

Great Western Highway - Forty Bends

Purple Copper Butterfly

Paralucia spinifera



2017-2018 Post-Construction Monitoring Report



M J A D W E S C H
ENVIRONMENTAL
SERVICE SUPPORT

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Signed:

Date: 12th February 2019



Raymond Mjadwesch (BAppSc – Env Tech)

Mjadwesch Environmental Service Support

26 Keppel Street
BATHURST NSW 2795

m: 0423 949 789
email: ray@mjadweschenvironmental.com.au

ABN: 72 878 295 925

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Lachlan Manning and his colleagues from the Australian Museum assisted with nocturnal survey of the offset site (Donaldsons / L20) on 7th January 2018; their assistance finding caterpillars was invaluable.

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

Introduction

Occupied Purple Copper Butterfly habitat along the Forty Bends Realignment of the Great Western Highway and the ecology and behaviour of the Purple Copper Butterfly was described in Mjadwesch (2012); Mjadwesch (2013) detailed the same for the Fern Hill section of the realignment. Management / operational procedures to minimise impacts on the threatened butterfly within and adjacent to the construction area were provided by GHD (2013) and NGH (2014). Locations of the occupied habitat areas are indicated in Figure 1; grid coordinates for each site are included as Table 1.

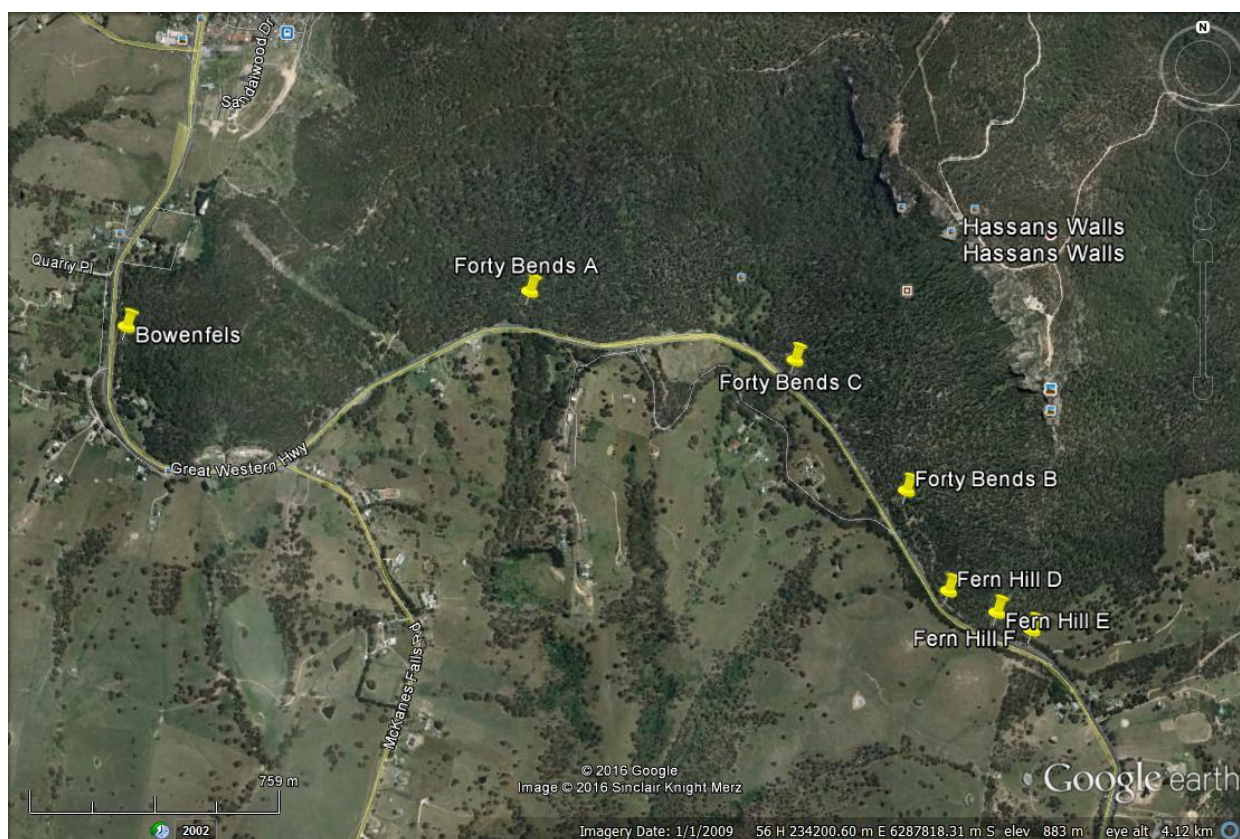


Figure 1. Location of Purple Copper Butterfly sites at Forty Bends

Table 1. Forty Bends / Fern Hill Purple Copper Butterfly Sites

Designation	Site Name	EASTING	NORTHING
L19(A)	Forty Bends A	233882	6288167
L19(B)	Forty Bends B	235016	6287612
L19(C)	Forty Bends C	234703	6287969
L19(D)	Fern Hill D	235150	6287318
L19(E)	Fern Hill E	235292	6287260
L19(F)	Fern Hill F	235397	6287211

