

The Purple Copper Butterfly (*Paralucia spinifera*)

Cultural Burning Program - Ecological Report



For the Local Land Services

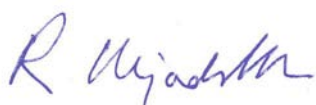


MJADWESCH
ENVIRONMENTAL
SERVICE SUPPORT

This *Ecological Report* has been prepared by Raymond Mjadwesch (BAppSci) of Mjadwesch Environmental Service Support.

The information contained herein is complete and correct to the best of my knowledge. This document has been prepared in good faith and on the basis that neither MESS nor its personnel are liable (whether by reason of negligence, lack of care or otherwise) to any person or entity for any damage or loss whatsoever which may occur in respect of any representation, statement or advice herein.

Signed:



11th March 2016

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Cover: *The Purple Copper Butterfly (Paralucia spinifera)*

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Introduction

In 2015 the LLS commenced a program of ecological burning in accordance with traditional cultural burning practices, as occurred prior to the arrival of Europeans in Australia.

With appropriately timed fire being a factor recognised as having a rejuvenating effect on bushland generally and habitat for the Purple Copper Butterfly (*Paralucia spinifera*) and related species specifically (Eltham Copper¹²), it was decided to enact a program of low-intensity prescribed burning to six butterfly sites in the Bathurst region (five at Yetholme and one population at Mount David - see Figures 1 & 2) in Autumn 2016.

The Rural Fire Service and the OEH-NPWS instructed that descriptions of the activity consider the ecology of the sites and possible impacts on the butterfly, according to licensing and legislated frameworks for management of prescribed fire / hazard reduction and threatened species (attached as Appendix 1).

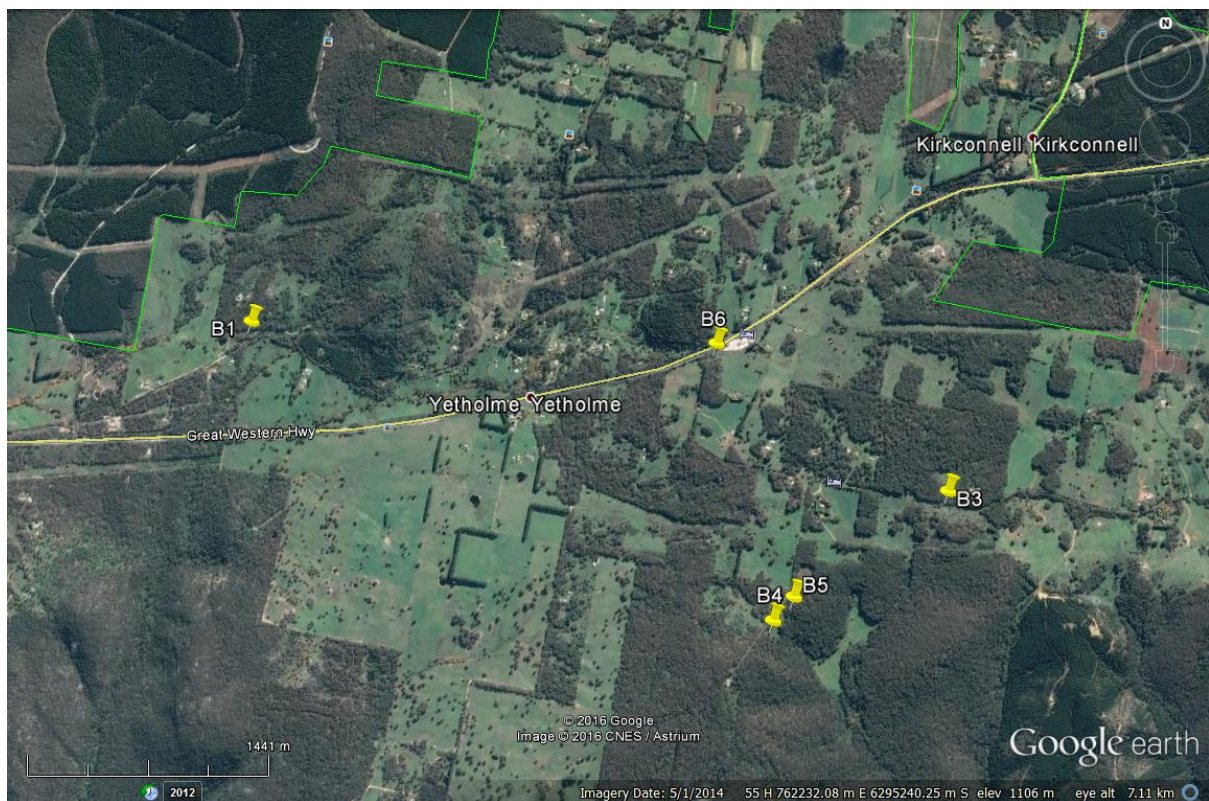


Figure 1. Five proposed burn sites are in the Yetholme area

¹ <http://museumvictoria.com.au/discoverycentre/infosheets/melbournes-butterflies/eltham-copper-butterfly/>

² http://www.depi.vic.gov.au/_data/assets/pdf_file/0018/250065/Eltham_Copper_Butterfly_Paralucia_pyrodiscus-lucida.pdf

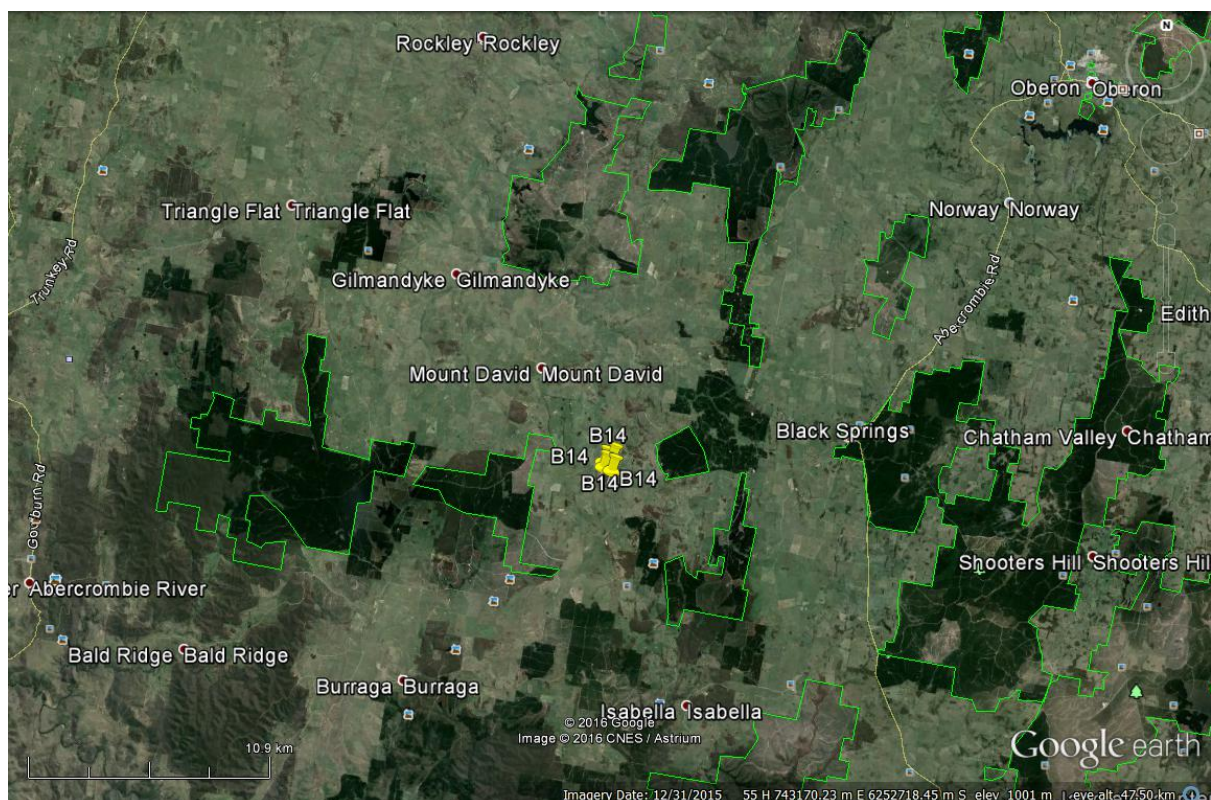


Figure 2. The proposed Mt David (Kennedy Park) burn site

Methodology

Inspections of the sites in their pre-burn condition in 2015 included site surveys for butterflies, and systematic nocturnal surveys of 20x20m quadrats (or parts thereof) for caterpillars, to quantify conditions prior to application of fire.

Site Descriptions

B1. The Boulder Site

Chris McKusker	12 Locke Street, RAGLAN NSW 2795		
Clare & Linton Bryant	107 Slingsby Road, Yetholme 2795		

The Boulder Site is the Type Locality for the species, where entomologists collected a series of 60 butterflies in the 1970s (held by the Australian National Insect Collection in Canberra) on which basis the species was described.

Butterflies have been observed here below a jumble of large granite boulders in a powerline easement which follows Broken Bridge Road /Yetholme Drive to Yetholme (see Figure 3).

Vegetation is locally dominated by Peppermint (*Eucalyptus dives*), Ribbon Gum (*E. viminalis*) and Apple Box (*E. bridgesiana*) with Black Wattle (*Acacia melanoxylon*) as a secondary canopy species. Canopy species are suppressed along the easement as part of a routine and ongoing powerline easement maintenance program. As a consequence Sifton Bush (*Cassinia arcuata*) has become a co-dominant shrub with the butterflies host plant (Blackthorn *Bursaria spinose*) along the easement, and this may be influencing characteristics of the site to the detriment of the butterfly (see Figure 4).



Figure 3. *The Boulder site is located along a powerline easement beside Broken Bridge Road*



Figure 4. *Sifton Bush has become co-dominant with Blackthorn at the Boulder Site*

Neither butterflies nor caterpillars were observed at the Boulder Site in 2015; data sheets are attached as Appendix 2.

B3. Eusdale Road

Joanne Moffitt	Adjacent Property		
Bathurst Regional Council	Roadside Reserve		

The Eusdale Road site occupies the roadside reserve between the power pole near the top of the rise and the creek-line at the bottom of the hill. Butterflies and caterpillars have also been observed over the years in the adjacent paddock area, and historically a small section of the paddock was fenced off from stock, however over time the butterflies seem to have abandoned this area, and the fence has subsequently been removed.



Figure 5. The Eusdale Road site is mostly restricted to the Eusdale Road roadside reserve

Again Ribbon Gum (*E. viminalis*) is the dominant species locally, with Snow Gum (*E. paciflora*) and Black Wattle (*A. melanoxylon*) forming a secondary component, however much of the road reserve is also dominated by shrubs including Bacon & Egg (*Daviesia latefolia*) as well as Blackthorn (*Bursaria spinosa*), and groundcover is more thickly occupied by species such as Blue Flax-lily (*Dianella ssp*), *Lomandra ssp* and Grass Trigger Plant (*Stylidium graminifolium*), instead of being dominated by grasses and the more ephemeral herb species, as is the case in the adjacent paddock area.

