92 hectares of Plains Grassland vegetation, and 0.12 hectares of exotic vegetation.

2 ANNUAL REPORT 2014/2015

2.1 Striped Legless Lizard Monitoring

Monitoring is required of both the status of the Striped Legless Lizard (SLL) population and their habitat for a period of ten years within the offset site. Monitoring will determine if management actions and habitats are suitable for the longevity of a viable Striped Legless Lizard population, and determine when remedial actions are required.

Monitoring of the SLL population and habitat was undertaken in accordance with Section 8.8.2 of the CMP (Ecology and Heritage Partners 2014a).

2.1.1 Population Monitoring Results

Five Striped Legless Lizard captures were recorded within the study area during targeted surveys (Plate 1-2) (Table 1). All individuals were captured from Grid 2 (west) (Figure 3). It is likely some of the individuals were recaptures and a population estimate was not undertaken. The locally common reptile species Common Blue-tongue Lizard *Tiliqua scincoides* was also recorded in the study area during tile grid checks (Table 1). No other fauna species were recorded during targeted surveys.

Table 1. Summary of targeted survey results

Date	Time	Air Temp.	Wind Direction and Speed	Grid 1 (east)	Grid 2 (west)
26/09/2014	8:00	13	SW (17 km/hr)	None recorded	None recorded
10/10/2014	12:00	21	N (22 km/hr)	None recorded	SLL x 1
14/10/2014	14:30	16	SW (27 km/hr)	None recorded	2 x SLL and 1 x Blue tongue
24/10/2014	8:30	16	N (7 km/hr)	None recorded	SLL x 1
31/10/2014	10:30	20	NE (15 km/hr)	None recorded	SLL x 1
7/11/2014	8:30	21	NE (10 km/hr)	None recorded	None recorded
11/11/2014	8:50	14	S (17 km/hr)	None recorded	None recorded
18/11/2014	9:40	15	WSW (19 km/hr)	None recorded	None recorded

2.1.2 Habitat Monitoring Results

The CMP details the requirements for Striped Legless Lizard habitat rehabilitation and management. For each habitat variable the recorded value must be compared to the trigger value to determine if a management response is triggered and the nature of the response required. Table 2 details the results of Year 1 habitat monitoring. No trigger values were exceeded and no management response is required following Year 1 of Striped Legless Lizard habitat monitoring.

Table 2. Striped Legless Lizard habitat monitoring criteria and results.

Habitat variable	Ideal level^	Trigger level for action	Grid 1	Grid 2	Response if triggered	Response Triggered?
Native clumping grass cover	50%	<30%	60%	70%	Plant native clumping species	No
Introduced grass cover	<10%	>20%	<10%	<10%	Remove weeds	No
Bare ground	20%	<5%	5%	5%	Removal of vegetation	No
		>50%			Plant native clumping species	No
Exposed rock	10%	<5%	10%	10%	Removal of vegetation	No
Inter-tussock spacing	30 centimetres	<10 cms	10 cms	10 cms	Removal of vegetation	No
		>50 cms			Plant native clumping species	No

Note. ^The ideal level value is the average value for each tile grid.

Plate 1. Striped Legless Lizard (from 14/10/2014)

Plate 2. Striped Legless Lizard (from 31/10/2014)

2.1.3 Conclusion

A population of Striped Legless Lizard is still present in the study area, with the species being recorded during five of eight tile grid checks.

Striped Legless Lizard is a highly cryptic species and as such there is currently no reliable method for assessing the size of a given Striped Legless Lizard population (O'Shea 2013). With minimal data pertaining to the study area and surrounding suitable habitat areas, a long-term pattern of distribution and abundance for Striped Legless Lizard cannot be inferred for the local population until the results of monitoring over the subsequent years are available. Continued monitoring in accordance with the CMP will

improve this data over time and photographs of dorsal head scale pattern of individuals captured in subsequent monitoring years will continue to be undertaken to assist in identifying individual lizards.

Monitoring indicated habitat within the offset site remains in good condition for Striped Legless Lizard and no trigger values were exceeded for any of the measured habitat components. No management responses are currently required at the site for Striped Legless Lizard habitat. Continued monitoring in line with the CMP will ensure habitat for the Striped Legless Lizard is maintained or improved within the site over the coming years.

2.2 Spiny Rice-flower Monitoring

Monitoring is required of both the status of the translocated Spiny Rice-flower (SRF) population within the designated recipient site, and a sample of the existing *in-situ* population and their habitat for a period of ten years within the offset site. Monitoring will determine if management actions to improve habitat are suitable for the longevity of a viable Spiny Rice-flower population, and determine when remedial actions are required.

Initial salvage and translocation activities were undertaken on 26 June 2014 with a total of 23 individuals recorded during pre-salvage surveys within the construction footprint, and translocated to the recipient site (Figure 4). During surveys conducted on 19 and 22 June 2015, an additional 32 SRF individuals were identified within the construction footprint and translocated into the recipient site on 30 June 2015. Further details relating to the salvage and translocation activities are contained in Ecology and Heritage Partners (2015a).

It should be noted that this report only details the monitoring activities undertaken on those plants initially translocation in 2014. Data pertaining to the additional SRF translocated on 30 June 2015 will be included in the Year 2 annual report.

2.2.1 Monitoring Methods

Long-term independent monitoring of translocated plants within the recipient site is crucial to ensuring ongoing survival (Vallee *et al.* 2004). Monitoring must be undertaken in accordance with the current PSRT protocols (PSRT 2013) (which are summarised in Section 8 of the CMP Ecology and Heritage Partners 2014a).

Monitoring was undertaken by a qualified botanist, familiar with the ecology and growth habits of Spiny Rice-flower. The site was visited at least once per month over the course of the management period, and often up to once per week during summer to ensure the translocated specimens were watered during periods of high drought stress.

To ensure that monitoring provided an accurate and ongoing assessment of the health of the translocated plants, the following variables were measured on each plant:

- Sex (Male or Female);
- Presence of flowering material and percentage of the plant in flower;

- Growth;
- Survival;
- Presence of germinants (recruitment); and,
- Health.

In addition to the indicators of growth and reproductive success, monitoring looked at drought stress, pest plant and animal impacts, biomass and other site disturbances that may negatively impact the translocated plants.