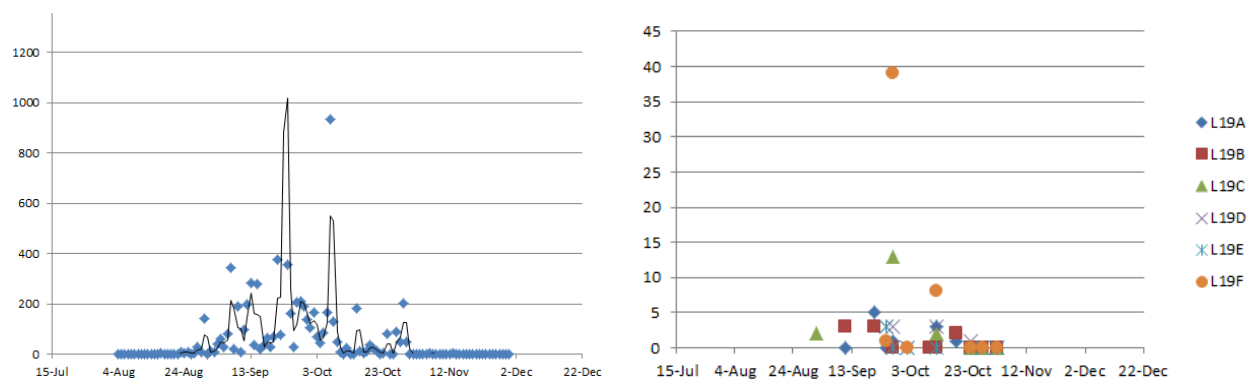
In addition a conservation offset property was identified near to the construction envelope, being referred to as L20. Donaldsons (E235529 N6287273). Annual monitoring of the offset site is required as part of the post-construction monitoring program.

Post-Construction Monitoring

Seymour Whyte Constructions were contracted to deliver the Great Western Highway MV2L safety upgrade, with works completed in 2017; Mjadwesch (2016) describes the known butterfly sites and impacts of the works program. Subsequently monitoring of (amongst other things) the Purple Copper Butterfly sites fell to the RMS; the RMS commissioned a monitoring program to quantify outcomes for the threatened butterfly; this report is the first monitoring report in this series, covering the years 2017 and 2018. A final monitoring report will be produced for monitoring in the 2019 flying / active period.

Methodology

Butterfly survey targeted each site under optimal conditions (sunny days) during the flying season (September – October), with site daytime butterfly inspections conducted between 1000 – 1500 hrs, and with nocturnal survey (January 2018) between 2200 – 2400 hrs.



Observations for the species define a flying period from late August – early November

Daytime inspections of known active sites included area searches of the entire known occupied area, and periods of observation. All butterflies observed were counted, and their locations were noted on site maps. The nocturnal survey of the offset site (L20) targeted the main site systematically (all plants inspected in an area ~20m radius), with opportunistic observations of plants across the wider site.

Data sheets from monitoring sessions are attached as Appendix 1.

Results

2017 Monitoring Period

12 October 2017	Bowenfels (spot check)	<i>P. aurifer</i>
	Forty Bends A	<i>P. spinifera</i> (3)
	Forty Bends B	Nil observed
	Forty Bends C	<i>P. spinifera</i> (2)
	Fern Hill D	<i>P. spinifera</i> (3)
	Fern Hill E	Nil observed
	Fern Hill F	<i>P. spinifera</i> (8)
	L20 (Donaldsons)	Nil observed



Forty Bends A: 12.10.2017 Purple Copper Butterfly observations



Forty Bends C: 12.10.2017 Purple Copper Butterfly observations

27 September 2018	Forty Bends A	<i>P. spinifera</i> (1)
	Forty Bends B	Nil observed
	Forty Bends C	<i>P. spinifera</i> (13)
	Fern Hill D	<i>P. spinifera</i> (3) + <i>P. aurifer</i>
	Fern Hill E	Nil observed
	Fern Hill F	<i>P. spinifera</i> (39)
	L20 (Donaldsons)	<i>P. spinifera</i> (3)