8 butterflies were observed on the 3rd October 2015 with conditions being optimal; active habitat was centered on the upper slope (see Figure 5); low numbers of caterpillars were also observed on bushes here over 2 nights. Data sheets and observations of caterpillars are attached in Appendix 2.

B4. Telstra Tower / Moffitts

Michael Moffitt & Cate McCarthy			
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The Telstra Tower Site is located on the northern slopes of a high hill in the Eusdale area, adjacent to a residential envelope in which the owners live, and where the butterflies visit garden plants and the open lawns.



Figure 6. Purple Copper Butterfly distribution at B4 on 7th October 2015

The southern section of the area here which is butterfly-active is a tall montane forest dominated by Ribbon Gum (*E. viminalis*) with Black Wattle (*A. melanoxylon*) as an understorey; closer to the house / shed complex is a stand of Snow Gums (*E. pauciflora*), still with Black Wattle as a significant secondary canopy component. Blackthorn (*Bursaria spinosa*) forms a variable shrub layer throughout, with clumps and scattered plants. Groundcover is grassy inter-mixed with a diverse assortment of herbs and forbs (see Mjadwesch 2011).

106 butterflies were observed here during the flying season in 2015, with activity being centered in the vicinity of the site marker post (B4 pin marker in the Figure above), and behind the house and shed (see Figure 6), under optimal conditions. Two 20x20m quadrats were surveyed for caterpillars here, on the nights of the 16th December 2015 and the 8th January 2016, with counts of 251 caterpillars and 655 caterpillars from quadrats A and B respectively (see data sheets attached as Appendix 2).

B5. Clonturkle

Andrew Bolam	160 Eusdale Rd Yetholme, 2795		
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The Clonturkle site lies close to the Telstra Tower site (see pin marker B5 in Figure 6 above), and while studies at the site in the 1980's had confirmed the existence of the butterfly there (Dexter *pers comm*), no butterflies have been observed there in the period 1997-2015 (Mjadwesch *pers obs*). It is assumed that structural change / maturation of the vegetation community has exceeded a threshold related to the butterfly's biological tolerance; for example the level to which Black Wattle (*A. melanoxylon*) has become dominant as a secondary canopy species is illustrated in Figure 7, which may be causing excessive shading.



Figure 7. The butterfly site at Clonturkle has become shaded by Black Wattle

Vegetation at Clonturkle is dominated here by the tall wet montane forests which characterize this section of the Great Dividing Range. The canopy is comprised of Ribbon Gum (*E. viminalis*) and Narrow-leafed Peppermint (*E. dives*), with Snow Gum (*E. pauciflora*) and Black Wattle (*A. melanoxylon*) forming a sub-strata. Blackthorn (*B. spinosa*), Broom (*Cytisus scoparius*) and River Lomatia (*Lomatia myricoides*) are common shrubs; groundcover is grassy and diverse with herbs such as Kidney Weed (*Dichondra repens*), pennywort (*Hydrocotyle laxiflora*) and violets (*Viola betonicifolia*).

The distribution of blackthorn plants was mapped at the site in 2008, and this is illustrated in Figure 8. Neither butterfly survey nor comprehensive caterpillar survey has been conducted at this site since then, however spot checks for butterflies have been conducted during inspections of the neighboring Telstra Tower site, with no individuals having been observed.

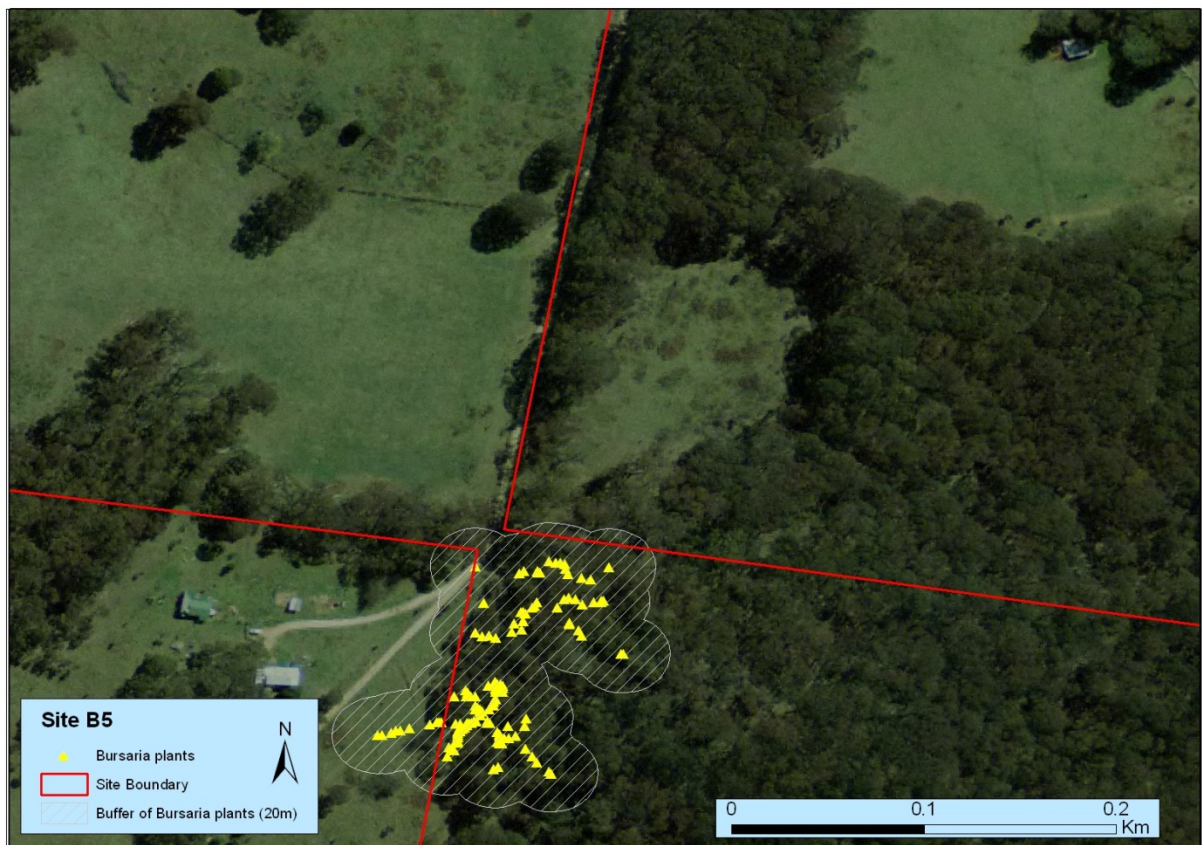


Figure 8. Blackthorn at Clonturkle (2008)



Figure 9. Proposed firegrounds at B4 and B5

B6. Turners

Mavis Turner			
Bathurst Regional Council			

Turners site is located along Eusdale Road behind the truck stop at Yetholme, habitat straddles the fenceline, however the active area is principally restricted to the roadside reserve (see Figure 10), which will be the area targeted by the proposed burning program.



Figure 10. B6 is in the Eusdale Rd roadside reserve behind the petrol station at Yetholme

Forest remnants locally are dominated by Ribbon Gum (*E. viminalis*), however this species has largely been removed from the roadside reserve at B6 as there is a powerline easement here – the only large Ribbon Gum remaining is towards the eastern end of the site. Instead low trees such as and Black Wattle (*A. melanoxylon*) and Hawthorn (*Crataegus monogyna*) are the most notable species at and around the butterfly site. Blackthorn plants at B6 have also often become heavily over-grown with Blackberry (*Rubus fruticosus*) and Bracken Fern (*Pteridium esculentum*), which is likely to be detracting from habitat values for the Purple Copper Butterfly here.

Surveys provided no butterflies on the 3rd October 2015, however four caterpillars were observed on a single plant during the caterpillar survey, on the night of the 15th December.

B14. Kennedy Park

Rod & Alexandra Tuson			
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Kennedy Park is the southern-most and out-lying population of the butterfly located at Mount David on an undulating private property, which is comprised of a complex of habitat units across the property, much of which was mapped in 2008 (Figure 11 below). Note that some waypoints indicated below were for clumps and scattered patches of Blackthorn rather than individual plants, particularly in the north-east of the study area, and not all of the property has been inspected during the flying season.

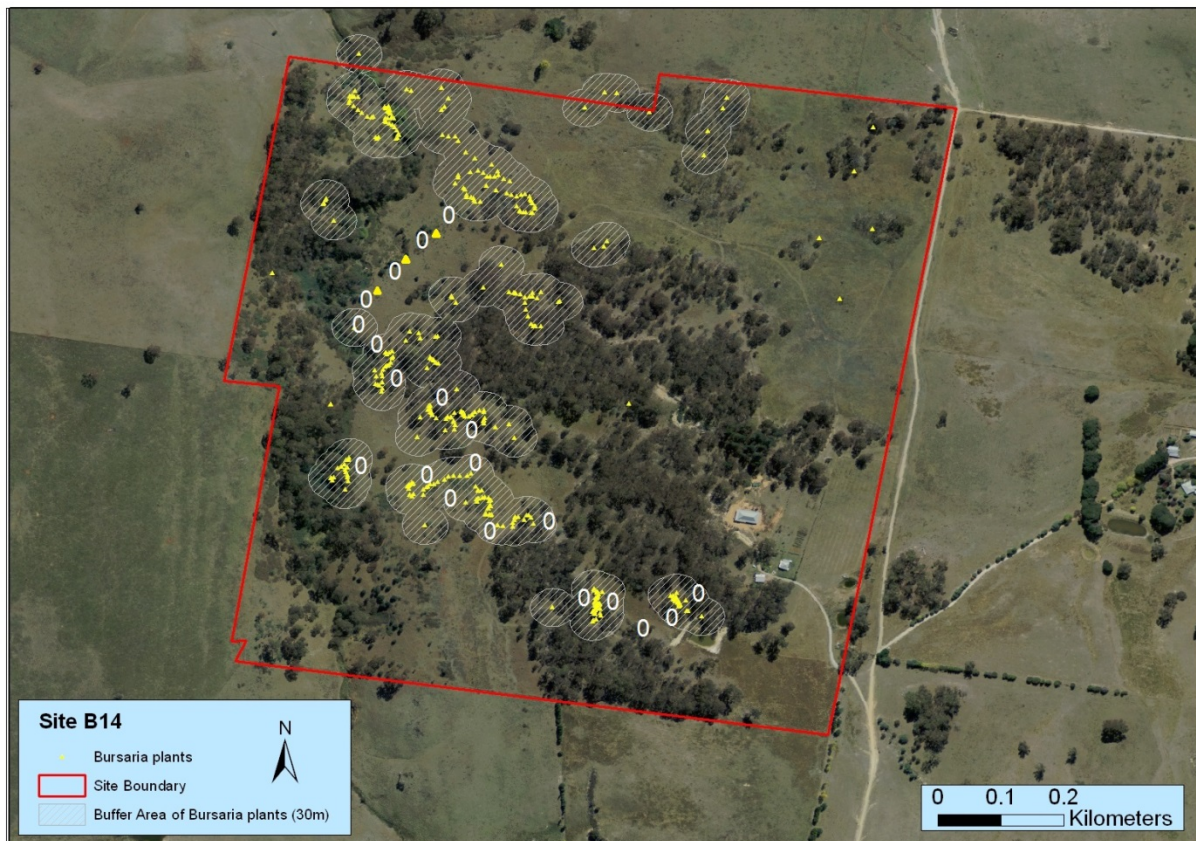


Figure 11. Kennedy Park is mostly wooded, in an often cleared landscape

Vegetation at Kennedy Park is dominated by a tall Tableland Basalt Forest community, with Mountain Gum (*E. viminalis*) and peppermint (*E. dives*) forming the main canopy, with Snow Gum (*E. pauciflora*) and Black Sally (*E. stellulata*) forming patches and along drainage lines. Silver Wattle (*A. dealbata*) and banksias (*Banksia marginata*) occur as infrequent small trees.