An existing *in-situ* population of 87 Spiny Rice-flower (excluding the translocated individuals) were mapped during targeted surveys undertaken during July and August 2014 (Figure 4). In accordance with the CMP, a subset of 25 individuals from this population was monitored concurrently with the translocated specimens. These plants were monitored on a monthly basis.

2.2.2 Recipient Site Conditions

To ensure minimal disturbance to the ecological values present within the offset site, the recipient site was located as close as possible to the lockable vehicular gate and entrance point into the conservation area in order to minimise the area of ground disturbance and compaction resulting from the use of the tree spade.

Although the floristic diversity of the offset site is high compared to the Plains Grassland EVC Benchmark, the recipient site for translocated Spiny Rice-flower plants is located in an area of lower quality. Kangaroo Grass is dominant within the recipient site, however, relative to the high quality areas elsewhere within the offset site, the recipient site contains moderate levels of exotic grasses and herbs including Wild Oat, Common Sow-thistle, Serrated Tussock, Chilean Needle-grass and Patterson's Curse. No 'floating rock' is present within the recipient site, and no rocks were disturbed or removed as part of the translocation process.

A remnant population of Spiny Rice-flower is present within the southern section of the recipient site, and care was taken to ensure these plants were not disturbed as part of the translocation, and ongoing monitoring and management activities.

2.2.3 Monitoring Results

2.2.3.1 In-situ population

A target survey was undertaken on 2 August 2014 to locate and mark and record the abundance of the Spiny Rice0flower population throughout the offset site and areas of retained grassland. A total of 93 Spiny Rice-flower were recorded and marked with a flag (Figure 4).

2.2.3.2 Plant Deaths and Disturbances

As of 30 June 2015, six out of 23 SRF salvaged individuals have not recovered from the translocation process and appear to be dead, with the remaining 17 alive and generally in moderate to very good condition.

Of the six SRF that appear to have died during Year 1, all plants were located in 'plugs' that sat above the surrounding groundlayer, and had developed large cracks around the base of the plug. This meant that each time these specimens were watered, rapid water runoff occurred into the cracks which likely resulted in a higher degree of drought stress relative to those specimens whose 'plugs' were translocated flush into the recipient site. It is also possible that the main tap root of some of these plants may have been damaged during salvage, reducing the likelihood of survivorship.

As seen in Figure A1.1, at several times during the year, various individual plants appeared to decline in health, only to rapidly recover following a watering event. In particular, plants #20 and 23 both appeared to be dead, only to re-sprout new growth following a watering event. This indicates that drought stress was likely a major factor in plant death and growth rate on the transplanted individuals. The *in-situ* population did not exhibit these same responses to drought stress, and remained in good condition throughout the course of Year 1, even though these individuals were not subject to the watering regime applied to the 23 translocated plants.

As the recipient site is located near the entrance to the offset site, and the potential for disturbance is therefore higher due to access issues, a post and wire fence with flagging tape was established around the recipient site to highlight the location of this area, and discourage unintended access by vehicles entering the offset site (Plate 3).

During the translocation activity, the ground within and adjacent to the recipient site was disturbed and compacted by repeated impacts by the tractor carrying the tree spade. This resulted in much of the biomass being compressed and flattened against the ground (Plate 4). Where possible, access tracks to/from the recipient site were confined to the construction footprint to minimise impacts to remnant vegetation.

Plate 3. Flagged post and wire fence around recipient site. Entrance gare to offset far left of picture

Plate 4. Ground disturbance caused during translocation (June 2014)

However, by July, the impact was less visible (Plate 5), and by November, the only evidence of previous ground disturbance was the presence of fewer grassy weeds (mainly Wild Oat) in the recipient site (Plate 6).

2.2.3.3 General Health and Growth

The health of all SRF plants was assessed at each monitoring event in accordance with the metric detailed in Table 3.

Of the 17 plants to survive Year 1, 16 are in a 'moderate' condition or better (i.e – a health score of between 1 and 3 (Figure A1.1), with the remaining plant being in 'poor' condition (i.e – health score of 4). In addition to the six plants that died , a further five translocated individuals were all in 'plugs' that sat above the surrounding groundlayer, and had developed large cracks around the base increasing the water stress on these specimens.

All 23 plants flowered during at least some of the period between June 2014 and June 2015, with Plants #14 and 15 flowering longest (all months bar October 2014 – March 2015), and Plant #5 flowering during July 2014 and June 2015 only (Figure A1.2). Four plants began flowering this season in April, with the majority in flower by June 2015. However, as of the date of the last monitoring event (30 June 2015), three of the surviving plants had yet to flower.

Although not directly measured, there was not deemed to be any increase in biomass detected over Year 1, with all translocated plants likely still in the process of recovery and re-establishment in the recipient site. Year 2 will include a measure of growth and above-ground biomass so that long-term trends can be recorded and tracked in conjunction with other performance metrics.

Table 3. Health Rating Metric for Spiny Rice-flower

Health Rating	Description	Health Indicator
1	Excellent	Less than 10% dieback
2	Good	Between 10 < 40% dieback
3	Moderate	Between 40 < 75% dieback
4	Poor	Between 75 < 100% dieback
5	Dead	No evidence of live biomass

Overall, the results indicate that Year 1 was likely a time during which plants were recovering from translocation shock and establishing themselves within the recipient site. The surviving individuals are generally in good health, with the presence of flowers on most plants during the 2014 and 2015 flowering season. The presence of SRF germinants near several plants indicates that the population should persist long-term provided management of the recipient site and the greater offset site continues to address and mitigate any threats to the current SRF population.

Summaries of the data recorded data since the June 2014 are presented in Appendix 1.

Plate 5. Ground disturbance caused during translocation (July 2014)

Plate 6. Site of ground disturbance in recipient site (November2014)

2.2.3.4 Threatening Processes

Weed invasion, biomass accumulation and drought stress present the greatest threats to the health and survival of translocated plants at the recipient site. In all cases, remedial actions to mitigate these threats were undertaken throughout the year, and these actions are summarised below in Section 2.3.4.

Weeds such as Serrated Tussock, Common Sow-thistle and Spear Thistle, and native grasses including Kangaroo-grass have the potential to out-compete or smother translocated Spiny Rice-flower plants and prevent recruitment. However, ongoing weed control, biomass removal and implementation of the watering regime are anticipated to continue to mitigate these threats as the translocated plants further establish.