Forty Bends A: 27.9.2018 Purple Copper Butterfly observations



Forty Bends C: 27.9.2018 Purple Copper Butterfly observations



Fern Hill D & F: 27.9.2018 Purple Copper Butterfly observations



L20, Donaldsons: 27.9.2018 Purple Copper Butterfly observations

28 October 2018	Forty Bends A	Nil observed
	Forty Bends B	Nil observed
	Forty Bends C	Nil observed
	Fern Hill D	Nil observed
	Fern Hill E	Nil observed
	Fern Hill F	Nil observed
	L20 (Donaldsons)	Nil observed

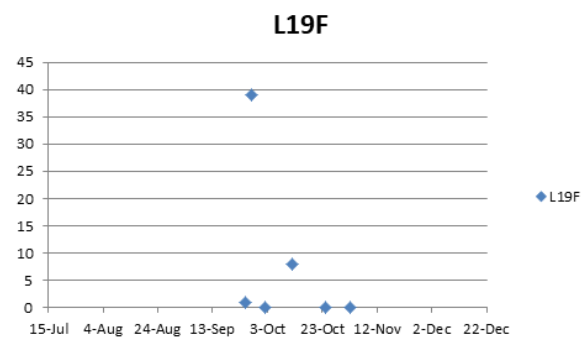
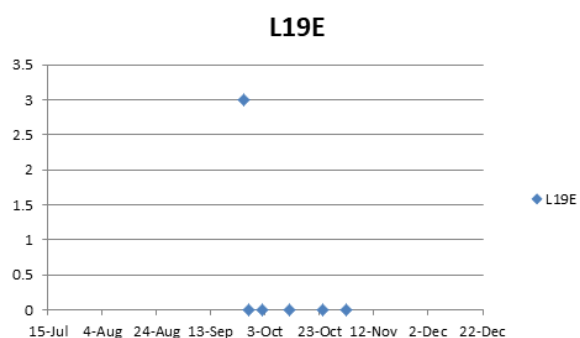
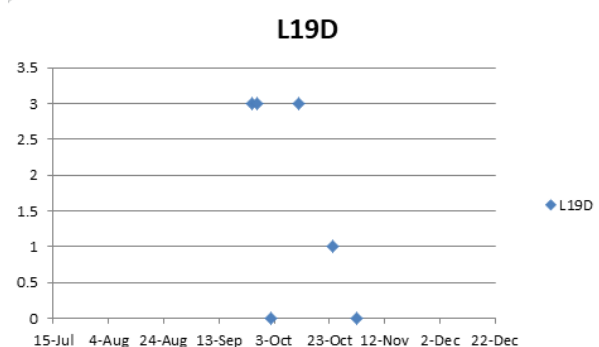
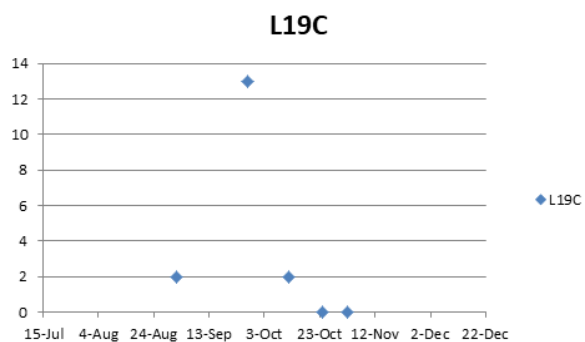
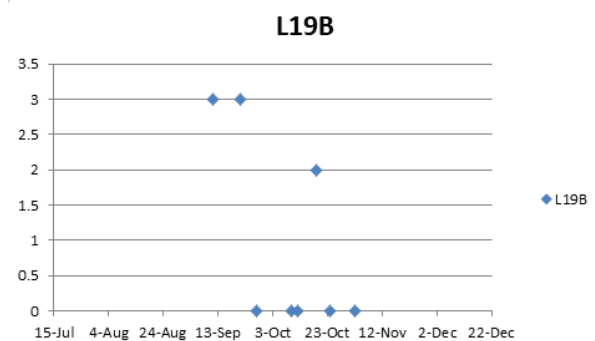
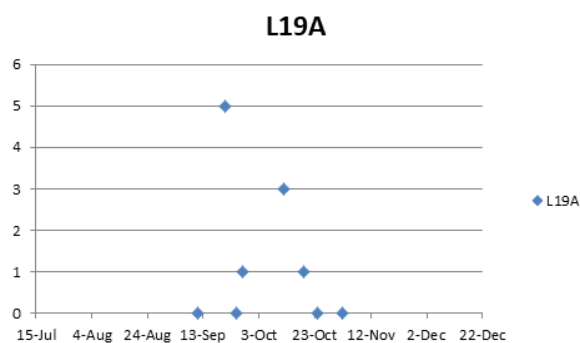
Discussion