Native Blackthorn (*B. spinosa*) and Gorse Bitter-Pea (*Daviesia latefolia*) dominate sections of the understorey, however low shrubs are diverse if not dominant, with Bossiae, Melichris, Hibbertia, Gompholobium and Lissanthe all being present. Groundcover is predominantly comprised of a wide range of native grass and herb species (69 species in 20x20 quadrat, Mjadwesch 2011), however some sections have been over-run with Serrated Tussock (*Nasella trichotoma*), and the creekline in the west is in places heavily infested with Blackberry (*R. fruticosus*).

Survey at Kennedy Park in 2015 occurred during a break in a period of often inclement weather later in the season (24th October). While the day was generally sunny and warm the previous day had seen heavy rain, which has been noted to possibly affect butterfly numbers on the following day, and no butterflies were observed. Increasing cloud closed out the later parts of the day for survey.

Surveys for caterpillars occurred on the nights of the 18th December 2015 (QB14A) and 9th January 2016 (QB14B). No caterpillars were found despite conditions being optimal and with survey occurring within the optimal survey period for caterpillars of the species at this location. Data sheets from butterfly and caterpillar surveys are attached in Appendix 2.

Parameters for Burning

NPWS (undated) provided a range of objectives and controls for the inclusion of the Bald Hill Creek butterfly population (B11) in a hazard reduction burn in Winburndale Nature Reserve:

1. To minimise the detrimental effects of the burning on the survival of the local population of the PCB, through the retention of key larval grazing habitats.

There were no key larval grazing habitats identified at B1, B5 or B14, based on a lack of butterfly observations in 2015 and negative results from nocturnal caterpillar surveys.

At other sites in the proposed burn program the experimental design includes randomizing a proportion of utilized Blackthorn bushes to ensure that elements of the utilized habitat area are not affected by fire (key habitat will be protected from fire), while still providing statistical certainty with regard to impacts of fire (positive or negative impacts) by allowing some occupied bushes to be subject to the prescribed burn.

The Winburndale Nature Reserve / Bald Hill Creek hazard reduction burn protocol (NPWS undated) specified that only 25% of utilized plants would be burnt during the hazard reduction. Given the size of the site and the lack of baseline work establishing the extent of utilised / grazed habitat, and with no closely mapped fire-ground post-fire, it is unknown if this measure was achieved. Whatever the result, the butterfly persists at Bald Hill Creek (*pers obs* 2015), so an intended partial ignition was successful in rejuvenating habitat, without endangering the butterfly population at the site in the short- to medium-term.

A secondary control to ensure survival of the butterfly during burning at Bald Hill Creek was to implement the program while the butterfly was not flying, and while larvae were not grazing (planned ignition during the pupal stage of the life-cycle, when individuals were underground). The proposed April / May time frame for this proposed ecological burning program satisfies these criteria.

Baseline studies (see Appendix 2, which quantifies the extent in distribution of utilized habitat and provides samples of the density of caterpillars therein) in combination with active management of the fire grounds, including pre-fire fuel measurement (to predict fire behavior, with a view to enacting the burn in a way which limits burn-intensity), delineating protection areas and having capacity on-site during the burn to suppress fire threatening protection areas, will ensure that key larval grazing habitats are retained in an unburnt condition, with burnt habitat forming a mosaic across the fire grounds.

2. To monitor and quantify impacts of fire on Native Blackthorn (*B. spinosa*) and the Purple Copper Butterfly (*Paralucia spinifera*).

Planning for the Winburndale Nature Reserve / Bald Hill Creek hazard reduction burn aimed to include establishing permanent quadrats, so performance measures (based on monitoring) could provide data on any change in utilization of Blackthorn in the quadrat by the butterfly, and changes in the composition and structure of vegetation in the quadrat.

It is uncertain whether the monitoring that was going to occur at Winburndale / Bald Hill Creek was conducted, however work conducted in conjunction with fieldwork for this project included visiting the Bald Hill Creek population; both butterflies and caterpillars were observed there.

For this project permanent 20x20m vegetation quadrats have been established in all of the proposed burn areas with the exception of B5 (Clonturkle).

Data from quadrats includes floristic survey (see Mjadwesch 2011); Blackthorn plants have been mapped across quadrats and tagged with fire-proof brass tags, and nocturnal survey has determined the distribution and abundance of caterpillars in representative sample areas across the proposed fire grounds (see Appendix 2).

Enacting the burn program and conducting subsequent monitoring will enable a quantitative analysis of outcomes for the butterfly, which may provide the evidence required to plan and implement prescribed burns at other sites

Final pre-burn preparations will include development of comprehensive burn plans (proposed wet-lines and exclusion areas, ignition points, containment lines and fire advantages etc) as well as photographing sites (establish photo-points) and recording pre-fire and fire conditions (fuel loads and moisture levels, temperature and humidity, wind-speed and direction, fire behavior etc).

In addition the randomization of utilized plants which are burnt / remain unburnt and other aspects of the experimental model will be finalized by / under the guidance of Dr Milton Lewis of ANU.

Bibliography

DSE 2003 *Flora & Fauna Guarantee Action Statement #39: Eltham Copper Butterfly Paralucia pyrodiscus lucida* Dept Sustainability & Environment, Victoria

Gill M & Catling C 2002 *Fire regimes and biodiversity of forested landscapes of southern Australia* in Bradstock RA, Williams JE & Gill M (eds) *Flammable Australia: The Fire Regimes and Biodiversity of a Continent*

Mjadwesch R 2011 *DRAFT Plans of Management for B1, B3, B4, B5, B6 and B14* unpublished reports to the OEH-NPWS

NPWS undated *ATTACHMENT 1 Winburndale Nature Reserve burning trials – Purple Copper Butterfly and Bursaria spinosa ssp lasiophylla*

Appendix 1. Section 91 Application

Appendix 2. Survey Data Sheets & Quadrat Survey Results

Purple Copper Butterfly Survey Form

Observer(s)'s name(s): Raymond Mjadwesch

Contact: Ray on [REDACTED]

Site: B1 Boulder Site Date: 3.10.2015 Start time: 1030 Finish time: 1100

GPS co-ordinates: Map Zone: 55 Map datum:

760113E 6295690N

Weather conditions

Cloud cover:

- ☒ None
☐ Up to 25%
☐ 26 – 50%
☐ 51 – 80%
☐ Overcast

Wind:

- ☐ None
☐ Light breeze
☒ Light wind
☐ Steady wind
☐ Strong wind

Precipitation:

- ☒ None
☐ Drizzle
☐ Light rain
☐ Heavy rain
☐ Downpour

Temperature:

- ☐ < 0°C
☐ 0 – 10°C
☒ 11-20°C
☐ 21-29°C
☐ 30°C +

Site Conditions: Air temp.:..... Ground temp.:..... Relative humidity:..... Shade:....%
(if thermometer held)

Weeds present Yes ☒ No ☐

If yes, identify where possible:

- | | | | |
|--|--|-----------------------------------|--------------------------------------|
| <input checked="" type="checkbox"/> Blackberry | <input type="checkbox"/> Phalaris | <input type="checkbox"/> Hawthorn | <input type="checkbox"/> Broom |
| <input type="checkbox"/> St John's Wort | <input type="checkbox"/> Willow | <input type="checkbox"/> Thistle | <input type="checkbox"/> Pine |
| <input type="checkbox"/> Sweet Briar | <input type="checkbox"/> Verbenum (purple top) | <input type="checkbox"/> Primrose | <input type="checkbox"/> Cotoneaster |

Other Weeds / Notes: Blackberry infestation of low intensity in upslope parts of the site.

% weed invasion: up to 10% ☒ 10-25% ☐ 25-50% ☐ 50-75% ☐ >75% ☐

Attendant ant: Present ☐ Absent ☐

Survey method: Transect ☐ Area search ☐ Stationary ☒

Number of butterflies observed: None ☒ 1-5 ☐ 5-10 ☐ 10-30 ☐ 30-50 ☐ 50-100 ☐ >100 ☐

Other / exact number:

Butterfly behaviour: Flying ☐ Basking ☐ Breeding ☐ Feeding ☐ Fighting ☐

☐ Other behaviour (describe):

If feeding, identify (or describe) plants used:

.....

Other insects present on *Bursaria*:

Other butterflies (describe): Zizilabr, Vanekers, Vaneitea (all flying SE diagonally across the easement and up-wind)

Other observations at this site: Fantail Cuckoo, Yellow-faced Honeyeater, White-winged Chough (2), White-browed Scrub-wren, wombat (active burrow), Crimson Rosella (feathers), horse and cow tracks and dung

Follow up required? Yes ☒ No ☐ If yes, describe: continued treatment of blackberry

.....

Purple Copper Larvae Survey Form

Observer(s)'s name(s): RM, CF, LD, GM, CB

Contact: RM on

Site: B1

Date: 14/12/2015

Start time: 2200

Finish time: 2245

GPS co-ordinates:

Map Zone: 55

Map datum:

760113E 6295690N

Weather conditions

Cloud cover:

☐ None
☒ Up to 25%
☐ 26 – 50%
☐ 51 – 80%
☐ Overcast

Wind:

☒ None
☐ Light breeze
☐ Light wind
☐ Steady wind
☐ Strong wind

Precipitation:

☒ None
☐ Drizzle
☐ Light rain
☐ Heavy rain
☐ Downpour

Temperature:

☐ < 0°C
☐ 0 – 10°C
☒ 11-20°C
☐ 21-29°C
☐ 30°C +

Site Conditions: Air temp:..... Ground temp:..... Relative humidity:..... (if thermometer held)

Moon phase: No Moon ☒ ¼ wax ☐ ¼ wane ☐ ½ wax ☐ ½ wane ☐ ¾ wax ☐ ¾ wane ☐ Full ☐

Dominant ground cover: Leaf litter ☐ Grasses & herbs ☒ Timber ☐ Stones & pebbles ☐

% BSL stems choked by weeds: up to 10% ☒ 10-25% ☐ 25-50% ☐ 50-75% ☐ >75% ☐

Attendant ant: Present ☒ occasional patrolling ant observed Absent ☐

Survey method: Transect ☐ Area search ☒ Systematic scrutiny of all BSL on site ☐

Caterpillars observed: None ☒ 1-5 ☐ 5-10 ☐ 10-30 ☐ 30-50 ☐ 50-100 ☐ >100 ☐

Exact number:

Other insects present on *Bursaria*: Cockroach

Other observations at this site:.....