2.2.3.5 Management Actions

Given the threats posed by weed invasion and biomass accumulation, Ecology and Heritage Partners botanists undertook maintenance activities when required during each monitoring event. The activities predominantly comprised hand weeding, and biomass removal around each of the translocated specimens to open inter-tussock spaces, reduce competition for resources and space, and encourage growth and establishment. Western Land Services also conducted selective herbicide application on those high-threat weeds within the recipient site and surrounds (with a particular focus on Serrated Tussock, thistles, and

Patterson's Curse) that have a higher potential to impact the Spiny Rice-flower population. The timings of these actions are further detailed below in Section 2.4.5.

On the advice of the PsRT, the recipient site was excluded from the ecological burn (described below in Section 2.4.7) for at least one more year to allow for the transplanted individuals to fully establish within the recipient site.

Due to the relatively dry conditions over late-winter/early spring, from approximately mid-October, several plants began to suffer from drought stress and began to wither. As per the contingency plan detailed in the CMP, a decision was made to extend the recommended watering schedule implemented during months 0-3 (Table A1.1 from Ecology and Heritage Partners 2014a) throughout the summer to minimise the likelihood of mortality due to drought stress. In addition, during November and December 2014, ecologists from Ecology and Heritage Partners undertook works to back-fill the cracks surrounding the raised plugs with soil excavated from within the rail corridor, and attempted to level the plug with the surrounding groundlayer. This reduced water run-off, and allowed for more water to soak into the soil immediately surrounding each plant.

Seed collection from translocated individuals did not occur following the 2014 flowering season but will be undertaken following the 2015 flowering season. Collected seed will be used to for propagation purposes should the performance targets specified in the CMP at the end of Year 3 not be met, and the contingency plan is enacted.

2.2.3.6 Performance Targets

The ultimate aim of translocation is to ensure the conservation of the genetic diversity of a species. The conservation of genetics is especially critical for endangered species and the loss of genetics from even a single plant can be seen as a failure of the translocation process.

Vallee *et al.* (2004) and the PsRT have detailed stringent criteria for determining the success of translocated plant species. The outlined criteria detailed in the CMP.

In order to meet the short term performance target of 50% survival, a total of 13 plants should be alive at the end of Year 5.

Although it is too early to consider the translocation a success, the survival target is still anticipated to be achieved, as aside from 3 individuals, the translocated population has all flowered during the 2015 season, and it will be determined later in the year whether viable seed is produced by these individuals. However, it is also possible that some of the plants are flowering and attempting to produce seed as a stress response. Continued monitoring and management actions in accordance with the CMP will improve this data over time and allow for more definitive trends to be established.

Monitoring indicated that the condition and structure of habitat within the recipient site, and offset site in general remains in good condition for Spiny Rice-flower persistence and no trigger values were exceeded for any of the measured habitat components. Aside from monitoring for cracks around each 'plug', ongoing weed control and additional watering during the summer months, no further management responses are currently required at the site for Spiny Rice-flower. Continued monitoring in line with the

CMP will ensure habitat for the Spiny Rice-flower and survival rates for translocated and *in-situ* individuals is maintained or improved within the site over the coming years.

2.3 Management Actions for Year 1 (as per Table 12 of the OMP)

The following section relates to the management actions and targets summarised in Table 12 of the OMP prepared for the offset site (Ecology and Heritage Partners 2014b).

2.3.1 Approve Offset Management Plan

2.3.1.1 Timing of Action and key performance target

OMP approved by relevant parties prior to the commencement of any works associated with the construction of the railway station.

Action Completed. As summarised in Section 1, the OMP (Ecology and Heritage Partners 20014b) was approved by DELWP on 24 June 2014. This date is also the date at which Year 1 of the 10 year management plan commenced. Construction of the railway station is proposed to begin July 2015.

2.3.2 Install Perimeter Rabbit Proof Fence

2.3.2.1 Timing of Action and key performance target

Fence is installed and signs erected prior to commencement of station works

Status – Year 1

Action Completed. Western Land Services commenced the installation of the pest animal-proof fence around the offset site, and a post and wire fence around the area of retained grassland in July 2014, and completed the works in March 2015 (Plate 7-8). Fences are currently in excellent condition.

Plate 7. Pest-fauna proof fence along the northern boundary of the offset site (July 2014)

Plate 8. Pest-fauna proof fence along the eastern boundary of the offset site (February 2015)

The fence around the offset site extends approximately 780 metres, and is comprised of:

- Steel pickets at 5m spacing with yellow safety caps;
- Double 12ft gates (24ft opening);
- Timber or Steel end assembly's;
- 1200mm Rabbit proof wire, (900mm on fence and a 300mm lap pegged to ground); and,
- 3 plain wires for Rabbit proof wire to be clipped to, and 1 plain top wire.

The post and wire fence around the retained grassland extends approximately 680 metres, and comprise of:

- Steel pickets at 7 m spacing with yellow safety caps;
- 3 plain wires;
- No gates;
- Timber or Steel end assembly's;

Signage was prepared and installed on both sets of fence in May 2015 (Plate 9-10).

Actions Required

Western Land Services will ensure signage and the integrity of the pest fauna-proof fence is maintained during Year 2 of the management plan.

2.3.3 Removal of all existing rubbish from site and rubbish removed immediately if further dumping occurs

2.3.3.1 Timing of Action and key performance target

All rubbished removed and removed immediately if dumping occurs.

Status – Year 1

Action Completed. Western Land Services undertake bi-monthly inspections across the year to monitor and remove rubbish from the offset site and areas of retained grassland. If/when rubbish is dumped within the offset site during the intermediate monitoring periods, Western Land Services are notified and remove the rubbish immediately. As construction works had not commenced during Year 1 of the works, rubbish within the offset site and retained grassland was not an issue. However, it was noted that other parts of the site had been used for the illegal dumping of rubbish throughout the course of the year. When this occurred, removal of the rubbish was organised by V/Line and/or PTV.

Actions Required

Western Land Services and Ecology and Heritage Partners will continue to monitor rubbish and remove where appropriate during Year 2 of management.