Commissioning of the monitoring program in 2017 was very late in the season, and not all sites remained active by mid-October, with inclement weather bringing the season to an early conclusion. Consistently cloudy and rainy weather between 4-19 October in 2018 again ended the flying season prematurely, with no Purple Copper Butterfly observations on 28 October.

Surveys earlier in the season provide that identified butterfly sites and the offset site remain active in the post construction period, with confirmed observations of butterflies at most locations; there were no butterflies observed at Forty Bends B, which seems to be an “early” site.

There have not been any observations of the species at Fern Hill E, subsequent to the observation there in 2014. Like the Type locality at Yetholme, Fern Hill E may be active intermittently, being dependant on seasonal conditions, or requiring dispersal of individuals across the wider habitat area, which is extensive between Fern Hill D and Fern Hill F.

Sites at Forty bends / Fern Hill have been inspected enough times now to produce graphs of observations across the flying season, which seem to define an early finishing date in the Forty Bends / Fern Hill area; inspections in the earlier part of the season (late August and early to mid September) have been infrequent.



L20. (the offset site) continues to return observations; with scattered observations over time the majority of the site appears to provide habitat which supports a low-density population across a wide area. Patch burning could improve sections of habitat so that more high-density populations could be established locally (results from a burning program for the LLS is *in prep*).

Recommendations

Survey in 2019 should target early to mid-September and early October, rather than being conducted later in the season (after mid-October). Lack of recent observations at Forty Bends B and Fern Hill E may be a consequence of infrequent survey in the first half of the flying season, as sites may finish “early” or may have a very short active period, where populations consist of few individuals.

Conclusion

Good numbers at Forty Bends C and Fern Hill F in 2018 illustrate the widely variable returns that come from butterfly (imago) counts; the peak in activity, where dozens of butterflies may be active, can be ephemeral. It does not appear to be the case that construction works had any discernible impact on the Purple Copper Butterfly; a final report in 2019 will conclude the post-construction phase of this threatened species monitoring program.

Bibliography / References

GHD 2013 *Great Western Highway Upgrade (Forty Bends to River Lett Hill) Purple Copper Butterfly Management Plan* unpublished report to RMS

GHD 2013 *Great Western Highway (Forty Bends Safety Upgrade) Purple Copper Butterfly EPBCA Act Offset Strategy* unpublished report to RMS

Mjadwesch R 2012 *Purple Copper Butterfly Survey Report – Great Western Highway: Mt Victoria to Lithgow Realignment* unpublished report to SKM

Mjadwesch R 2013 *Purple Copper Butterfly: Forty Bends - River Lett - Hartley Offset Assessment* unpublished report to RMS

Mjadwesch R 2015 *Great Western Highway: Fern Hill Purple Copper Butterfly Management Program* unpublished report to RMS

NGH 2014 *Review of Environmental Factors: Great Western Highway – Fern Hill* unpublished report to RMS

NPWS 2001 *Environmental Impact Assessment Guidelines – Purple Copper Butterfly*
OEH Hurstville

APPENDIX 1: Data Sheets

Purple Copper Butterfly Survey Form

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

Contact: Ray on 02 6331 5858

Site: L19. Forty Bends / Fern Hill **Date:** 12.10.2017 **Start time:** 1300 **Finish time:** 1430

GPS co-ordinates: Map Zone: 56 Map datum:

A 233882 6288167; B 235016 6287612; D 235150 6287318; E 235292 6287260; F 235397 6287211

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 night before
☐ 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 ☐ 50-100 ☐ >100 ☐

Other / exact number: A = 3; C = 2; D = 3; F = 8

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

☐ Other behaviour (describe).....

If feeding, identify (or describe) plants used:

.....

Other insects present on *Bursaria*: Robber Fly; Bullants

Other butterflies (describe): *Hetemero*, *Paraauri*, skipper

Other observations at this site:

Follow up required? Yes ☒ No ☐ If yes, describe: Ongoing monitoring required.