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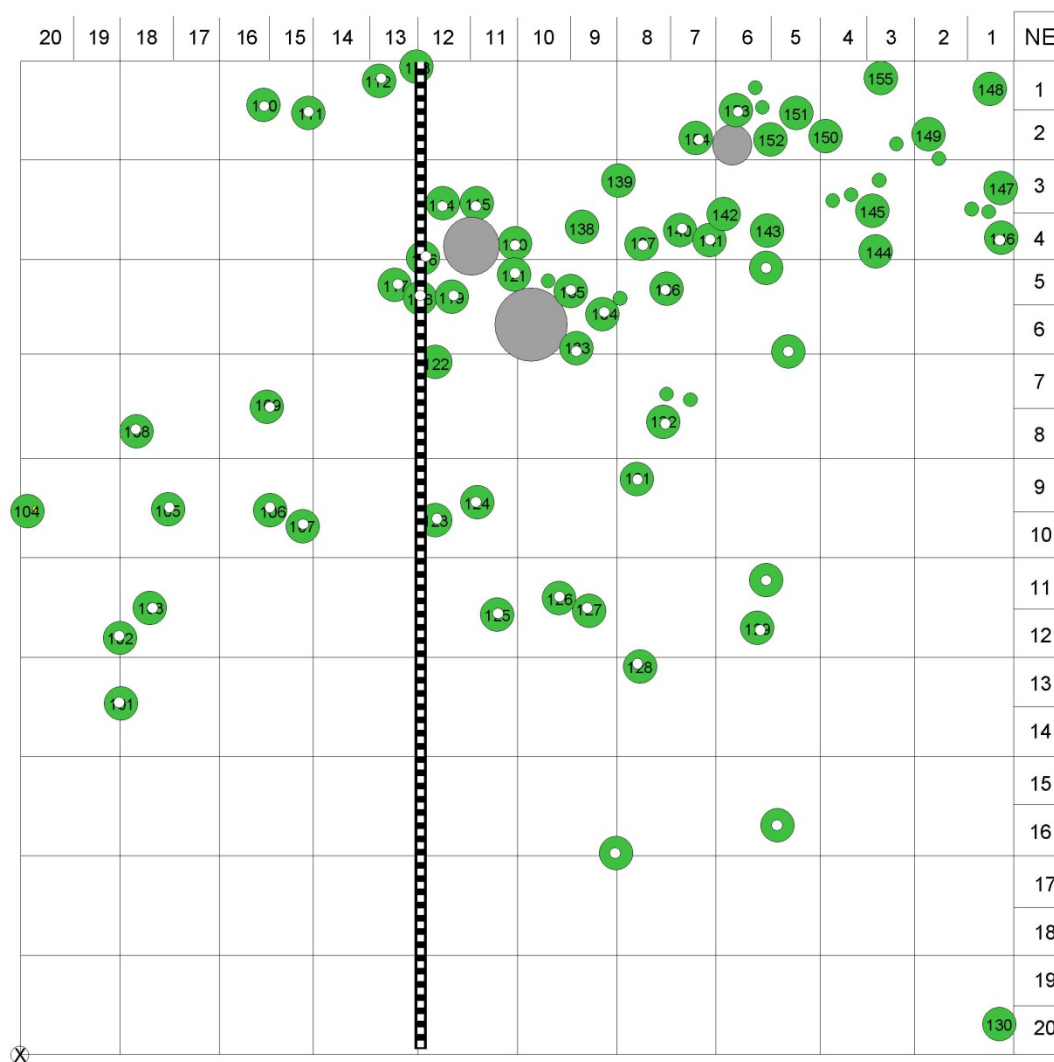
Follow up required? Yes ☒ No ☐ If yes, describe: Blackberry treatment

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.....

.....

Caterpillar Distribution



White dots indicate that the bush was positively identified, either by finding the brass tag on the plant, or by the plant being found to be spatially correct in relation to a located tag; all white-dot plants were systematically scanned for ants / caterpillars between 2200-2245.

No caterpillars were observed at the Boulder Site during survey on the night of 14th December 2015. A positive spot-check at Slingsby Rd (B13) between 2245-1100 provided that caterpillars were active on the night of 14.12.2015, so it is assumed that the species is again absent or at very low abundance at the Boulder Site in 2015 (not detected).

Note that the fence has moved 8m to the east from when the permanent quadrat was marked in 2008, which has resulted in a second landowner (Lindsay & Clare Bryant) now being party to management of the butterfly at the site.

Purple Copper Butterfly Survey Form

Observer(s)'s name(s): Raymond Mjadwesch

Contact: Ray on [REDACTED]

Site: B3 Eusdale Road **Date:** 3.10.2015 **Start time:** 1310 **Finish time:** 1340

GPS co-ordinates: **Map Zone:** 55 **Map datum:**

764061E 6294671N

Weather conditions

Cloud cover:

- ☒ None
☐ Up to 25%
☐ 26 – 50%
☐ 51 – 80%
☐ Overcast

Wind:

- ☐ None
☐ Light breeze
☐ Light wind
☒ Steady wind
☐ Strong wind

Precipitation:

- ☒ None
☐ Drizzle
☐ Light rain
☐ Heavy rain
☐ Downpour

Temperature:

- ☐ < 0°C
☐ 0 – 10°C
☐ 11-20°C
☒ 21-29°C
☐ 30°C +

Site Conditions: Air temp.: Ground temp.: Relative humidity: Shade: ...%
(if thermometer held)

Weeds present Yes ☒ No ☐

If yes, identify where possible:

- ☒ Blackberry
☐ St John's Wort
☐ Sweet Briar

- ☐ Phalaris
☐ Willow
☐ Verbenum (purple top)

- ☐ Hawthorn
☐ Thistle
☐ Primrose

- ☒ Broom
☐ Pine
☒ Cotoneaster

Other Weeds / Notes:

% weed invasion: up to 10% ☒ 10-25% ☐ 25-50% ☐ 50-75% ☐ >75% ☐

Attendant ant: Present ☐ Absent ☐

Survey method: Transect ☐ Area search ☒ Stationary ☐

Number of butterflies observed: None ☐ 1-5 ☐ 5-10 ☐ 10-30 ☐ 30-50 ☐ 0-100 ☐ >100 ☐

Other / exact number: 2 (top of hill) +1 +2 +1 / 2 (halfway down the hill)

Butterfly behaviour: Flying ☒ Basking ☒ Breeding ☐ Feeding ☐ Fighting ☐

☐ Other behaviour (describe):

If feeding, identify (or describe) plants used:

Other insects present on *Bursaria*:

Other butterflies (describe): Candhyac, Vaneitea, Vanekers

Other observations at this site: Kookaburra, Grey Shrike Thrush, Yellow-faced Honeyeater, wombat burrow plus activity (holes under fence mesh)

Follow up required? Yes ☒ No ☐ If yes, describe: continued treatment of blackberry and broom; Council work with roadside drainage has impacted on habitat values

Purple Copper Larvae Survey Form

Observer(s)'s name(s): RM, CF, PE

Contact: RM on [REDACTED]

Site: B3A B3B

Date: 16/12/2015

Start time: 2200

Finish time: 2230

GPS co-ordinates:

Map Zone: 55

Map datum:

764061E 6294671N

Weather conditions

Cloud cover:

☐ None
☒ Up to 25%
☐ 26 – 50%
☐ 51 – 80%
☐ Overcast

Wind:

☒ None
☐ Light breeze
☐ Light wind
☐ Steady wind
☐ Strong wind

Precipitation:

☒ None
☐ Drizzle
☐ Light rain
☐ Heavy rain
☐ Downpour

Temperature:

☐ < 0°C
☐ 0 – 10°C
☒ 11-20°C
☐ 21-29°C
☐ 30°C +

Site Conditions: Air temp:..... Ground temp:..... Relative humidity:..... (if thermometer held)

Moon phase: No Moon ☒ ¼ wax ☐ ¼ wane ☐ ½ wax ☐ ½ wane ☐ ¾ wax ☐ ¾ wane ☐ Full ☐

Dominant ground cover: Leaf litter ☐ Grasses & herbs ☒ Timber ☐ Stones & pebbles ☐

% BSL stems choked by weeds: up to 10% ☒ 10-25% ☐ 25-50% ☐ 50-75% ☐ >75% ☐

Attendant ant: Present ☒ Absent ☐

Survey method: Transect ☐ Area search ☒ Systematic scrutiny of all BSL on site ☐

Caterpillars observed: None ☐ 1-5 ☐ 5-10 ☒ 10-30 ☐ 30-50 ☐ 50-100 ☐ >100 ☐

Exact number: 7

Other insects present on *Bursaria*:

Other observations at this site:.....

.....

Follow up required? Yes ☒ No ☐ If yes, describe: Blackberry treatment

.....

.....

.....

Purple Copper Larvae Survey Form

Observer(s)'s name(s): RM

Contact: RM on

Site: B3C

Date: 8/1/2016

Start time: 2200

Finish time: 2300

GPS co-ordinates:

Map Zone: 55

Map datum:

764061E 6294671N

Weather conditions

Cloud cover:

☐ None
☒ Up to 25%
☐ 26 – 50%
☐ 51 – 80%
☐ Overcast

Wind:

☒ None
☐ Light breeze
☐ Light wind
☐ Steady wind
☐ Strong wind

Precipitation:

☒ None
☐ Drizzle
☐ Light rain
☐ Heavy rain
☐ Downpour

Temperature:

☐ < 0°C
☐ 0 – 10°C
☒ 11-20°C
☐ 21-29°C
☐ 30°C +

Site Conditions: Air temp:..... Ground temp:..... Relative humidity:..... (if thermometer held)

Moon phase: No Moon ☐ ¼ wax ☐ ¼ wane ☐ ½ wax ☒ ½ wane ☐ ¾ wax ☐ ¾ wane ☐ Full ☐

Dominant ground cover: Leaf litter ☐ Grasses & herbs ☒ Timber ☐ Stones & Pebbles ☒

% BSL stems choked by weeds: up to 10% ☒ 10-25% ☐ 25-50% ☐ 50-75% ☐ >75% ☐

Attendant ant: Present ☒ Absent ☐

Survey method: Transect ☐ Area search ☒ Systematic scrutiny of all BSL on site ☐

Caterpillars observed: None ☐ 1-5 ☒ 5-10 ☐ 10-30 ☐ 30-50 ☐ 50-100 ☐ >100 ☐

Exact number: 1

Other insects present on *Bursaria*: Katydid (*Coptaspis ssp*)

Other observations at this site:.....

.....