Plate 9. Signage for 'retained grassland'

Plate 10. Signage on entrance gates to the offset site (flagged recipient site in background)

2.3.4 Removal of all woody weeds, specifically African Boxthorn and Briar Rose.

2.3.4.1 Timing of Action and key performance target

Reduce cover of woody weeds to <1%.

Action Completed.

Western Land Services conducted four site visits between November and April to conduct woody weed control activities. The offset site contained several large infestations of African Box-thorn *Lycium ferocissimum,* particularly around the rocky outcrop in the west of the offset site, and several smaller infestations scattered throughout (Plate 11-12).

African Box-thorn and Sweet Briar infestations were mechanically removed over several visits (Plates 13-14) and appropriately disposed of. Based on the removal of existing infestations within the offset site and areas of retained grassland, woody weed cover is now considered to be at approximately 1%. However, small numbers of Box-thorn recruits were observed re-sprouting from previously removed infestations (Plate 14), and due to the existing stored soil seedbank, further control will be required over the coming years to ensure additional woody weed infestations do not establish within the site.

Herbicides were carefully applied in order to minimise off-target damage and facilitate the natural regeneration of native species.

Plate 11. African Box-thorn infestations scattered along the northern boundary of the offset site (June 2014).

Plate 12. African Box-thorn infestations scattered along the northern boundary of the offset site (July 2014).

Actions Required

Western Land Services and Ecology and Heritage Partners will continue to monitor the cover and extent of woody weeds within the site, and take appropriate control activities to ensure the cover remains at or below 1% for Year 2 and beyond. Weed levels of all types will be monitored and management techniques adapted over time in response to the prevailing conditions and the state of the reserve each year.

2.3.5 Undertake control of exotic grasses and herbaceous broad leaves

2.3.5.1 Timing of Action and key performance target

Before seed heads mature in spring/summer Five visits per year. Reduction in weed cover to <5% cover

Status – Year 1

Action Completed. Western Land Services undertook several visits during the Year 1 management works to control grassy and herbaceus weeds. The offset site and retained grassland contains large infestations of Serrated Tussock *Nasella trichotoma* throughout, and this was a particular focus of grassy weed control in Year 1 (Plates 15-16). Exotic grasses were sprayed multiple times with Glyphosate bi-active and selective

herbicide was used for Broadleaf weeds, particularly Patterson's Curse, Spear Thistle and Sow Thistle (Plate 17-18).

Actions Required

As this is only Year 1 of the 10 year active management period, and based on the current extent of grassy and herbaceus weed, cover is not anticipated to be reduced to <5% for at least 4-5 years of intensive management. Continued intensive weed control will be required in Year 2 to ensure the current levels weeds to not increase. Serrated Tussock and Patterson's Course will continue to be a priority, and it is anticipated that the ongoing ecological burning regime will assist in controlling these, and other weeds currently present. A high level of weed control will be undertaken in the area recently burnt to minimise the regeneration of weeds in these areas.

2.3.6 Conduct rabbit control if required.

2.3.6.1 Timing of Action and key performance target

Late summer/early autumn - Significant reduction in number/signs of rabbits.

Status – Year 1

Action Completed. All harbour identified within the offset site was removed. No pest animals were observed in the first year of monitoring with the pest-animal proof fence appearing to be successfully excluding pest fauna from the offset site.

Actions Required

Western Land Services will continue to monitor for the presence of pest fauna during Year 2, remove harbour, and undertake appropriate control measures if required.

Plate 13. Partial removal of Box-thorn infestation

Plate 14. Signage on entrance gates to the offset site

Plate 15. Serrated Tussock after herbicide treatment

Plate 16. Serrated Tussock after herbicide treatment (photo taken in the same location as Plate 12)

Plate 17. Treated Patterson's Curse

Plate 18. Treated Patterson's Curse and other herbaceous weeds

2.3.7 Undertake biomass reduction either through weeding or small mosaic burns in selected areas.

2.3.7.1 Timing of Action and key performance target

Autumn - Areas of inter-tussock space opened up to allow recruitment.

Status – Year 1

Action Completed. As mowing and/or slashing is not a permitted action within the offset site, ecological burning is an essential management action to reduce biomass. As such, in addition to weed control and weed removal, an ecological burn was undertaken by Western Land Services during April 2015 in an area comprising approximately one third of the offset site (Plate 19-20) (Figure 4a). This area of the offset site was selected (excluding the Spiny Rice-flower recipient site) as there was little inter-tussock space present due to the very high levels of biomass (predominantly comprised of Kangaroo Grass *Themeda triandra*). The selected area is also considered to comprise high quality habitat for the Striped Legless Lizard, and contains an *in-situ* population of approximately 50 Spiny Rice-flower.

Following the ecological burn, inter-tussock space is now clearly evident, which is anticipated to aid the natural recruitment of native grasses and herbs over the next 12-18 months, increase habitat value for the Striped Legless Lizard and recruitment opportunities for SRF.

Actions Required

As biomass is currently very high over the majority of the offset site, it is envisaged that Year 2 management actions will continue to focus largely on biomass control. As ecological burning and ongoing biomass reduction is critical to the success of the translocation the Spiny Rice-flower. The recipient site is anticipated to be burnt in Year 2, along with other parts of the offset site not burnt in Year 1. Ecology and Heritage Partners are currently formulating a strategy with Western Land Services as to how and when additional ecological burns are undertaken to reduce biomass, increase the quality and diversity of the grassland, and increase the habitat value of the offset site for both Striped Legless Lizard and Spiny Rice-flower. Additional ecological burns in other parts of the reserve that contain a higher cover of exotic grasses will also open up the groundlayer to facilitate direct seeding actions to be undertaken in Year 2 and Year 3.

2.3.8 Undertake collection of grass seed for direct seeding in Year 2

2.3.8.1 Timing of Action and key performance target

Collect seed in Summer to cover areas to be direct seeded in Year 2.

Status – Year 1

Action Partially Completed. Although some seed was collected from Kangaroo grass and Wallaby-grass within the offset site, it is currently unlikely to be enough to undertake all direct seeding activities in Year 2.

Western Land Services have sourced seed from other sites within the Melton municipality which can be used to supplement the seed sourced within the offset site for direct seeding purposes.

Plate 19. Low intensity ecological burn

Plate 20. Offset site after the ecological burn

Actions Required

Seed collection from native grasses will continue to be collected from within the offset site during 2015/2016. This seed will be used for future direct seeding purposes.