Purple Copper Butterfly Survey Form

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

Contact: Ray on 02 6331 5858

Site: L20. Donaldsons **Date:** 12.10.2017 **Start time:** 1430 **Finish time:** 1500

GPS co-ordinates: E235529 N6287273 **Map Zone:** 56 **Map datum:**

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 night before
☐ 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:

% 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, Paraaauri

Other observations at this site:

Follow up required? Yes ☒ No ☐ If yes, describe: Ongoing monitoring required.

Purple Copper Butterfly Survey Form

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

Contact: Ray on 02 6331 5858

Site: L19. Forty Bends / Fern Hill **Date:** 24.10.2017 **Start time:** 1300 **Finish time:** 1430

GPS co-ordinates: Map Zone: 56 Map datum:

A 233882 6288167; B 235016 6287612; D 235150 6287318; E 235292 6287260; F 235397 6287211

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 night before
☐ 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 ☐ 50-100 ☐ >100 ☐

Other / exact number: D = 1

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:

Follow up required? Yes ☒ No ☐ If yes, describe: Ongoing monitoring required.

Purple Copper Butterfly Survey Form

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

Contact: Ray on 02 6331 5858

Site: L20. Donaldsons **Date:** 24.10.2017 **Start time:** 1430 **Finish time:** 1500

GPS co-ordinates: E235529 N6287273 **Map Zone:** 56 **Map datum:**

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 night before
☐ 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:

% 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:

Follow up required? Yes ☒ No ☐ If yes, describe: Ongoing monitoring required.

Purple Copper Larvae Survey Form

Observer(s)'s name(s): RM, LM, & Museum staff

Contact: RM on 0423 949 789

Site: L20

Date: 7/1/2018

Start time: 2200

Finish time: 2300

GPS co-ordinates:

Map Zone:

Map datum:

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 (19 meas.)
☐ 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*:

Other observations: 1 caterpillar also observed in the adjacent L19F site

Follow up required? Yes ☒ No ☐ **If yes, describe:** ongoing monitoring.

Purple Copper Butterfly Survey Form

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

Contact: Ray on 02 6331 5858

Site: L19. Forty Bends / Fern Hill **Date:** 27.9.2018 **Start time:** 1100 **Finish time:** 1250

GPS co-ordinates: Map **Zone:** 56 **Map datum:**

A 233882 6288167; B 235016 6287612; D 235150 6287318; E 235292 6287260; F 235397 6287211

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 night before
☐ 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 ☐ 50-100 ☐ >100 ☐

Other / exact number: A = 1; C = 13; D = 3; F = 39

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

☐ Other behaviour (describe).....

If feeding, identify (or describe) plants used:

.....

Other insects present on *Bursaria*: Beefly, Blowfly, Hover Fly, Wasps, *Crematogaster spp.*, Dragonfly,

Other butterflies (describe): *P. aurifer*

Other observations at this site: *Cymbalaws* and *Hardviol* flowering, Gang-gangs calling at Fern Hill F

Follow up required? Yes ☒ No ☐ If yes, describe: Ongoing monitoring required.

Purple Copper Butterfly Survey Form

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

Contact: Ray on 02 6331 5858

Site: L20. Donaldsons **Date:** 27.9.2018 **Start time:** 1250 **Finish time:** 1320

GPS co-ordinates: E235529 N6287273 **Map Zone:** 56 **Map datum:**

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 night before
☐ 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:

% 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: 3

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:

Follow up required? Yes ☒ No ☐ If yes, describe: Ongoing monitoring required.

Purple Copper Butterfly Survey Form

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

Contact: Ray on 02 6331 5858

Site: L19. Forty Bends / Fern Hill **Date:** 28.10.2018 **Start time:** 1200 **Finish time:** 1330

GPS co-ordinates: Map Zone: 56 Map datum:

A 233882 6288167; B 235016 6287612; D 235150 6287318; E 235292 6287260; F 235397 6287211

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 night before
☐ 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 ☐ 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:

Follow up required? Yes ☒ No ☐ If yes, describe: Ongoing monitoring required.

Purple Copper Butterfly Survey Form

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

Contact: Ray on 02 6331 5858

Site: L20. Donaldsons **Date:** 28.10.2018 **Start time:** 1330 **Finish time:** 1420

GPS co-ordinates: E235529 N6287273 **Map Zone:** 56 **Map datum:**

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 night before
☐ 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:

% 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): *Junovill*, *Vaneitea*

Other observations at this site:

Follow up required? Yes ☒ No ☐ If yes, describe: Ongoing monitoring required.