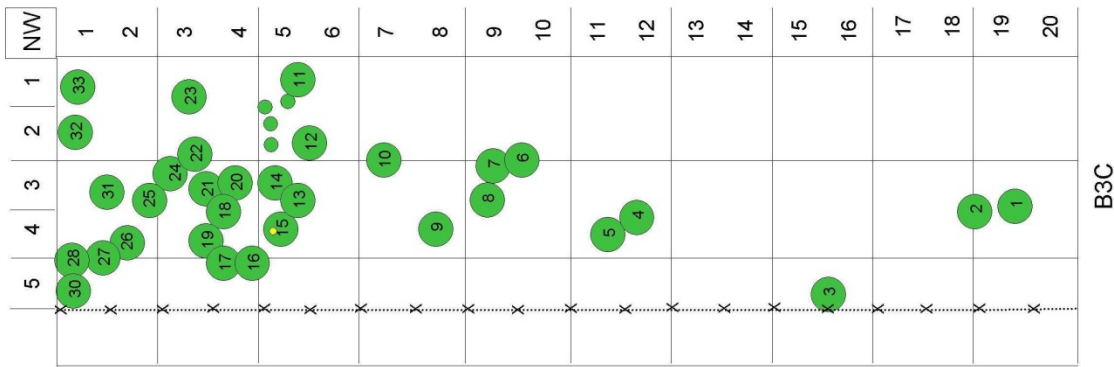
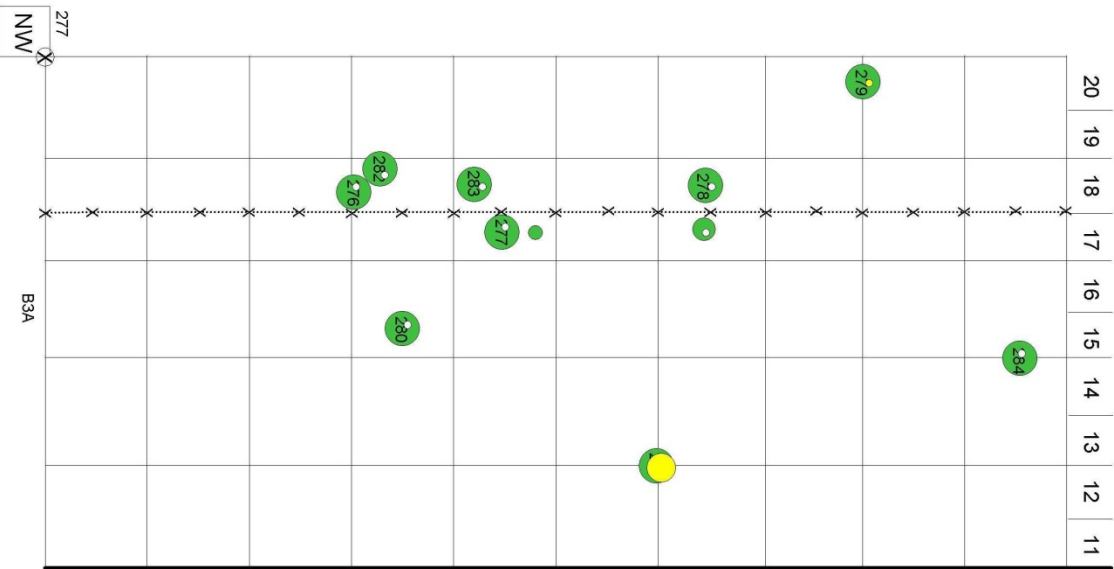
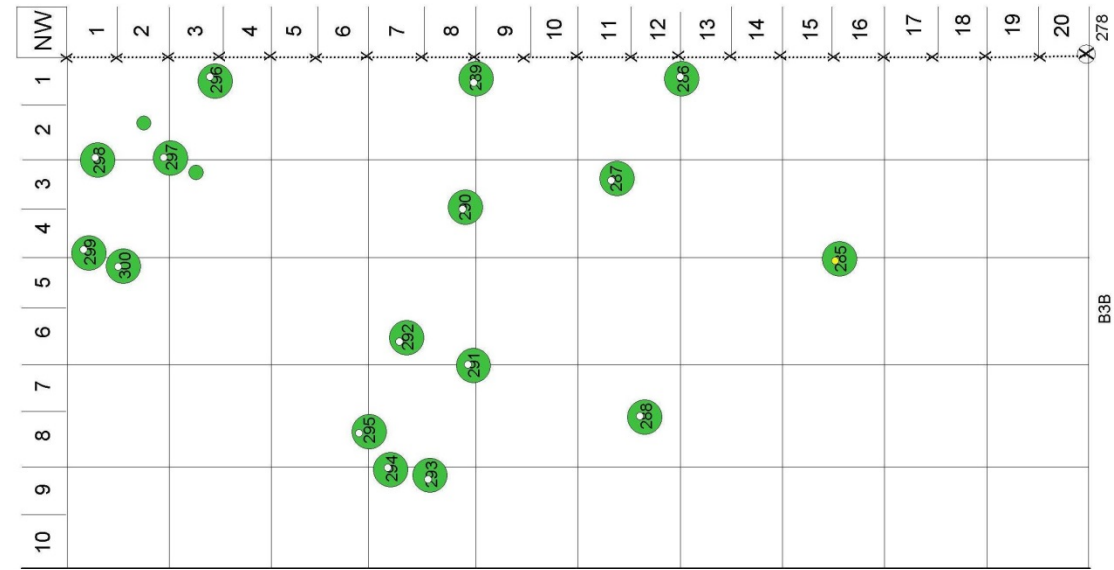
Follow up required? Yes ☒ No ☐ If yes, describe: Blackberry treatment

.....

.....

.....

B3. Eusdale Road Caterpillar Survey 2015



Quadrat Edge 15m to Powerpole

Purple Copper Butterfly Survey Form

Observer(s)'s name(s): Raymond Mjadwesch

Contact: Ray on [REDACTED]

Site: B4 Telstra Tower / Moffitts **Date:** 7.10.2015 **Start time:** 1100 **Finish time:** 1140

GPS co-ordinates: **Map Zone:** 55 **Map datum:**

763111E 6293955N

Weather conditions

Cloud cover:

- ☐ None
☐ Up to 25%
☒ 26 – 50%
☐ 51 – 80%
☐ Overcast

Wind:

- ☐ None
☐ Light breeze
☒ Light wind
☐ Steady wind
☐ Strong wind

Precipitation:

- ☒ None
☐ Drizzle
☐ Light rain
☐ Heavy rain
☐ Downpour

Temperature:

- ☐ < 0°C
☐ 0 – 10°C
☒ 11-20°C
☐ 21-29°C
☐ 30°C +

Site Conditions: Air temp.:..... Ground temp.:... Relative humidity:..... Shade:.....%
(if thermometer held)

Weeds present Yes ☒ No ☐

If yes, identify where possible:

- ☒ Blackberry
☐ St John's Wort
☒ Sweet Briar

- ☐ Phalaris
☐ Willow
☐ Verbenum (purple top)

- ☐ Hawthorn
☐ Thistle
☐ Primrose

- ☒ Broom
☐ Pine
☐ Cotoneaster

Other Weeds / Notes: Weed infestations are of low intensity.

% weed invasion: up to 10% ☒ 10-25% ☐ 25-50% ☐ 50-75% ☐ >75% ☐

Attendant ant: Present ☐ Absent ☐

Survey method: Transect ☐ Area search ☒ Stationary ☐

Number of butterflies observed: None ☐ 1-5 ☐ 5-10 ☐ 10-30 ☐ 30-50 ☐ 50-100 ☐ >100 ☐

Other / exact number: 106 (see attached)

Butterfly behaviour: Flying ☒ Basking ☒ Breeding ☐ Feeding ☐
Fighting ☒

☒ Other behaviour (describe): Courting

If feeding, identify (or describe) plants used:

.....

Other insects present on *Bursaria*:

Other butterflies (describe): Argynnis cyrila, Vaneitea, Delias aganippe, Zizilabr

Other observations at this site: Kookaburra, Sulphur-crested Cockatoo, Wedgetailed Eagle, Australian Magpie, Rufous Whistler, Grey Shrike Thrush

Follow up required? Yes ☒ No ☐ If yes, describe: continued treatment of blackberry and broom.....

Purple Copper Larvae Survey Form

Observer(s)'s name(s): RM, ML, MH, HE

Contact: RM on [REDACTED]

Site: B4A

Date: 17/12/2015

Start time: 2200

Finish time: 2300

GPS co-ordinates:

Map Zone: 55

Map datum:

763111E 6293955N

Weather conditions

Cloud cover:

☐ None
☒ Up to 25%
☐ 26 – 50%
☐ 51 – 80%
☐ Overcast

Wind:

☒ None
☐ Light breeze
☐ Light wind
☐ Steady wind
☐ Strong wind

Precipitation:

☒ None
☐ Drizzle
☐ Light rain
☐ Heavy rain
☐ Downpour

Temperature:

☐ < 0°C
☐ 0 – 10°C
☒ 11-20°C
☐ 21-29°C
☐ 30°C +

Site Conditions: Air temp:..... Ground temp:..... Relative humidity:..... (if thermometer held)

Moon phase: No Moon ☒ ¼ wax ☐ ¼ wane ☐ ½ wax ☐ ½ wane ☐ ¾ wax ☐ ¾ wane ☐ Full ☐

Dominant ground cover: Leaf litter ☐ Grasses & herbs ☒ Timber ☐ Stones & Pebbles ☐