2.3.9 Prepare area to be direct seeded in year 2.

2.3.9.1 Timing of Action and key performance target

Area of low native cover prepared to be directed seeded.

Status – Year 1

Action Partially Complete.

As the offset site contains high levels of biomass throughout, there are few areas of bare-ground currently able to be direct seeded. Areas of low native cover currently contain high cover of exotic grasses (e.g. Plates 9-12) and weed control activities to date have yet to eradicate these infestations. This work is on-going and will require a persistent effort. It is anticipated that once follow-up control is undertaken to remove any regrowth in areas formerly containing woody weed infestations, (Plate 10), and another ecological burn is undertaken incorporating areas of high exotic grass cover, these areas will be direct seeded with native grasses to mitigate the recruitment of exotic species.

Actions Required

Continued weed control and biomass reduction (burning) will occur in Year 2 to create areas of bare-ground/low cover in areas formerly dominated by exotic species to enable these areas to be direct seeded in autumn 2016 and beyond.

2.3.10 Install signage detailing significance of area for ecological values

2.3.10.1 Timing of Action and key performance target

After OMP is endorsed, signage is installed and remains in place for the duration of the offsets.

Action Completed. As described in Section 2.3.2, signage was prepared and installed on both the fence and gates of the offset site, and the fence for the retained grassland in May 2015 highlighting the area's role in protection of the Spiny Rice-flower, Striped Legless Lizard and Natural Temperate Grassland of the Victorian Volcanic Plain (Plate 5-6). Signage will remain in place for the offset site and areas of retained grassland for the duration of the management plan. A total of 10 signs have been installed, with three on the retained grassland fence, and seven around the offset site. All signs currently remain in good repair.

Actions Required

Western Land Services and Ecology and Heritage Partners will ensure all signage is maintained during Year 2 and beyond of the CMP and OMP.

2.3.11 Monitor status of ecological values and provide annual report to DEPI/DoE.

2.3.11.1 Timing of Action and key performance target

12 months after offset plan is implemented Report provided to DoE/DELWP detailing monitoring results.

Action Completed. This report satisfies this requirement.

2.4 Other relevant Issues

2.4.1 Stockpile Relocation (Ecology and Heritage Partners 2015b)

Following approval of the CMP and OMP, the offset site, and areas of retained grassland as identified in the approved CMP and OMP were fenced, and preliminary works began in the rail corridor, with the resulting soil removed stockpiled in an area identified in both the CMP and OMP as within the approved construction footprint (Ecology and Heritage Partners 2014a).

A land survey of the railway station site (Peyton Waite 2014) revealed that there were discrepancies with the eastern boundary of the 2.04 hectare offset site secured and protected in perpetuity under the *Victorian Conservation Trust Act 1972*. It was subsequently determined by PTV and V/Line to engage a contractor to relocate the fence to the correct boundary line, and relocate the stockpile three metres outside of the new fence. Rehabilitation works were conducted to mitigate any impact to ecological values within the site. These rehabilitation works will be ongoing as required.

The soil stockpile was relocated over four days between 7 January and 12 January 2015 and was supervised at all times by environmental specialists from V/Line and Ecology and Heritage Partners. The soil stockpile was relocated to a distance past the new covenant boundary to ensure that any future works within the

construction footprint will not impact the offset site. Further, the stockpile was removed to a depth equivalent with the former groundlayer, to minimise the loss of topsoil containing the soil seedbank at ground level so that natural regeneration of the impacted area has a higher likelihood of success.

2.4.1.1 Rehabilitation

The impacted area was rehabilitated after stockpile removal via direct seeding with a mix of approximately 15 kilograms of Kangaroo Grass and Spear Grass seed which were harvested from a nearby site in Melton during December 2013. The indigenous seed mix was spread by hand, raked in and watered. Water crystals were also spread across the rehabilitated area to ensure an available water source for germinated seeds.

Ongoing weed control works will occur in conjunction scheduled management actions (detailed in the CMP and OMP) in the remainder of the offset site to minimise the establishment of exotic flora, and maximise the likelihood of re-establishment of indigenous flora.

2.4.1.2 Current Condition

Between the months of January and March, very little recruitment of vegetation, both native and exotic, was evident due to the generally dry conditions experienced in Melbourne's west. Following rainfall events in early March and April, a number of the exotic Wild Turnip *Brassica* sp. germinated to the south of the area. These have been systematically removed via hand over subsequent monitoring visits. Germination of native grasses is also evident within the affected area, as well as scattered occurrences of Native Plaintain (Plates 21-23).

Plate 21. Affected Area – early March

Plate 22. Affected Area with native grass germination – early April

Plate 23. Affected Area – early June

During Year 2 of management, within the affected area, a high level of weed control is scheduled to be undertaken to ensure exotic species do not successfully colonise this area, and this will be supplemented with another treatment of direct seeding in Year 2 to increase the likelihood that native species will germinate and persist .

Further details pertaining to the implications of the stockpile are contained within Ecology and Heritage Partners Pty Ltd (2015b).

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FIGURES

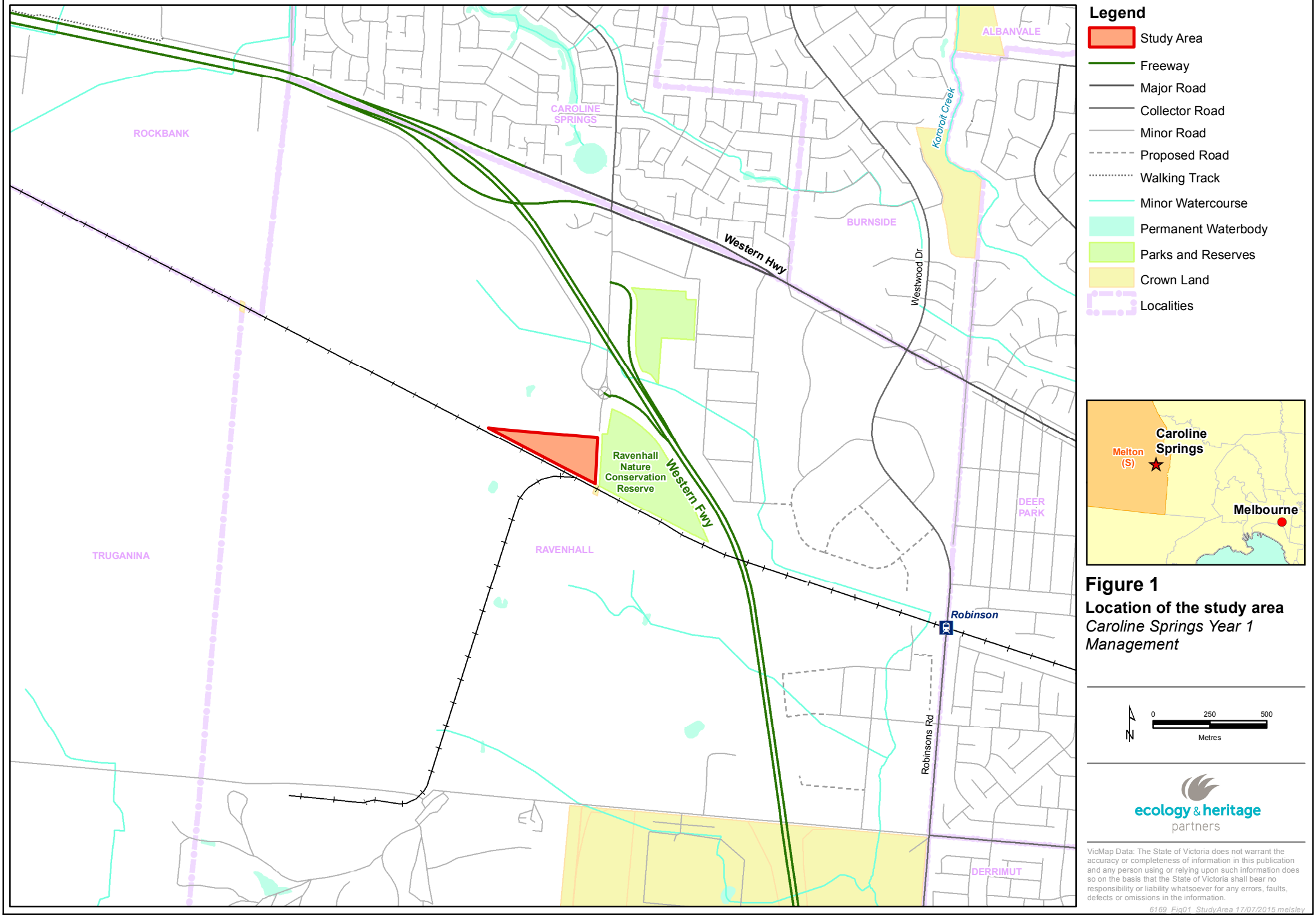


Figure 1

Location of the study area

Caroline Springs Year 1 Management

6169_Fig01_StudyArea 17/07/2015 melsley

Legend

- Offset site
- Spiny Rice-flower recipient site
- Retained areas of Grassland

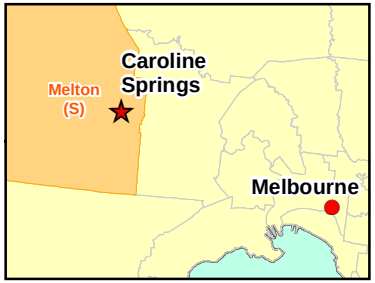


Figure 2

Location of offset site, recipient site, and areas of retained grassland

Caroline Springs Year 1 Management

N

0 25 50

Metres

ecology & heritage partners

Legend

- Study Area
- Tile grids

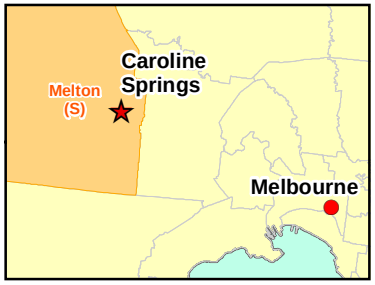


Figure 3

Striped Legless Lizard grid locations and records

Caroline Springs Year 1 Management

N

0 30 60

Metres

ecology & heritage partners

6169_Fig03_SLL_GridLoc 17/07/2015 melsley

Legend

- Spiny Rice-flower recipient site
- Monitored *In-situ* Spiny Rice-flower
- Translocated Spiny Rice-flower (2015)
- *In-situ* Spiny Rice-flower population (August 2014)
- Translocated Spiny Rice-flower (2014)
- Offset site
- Retained areas of Grassland
- Ecological burn

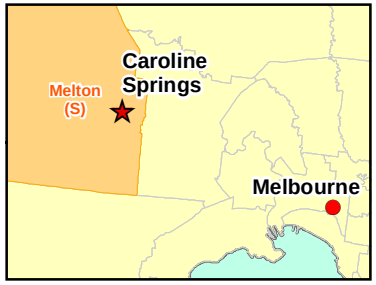


Figure 4a

Spiny Rice-flower recipient site, and monitored and translocated Spiny Rice-flowers

Caroline Springs Year 1 Management

N

0 25 50

Metres

ecology & heritage partners

6169_Fig04a_SRF 20/07/2015 melsley

Figure 4b

Spiny Rice-flower recipient site, and monitored and translocated Spiny Rice-flowers

Caroline Springs Year 1 Management

6169_Fig04b_SRF_RecipientSite 20/07/2015 melsley

APPENDICES

Appendix 1. Spiny Rice-flower Monitoring Data

Table A1.1. Sex of translocated Spiny Rice-flower.