% BSL stems choked by weeds: up to 10% ☒ 10-25% ☐ 25-50% ☐ 50-75% ☐ >75% ☐

Attendant ant: Present ☒ Absent ☐

Survey method: Transect ☐ Area search ☒ Systematic scrutiny of all BSL on site ☐

Caterpillars observed: None ☐ 1-5 ☐ 5-10 ☐ 10-30 ☐ 30-50 ☐ 50-100 ☐ >100 ☒

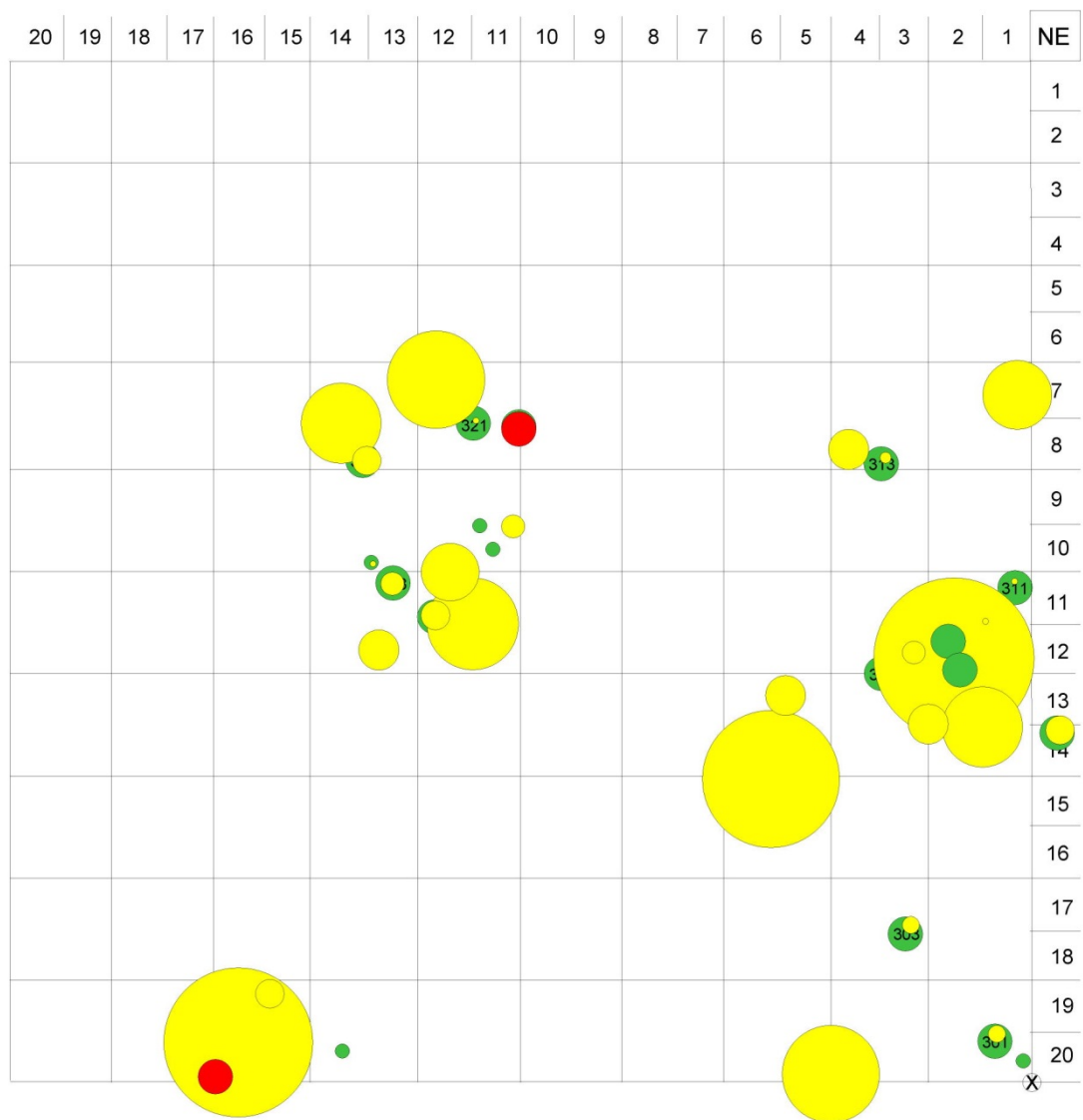
Exact number: 251

Other insects present on *Bursaria*:

Other observations at this site:.....
.....

Follow up required? Yes ☒ No ☐ If yes, describe: Blackberry treatment

.....
.....
.....



Purple Copper Larvae Survey Form

Observer(s)'s name(s): RM

Contact: RM on

Site: B4B

Date: 8/1/2016

Start time: 2300

Finish time: 0030

GPS co-ordinates:

Map Zone: 55

Map datum:

763111E 6293955N

Weather conditions

Cloud cover:

☐ None
☒ Up to 25%
☐ 26 – 50%
☐ 51 – 80%
☐ Overcast

Wind:

☒ None
☐ Light breeze
☐ Light wind
☐ Steady wind
☐ Strong wind

Precipitation:

☒ None
☐ Drizzle
☐ Light rain
☐ Heavy rain
☐ Downpour

Temperature:

☐ < 0°C
☐ 0 – 10°C
☒ 11-20°C
☐ 21-29°C
☐ 30°C +

Site Conditions: Air temp:..... Ground temp:..... Relative humidity:..... (if thermometer held)

Moon phase: No Moon ☐ ¼ wax ☐ ¼ wane ☐ ½ wax ☒ ½ wane ☐ ¾ wax ☐ ¾ wane ☐ Full ☐

Dominant ground cover: Leaf litter ☐ Grasses & herbs ☒ Timber ☐ Stones & Pebbles ☐

% BSL stems choked by weeds: up to 10% ☒ 10-25% ☐ 25-50% ☐ 50-75% ☐ >75% ☐

Attendant ant: Present ☒ Absent ☐

Survey method: Transect ☐ Area search ☒ Systematic scrutiny of all BSL on site ☐

Caterpillars observed: None ☐ 1-5 ☐ 5-10 ☐ 10-30 ☐ 30-50 ☐ 50-100 ☐ >100 ☒

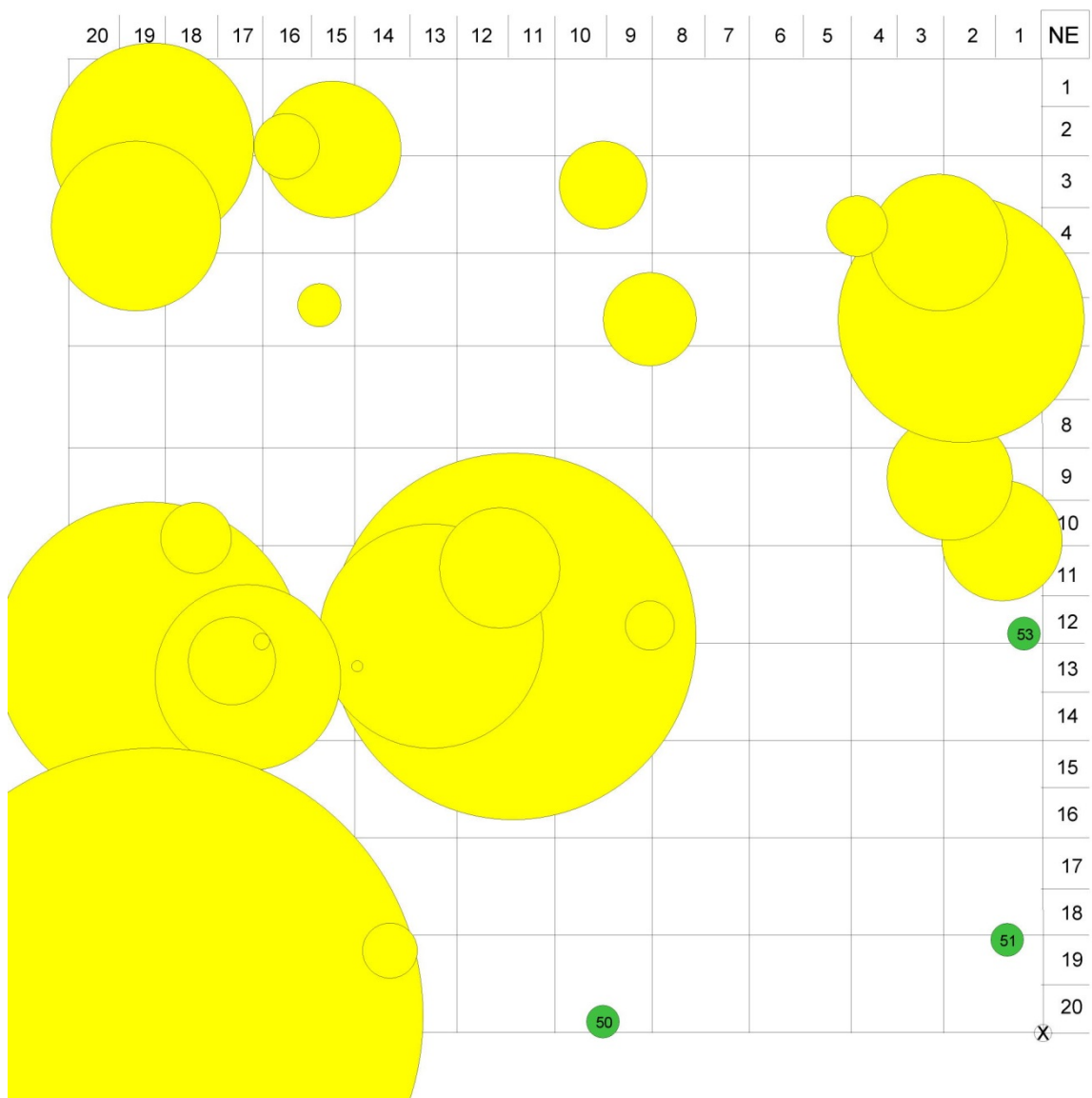
Exact number: 655

Other insects present on *Bursaria*:

Other observations at this site:.....
.....

Follow up required? Yes ☒ No ☐ If yes, describe: Blackberry treatment

.....
.....
.....



Purple Copper Butterfly Survey Form

Observer(s)'s name(s): Raymond Mjadwesch

Contact: Ray on [REDACTED]

Site: B5 Clonturkle **Date:** 7.10.2015 **Start time:** 1140 **Finish time:** 1200

GPS co-ordinates: **Map Zone:** 55 **Map datum:**
763111E 6293955N

Weather conditions

Cloud cover:

- ☐ None
☐ Up to 25%
☒ 26 – 50%
☐ 51 – 80%
☐ Overcast

Wind:

- ☐ None
☐ Light breeze
☒ Light wind
☐ Steady wind
☐ Strong wind

Precipitation:

- ☒ None
☐ Drizzle
☐ Light rain
☐ Heavy rain
☐ Downpour

Temperature:

- ☐ < 0°C
☐ 0 – 10°C
☒ 11-20°C
☐ 21-29°C
☐ 30°C +

Site Conditions: Air temp.:..... Ground temp.:... Relative humidity:..... Shade:.....%
(if thermometer held)

Weeds present Yes ☒ No ☐

If yes, identify where possible:

- ☒ Blackberry
☐ St John's Wort
☐ Sweet Briar

- ☐ Phalaris
☐ Willow
☐ Verbenum (purple top)

- ☐ Hawthorn
☐ Thistle
☐ Primrose

- ☒ Broom
☐ Pine
☐ Cotoneaster

Other Weeds / Notes: Weed infestations are of low intensity.

% weed invasion: up to 10% ☒ 10-25% ☐ 25-50% ☐ 50-75% ☐ >75% ☐

Attendant ant: Present ☐ Absent ☐

Survey method: Transect ☐ Area search ☐ Stationary ☒

Number of butterflies observed: None ☒ 1-5 ☐ 5-10 ☐ 10-30 ☐ 30-50 ☐ 50-100 ☐ >100 ☐

Other / exact number:

Butterfly behaviour: Flying ☐ Basking ☐ Breeding ☐ Feeding ☐ Fighting ☐

☐ Other behaviour (describe):

If feeding, identify (or describe) plants used:

.....

Other insects present on *Bursaria*:

Other butterflies (describe): Argynnis cyrila

Other observations at this site: Red-necked Wallaby, King Parrots

Follow up required? Yes ☒ No ☐ If yes, describe: continued treatment of blackberry and broom.....