Plant #	Sex
#1	Female
#2	Male
#3	Female
#4	Female
#5	Female
#6	Female
#7	Female
#8	Female
#9	Female
#10	Male
#11	Male
#12	Male
#13	Female
#14	Female
#15	Male
#16	Male
#17	Male
#18	Female
#19	Male
#20	Male
#21	Female
#22	Female
#23	Male

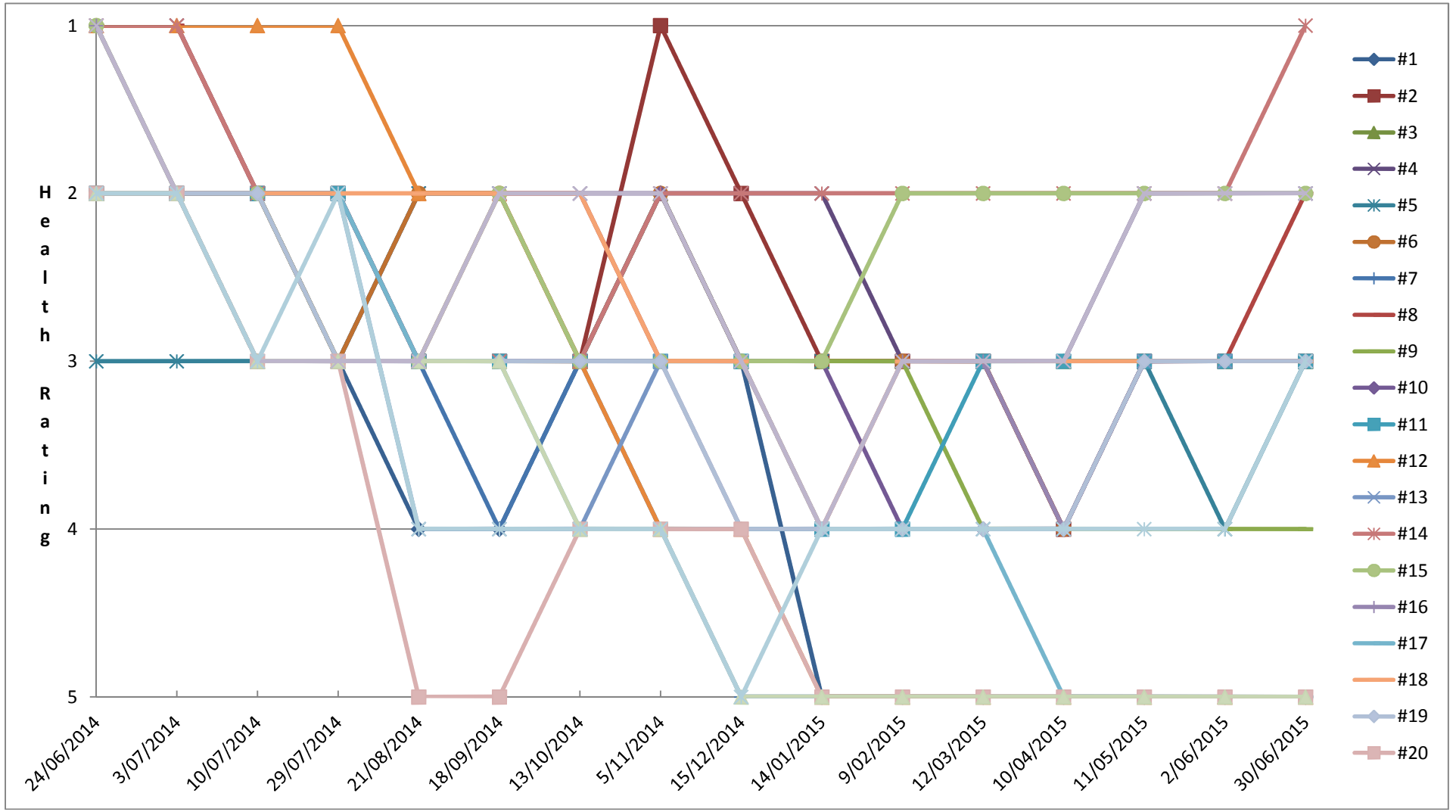


Figure A1.1. Spiny Rice-flower Health (refer to Table 3 for Health metric)