Purple Copper Butterfly Survey Form

Observer(s)'s name(s): Raymond Mjadwesch

Contact: Ray on [REDACTED]

Site: B6 Turners **Date:** 3.10.2015 **Start time:** 1230 **Finish time:** 1250

GPS co-ordinates: Map Zone: 55 Map datum:
762832E 6295518N

Weather conditions

Cloud cover:

- ☒ None
☐ Up to 25%
☐ 26 – 50%
☐ 51 – 80%
☐ Overcast

Wind:

- ☐ None
☒ Light breeze
☐ Light wind
☐ Steady wind
☐ Strong wind

Precipitation:

- ☒ None
☐ Drizzle
☐ Light rain
☐ Heavy rain
☐ Downpour

Temperature:

- ☐ < 0°C
☐ 0 – 10°C
☐ 11-20°C
☒ 21-29°C
☐ 30°C +

Site Conditions: Air temp.:..... Ground temp.:... Relative humidity:..... Shade:.....%
(if thermometer held)

Weeds present Yes ☒ No ☐

If yes, identify where possible:

- ☒ Blackberry
☐ St John's Wort
☐ Sweet Briar

- ☐ Phalaris
☐ Willow
☐ Verbenum (purple top)

- ☒ Hawthorn
☐ Thistle
☐ Primrose

- ☒ Broom
☐ Pine
☐ Cotoneaster

Other Weeds / Notes: Cocksfoot

% weed invasion: up to 10% ☐ 10-25% ☒ 25-50% ☐ 50-75% ☐ >75% ☐

Attendant ant: Present ☐ Absent ☐

Survey method: Transect ☐ Area search ☒ Stationary ☒

Number of butterflies observed: None ☒ 1-5 ☐ 5-10 ☐ 10-30 ☐ 30-50 ☐ 50-100 ☐ >100 ☐

Other / exact number:

Butterfly behaviour: Flying ☐ Basking ☐ Breeding ☐ Feeding ☐ Fighting ☐

☐ Other behaviour (describe):

If feeding, identify (or describe) plants used:

.....

Other insects present on *Bursaria*:

Other butterflies (describe):

Other observations at this site: Bulbuls flowering.

Follow up required? Yes ☒ No ☐ If yes, describe: long unburnt, bracken building up heavily.....

Purple Copper Larvae Survey Form

Observer(s)'s name(s): RM, ML, CK, JB, NM

Contact: RM on

Site: B6

Date: 15/12/2015

Start time: 2200

Finish time: 2230

GPS co-ordinates:

Map Zone: 55

Map datum:

762832E 6295518N

Weather conditions

Cloud cover:

☐ None
☒ Up to 25%
☐ 26 – 50%
☐ 51 – 80%
☐ Overcast

Wind:

☒ None
☐ Light breeze
☐ Light wind
☐ Steady wind
☐ Strong wind

Precipitation:

☒ None
☐ Drizzle
☐ Light rain
☐ Heavy rain
☐ Downpour

Temperature:

☐ < 0°C
☐ 0 – 10°C
☒ 11-20°C
☐ 21-29°C
☐ 30°C +

Site Conditions: Air temp:..... Ground temp:..... Relative humidity:..... (if thermometer held)

Moon phase: No Moon ☒ ¼ wax ☐ ¼ wane ☐ ½ wax ☐ ½ wane ☐ ¾ wax ☐ ¾ wane ☐ Full ☐

Dominant ground cover: Leaf litter ☐ Grasses & herbs ☒ Timber ☐ Stones & pebbles ☐

% BSL stems choked by weeds: up to 10% ☐ 10-25% ☐ 25-50% ☒ 50-75% ☐ >75% ☐

Attendant ant: Present ☒ Absent ☐

Survey method: Transect ☐ Area search ☒ Systematic scrutiny of all BSL on site ☐

Caterpillars observed: None ☐ 1-5 ☒ 5-10 ☐ 10-30 ☐ 30-50 ☐ 50-100 ☐ >100 ☐

Exact number: 4

Other insects present on *Bursaria*: *Crematogaster ssp.*

Other observations at this site:.....

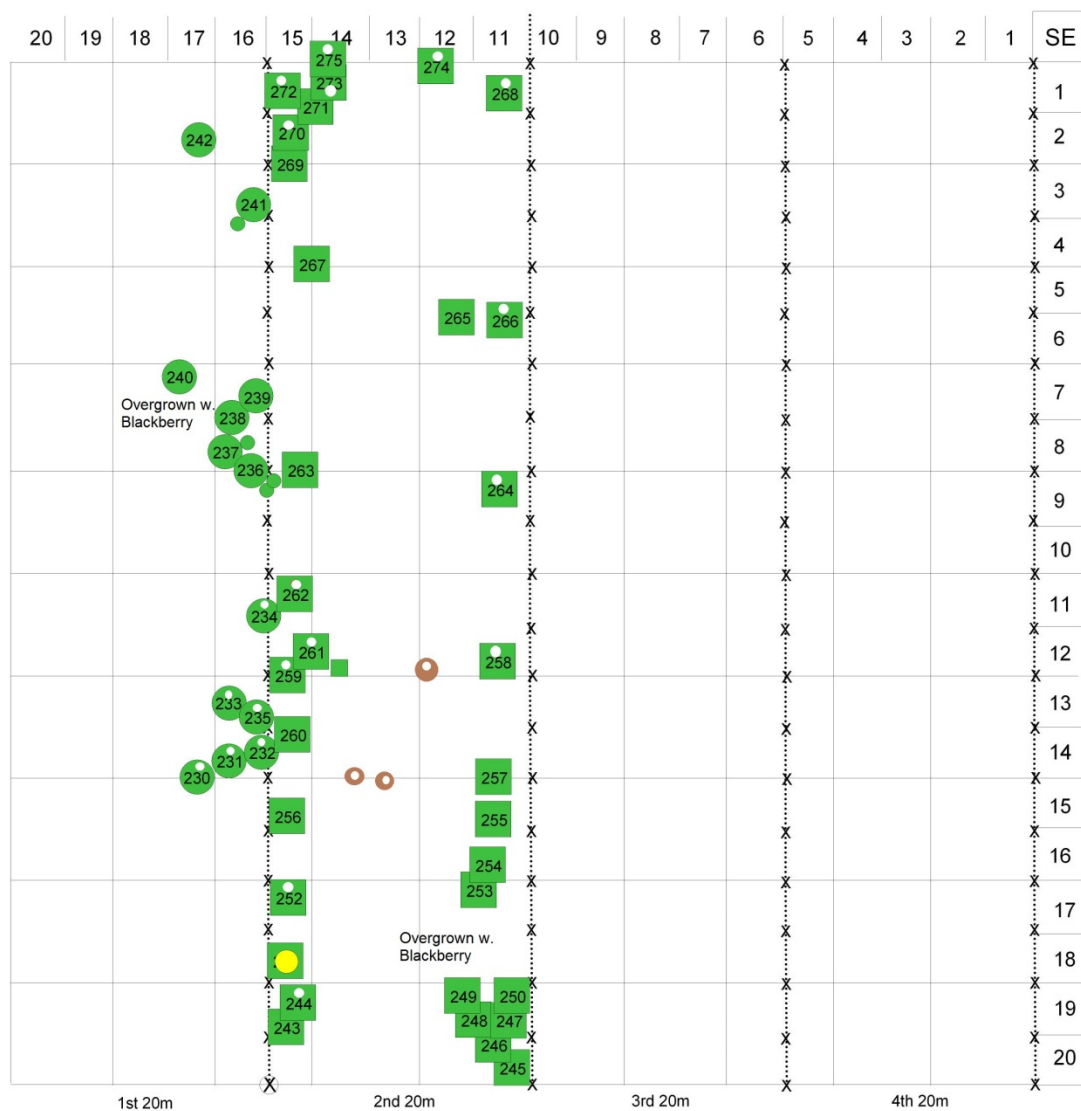
.....

Follow up required? Yes ☒ No ☐ If yes, describe: Blackberry treatment

.....

.....

.....



White dots indicate that the bush was positively identified, either by finding the brass tag on the plant, or by the plant being found to be spatially correct in relation to a located tag; all white-dot plants were systematically scanned for ants / caterpillars between 2200-2230.

4 caterpillars were observed on a single plant during survey on the night of 15th December 2015. The species remains at low abundance at B6 in 2015.

Purple Copper Butterfly Survey Form

Observer(s)'s name(s): Raymond Mjadwesch

Contact: Ray on [REDACTED]

Site: B14 Kennedy Park **Date:** 24.10.2015 **Start time:** 1105 **Finish time:** 1205

GPS co-ordinates: **Map Zone:** 55 **Map datum:**
742885E 6249610N

Weather conditions

Cloud cover:

- ☐ None
☒ Up to 25%
☐ 26 – 50%
☐ 51 – 80%
☐ Overcast

Wind:

- ☐ None
☒ Light breeze
☐ Light wind
☐ Steady wind
☐ Strong wind

Precipitation:

- ☒ None
☐ Drizzle
☐ Light rain
☐ Heavy rain
☐ Downpour

Temperature:

- ☐ < 0°C
☐ 0 – 10°C
☒ 11–20°C
☐ 21–29°C
☐ 30°C +

Site Conditions: Air temp.:..... Ground temp.:... Relative humidity:..... Shade:.....%
(if thermometer held)

Weeds present Yes ☒ No ☐

If yes, identify where possible:

- ☒ Blackberry
☐ St John's Wort
☐ Sweet Briar

- ☐ Phalaris
☐ Willow
☐ Verbenum (purple top)

- ☐ Hawthorn
☐ Thistle
☐ Primrose

- ☐ Broom
☐ Pine
☒ Cotoneaster

Other Weeds / Notes: White Poplar in creekline

% weed invasion: up to 10% ☒ 10-25% ☐ 25-50% ☐ 50-75% ☐ >75% ☐

Attendant ant: Present ☐ Absent ☐

Survey method: Transect ☐ Area search ☒ Stationary ☒

Number of butterflies observed: None ☒ 1-5 ☐ 5-10 ☐ 10-30 ☐ 30-50 ☐ 50-100 ☐ >100 ☐

Other / exact number:

Butterfly behaviour: Flying ☐ Basking ☐ Breeding ☐ Feeding ☐ Fighting ☐

☐ Other behaviour (describe):

If feeding, identify (or describe) plants used:

Other insects present on *Bursaria*:

Other butterflies (describe): Vanekers, Zizilabr, Vaneitea, Belejavateut

Other observations at this site: White's Skink (in garden), Noisy Miner, Crinsign, Limntasm, Grey Butcherbird, Eastern Grey Kangaroos (10E), White-winged Chough, Sacred Kingfisher, Yellow-faced Honeyeater, Sulphur-crested Cockatoo, Crimson Rosella, Rufous Whistler, Grey Fantail, Australian Raven, Pied Currawong, Australian Magpie, White-throated Treecreeper, White-browed Scrubwren, Restless Flycatcher, Eastern Spinebill, Grey Currawong .

Follow up required? Yes ☒ No ☐ If yes, describe: Stage 2 / follow-up blackberry treatment.....

Purple Copper Larvae Survey Form

Observer(s)'s name(s): RM, CF, PE, BF

Contact: RM on [REDACTED]

Site: B14A

Date: 18/12/2015

Start time: 2200

Finish time: 2300

GPS co-ordinates:

Map Zone: 55

Map datum:

742885E 6249610N

Weather conditions

Cloud cover:

- ☐ None
☒ Up to 25%
☐ 26 – 50%
☐ 51 – 80%
☐ Overcast

Wind:

- ☒ None
☐ Light breeze
☐ Light wind
☐ Steady wind
☐ Strong wind

Precipitation:

- ☒ None
☐ Drizzle
☐ Light rain
☐ Heavy rain
☐ Downpour

Temperature:

- ☐ < 0°C
☐ 0 – 10°C
☒ 11-20°C
☐ 21-29°C
☐ 30°C +

Site Conditions: Air temp:..... Ground temp:..... Relative humidity:..... (if thermometer held)

Moon phase: No Moon ☐ ¼ wax ☒ ¼ wane ☐ ½ wax ☐ ½ wane ☐ ¾ wax ☐ ¾ wane ☐ Full ☐

Dominant ground cover: Leaf litter ☐ Grasses & herbs ☒ Timber ☐ Stones & pebbles ☐

% BSL stems choked by weeds: up to 10% ☒ 10-25% ☐ 25-50% ☐ 50-75% ☐ >75% ☐

Attendant ant: Present ☒ only a few found patrolling Absent ☐

Survey method: Transect ☐ Area search ☒ Systematic scrutiny of all BSL on site ☐

Caterpillars observed: None ☒ 1-5 ☐ 5-10 ☐ 10-30 ☐ 30-50 ☐ 50-100 ☐ >100 ☐

Exact number:

Other insects present on *Bursaria*: Dragonfly, Huntsman, Cockroach

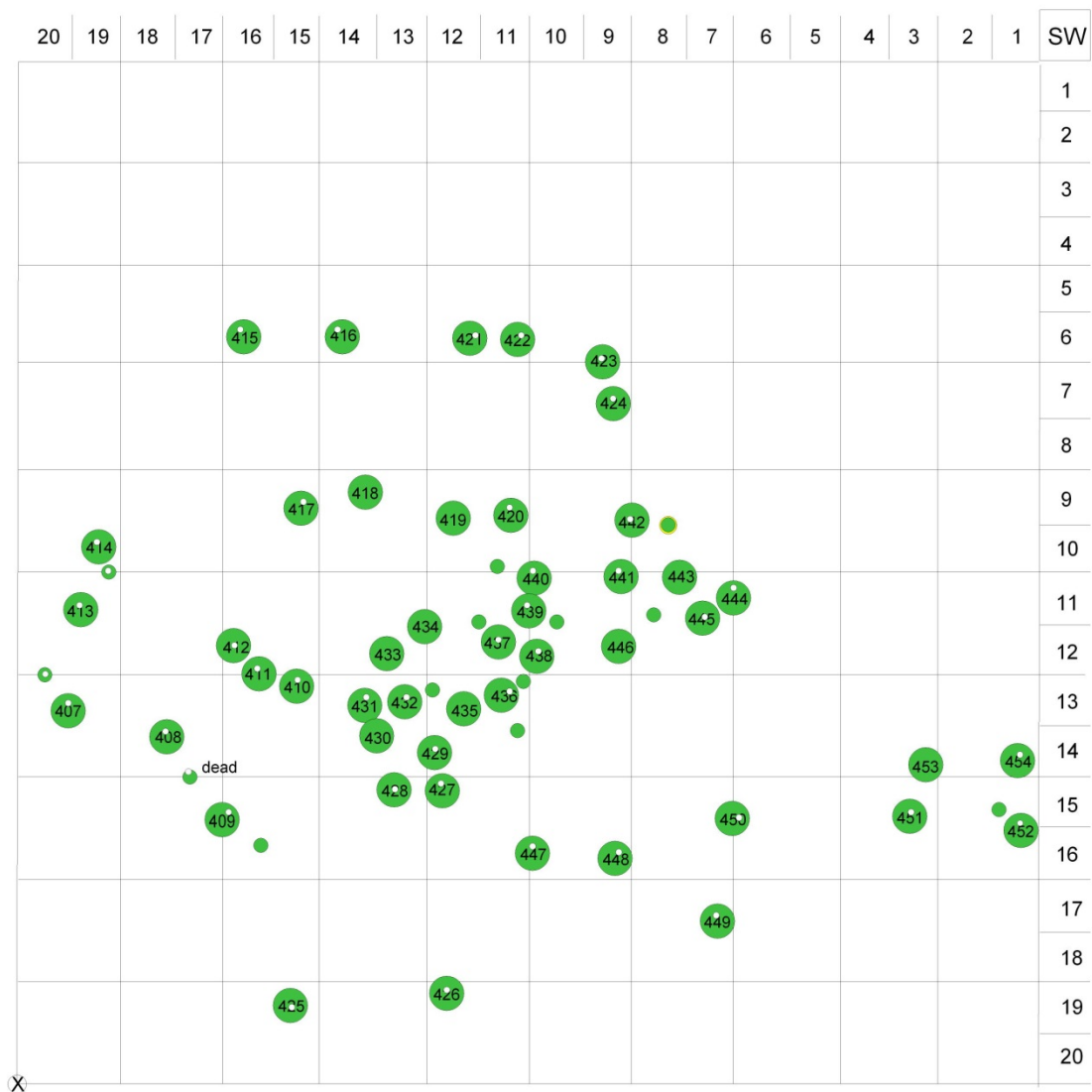
Other observations at this site: Barking Owl (calls), *Litopero*, *Limntasm*, *Uperlaev*, Frogmouth (calls)

Drive to site: Eastern Grey Kangaroo (Mt Rockley), Red-necked Wallaby (south of Mt David), Eastern Grey Kangaroo (south of Rockley), Wombat (Mt David Rd), Fox (1 cub Gilmandyke; 1 cub Loch Erin Rd)

Follow up required? Yes ☒ No ☐ If yes, describe: Confirm population status

.....
.....
.....

B14A



White dots indicate that the bush was positively identified, either by finding the brass tag on the plant, or by the plant being found to be spatially correct in relation to a located tag; all white-dot plants were systematically scanned for ants / caterpillars between 2200-2300.

No caterpillars were located.

Purple Copper Larvae Survey Form

Observer(s)'s name(s): RM

Contact: RM on

Site: B14B

Date: 9/1/2016

Start time: 2200

Finish time: 0100

GPS co-ordinates:

Map Zone: 55

Map datum:

742885E 6249610N

Weather conditions

Cloud cover:

- ☐ None
☐ Up to 25%
☐ 26 – 50%
☐ 51 – 80%
☐ Overcast

Wind:

- ☐ None
☐ Light breeze
☐ Light wind
☐ Steady wind
☐ Strong wind

Precipitation:

- ☐ None
☐ Drizzle
☐ Light rain
☐ Heavy rain
☐ Downpour

Temperature:

- ☐ < 0°C
☐ 0 – 10°C
☐ 11-20°C
☐ 21-29°C
☐ 30°C +

Site Conditions: Air temp:..... Ground temp:..... Relative humidity:..... (if thermometer held)

Moon phase: No Moon ☐ ¼ wax ☐ ¼ wane ☐ ½ wax ☒ ½ wane ☐ ¾ wax ☐ ¾ wane ☐ Full ☐

Dominant ground cover: Leaf litter ☐ Grasses & herbs ☒ Timber ☐ Stones & pebbles ☒

% BSL stems choked by weeds: up to 10% ☒ 10-25% ☐ 25-50% ☐ 50-75% ☐ >75% ☐

Attendant ant: Present ☒ only a few found patrolling Absent ☐

Survey method: Transect ☐ Area search ☒ Systematic scrutiny of all BSL on site ☐

Caterpillars observed: None ☒ 1-5 ☐ 5-10 ☐ 10-30 ☐ 30-50 ☐ 50-100 ☐ >100 ☐

Exact number:

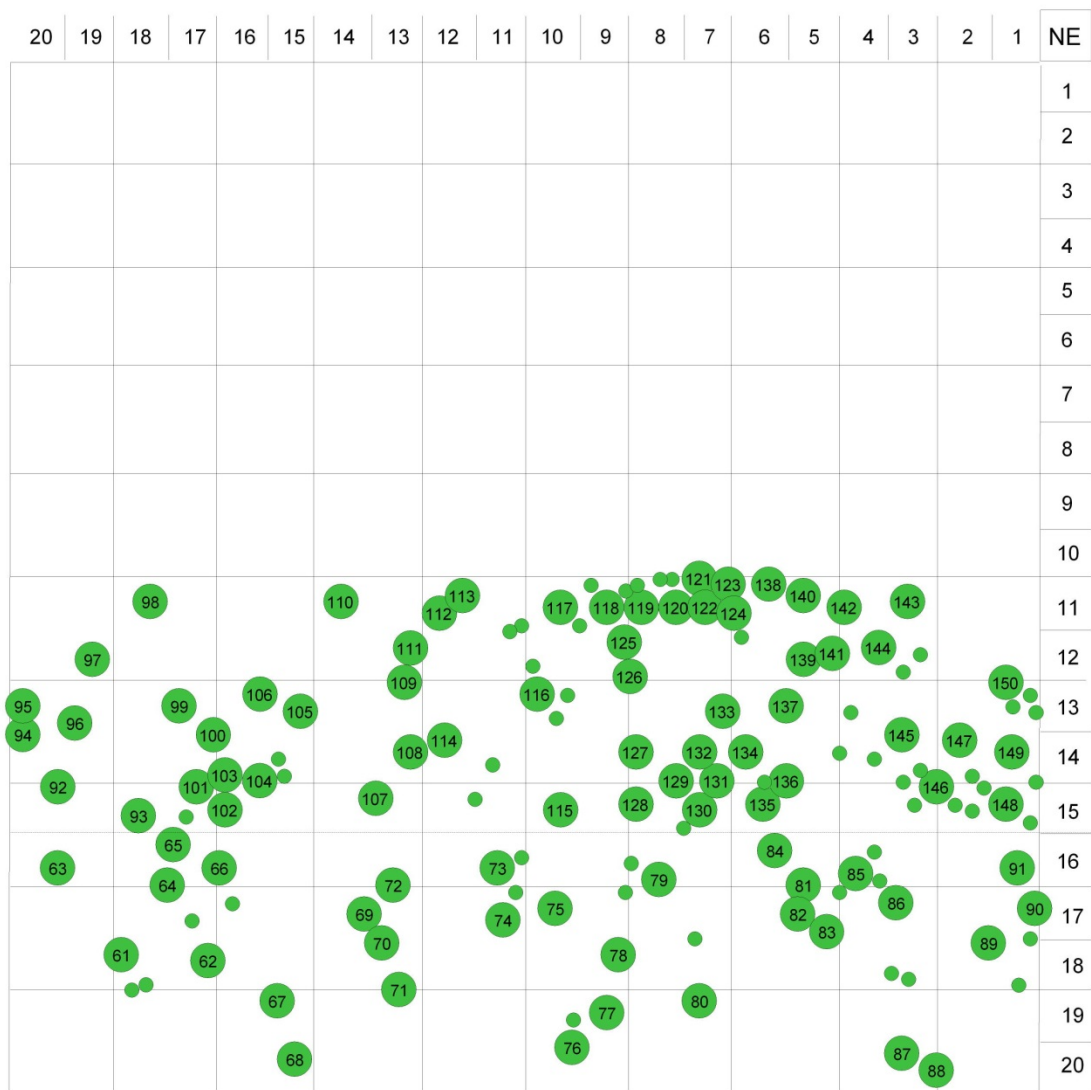
Other insects present on *Bursaria*: Grasshopper, Huntsman

Other observations at this site: Wombat, Eastern Grey Kangaroo (2), Frogmouth (calls),
Limndume, Boobook (calls)

Follow up required? Yes ☒ No ☐ If yes, describe: Confirm population status

.....
.....
.....

B14B



All marked plants were located and systematically scanned for ants and/or caterpillars on the night of 9th January 2016. No caterpillars were observed.