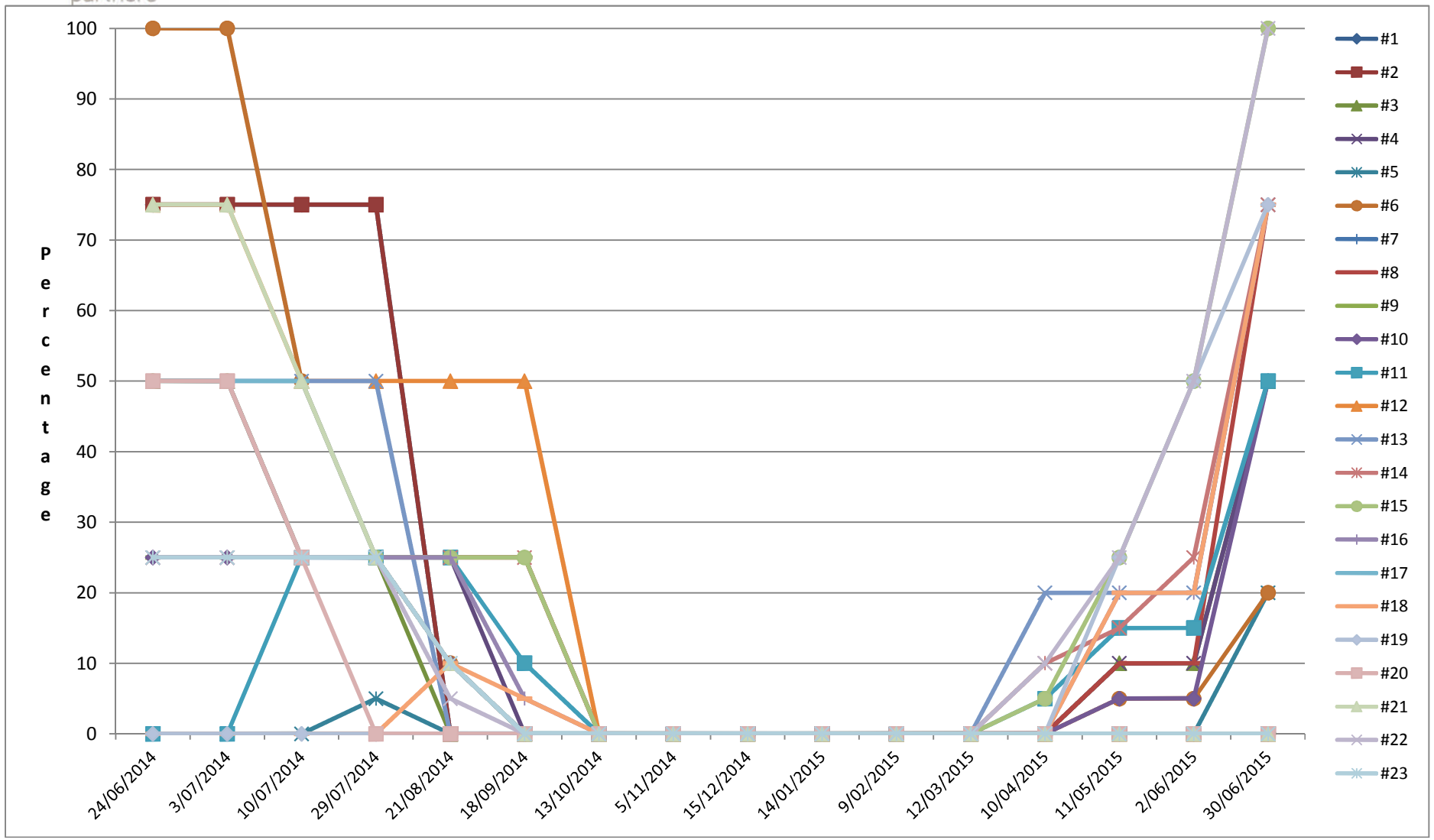


Figure A1.2. Spiny Rice-flower Flowering time and percentage in flower

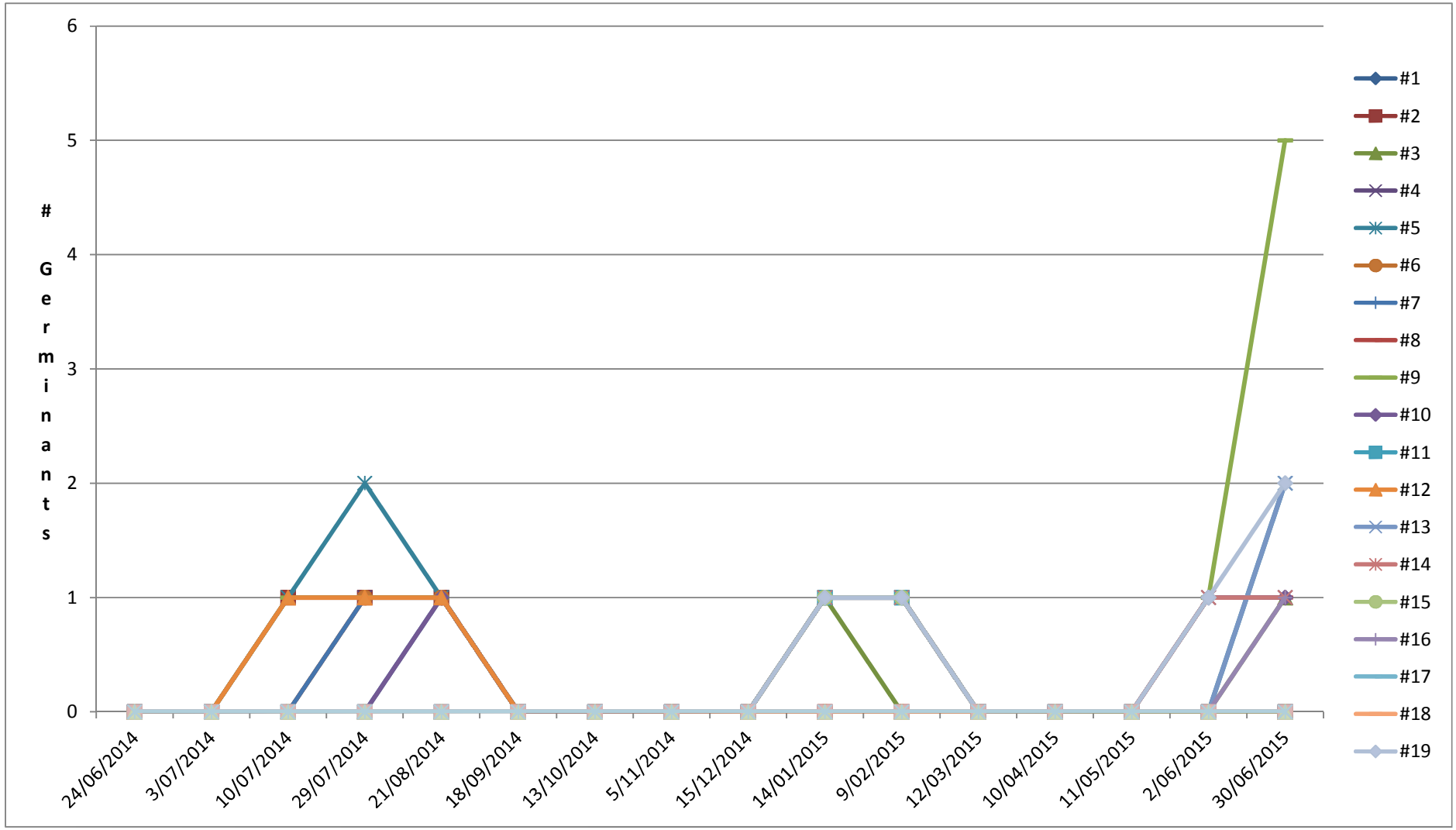
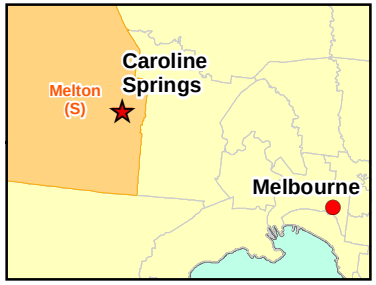


Figure A1.3. # Germinants observed at each plant

Legend

- Photo points
- Offset site
- Spiny Rice-flower recipient site
- Ecological burn



Appendix 2

Location of photo points

Caroline Springs Railway Station

N

0 15 30

Metres

ecology & heritage partners

Plate A2.1. Photopoint 1 (June 2015)

Plate A2.2. Photopoint 2 (June 2015)

Plate A2.3. Photopoint 3 (June 2015)

PlateA2.4. Photopoint 4 (June 2015)

Plate A2.5. Photopoint 5 (June 2015)

PlateA2.6. Photopoint 6 (June 2015)

PlateA2.7. Photopoint 7 (June 2015)

Plate A2.8. Photopoint 8 (June 2015)

Plate A2.9. Photopoint 9 (June 2015)

Plate A2.10. Photopoint 10 (June 2015)