Conservation of the Arid Bronze Azure Butterfly (*Ogyris subterrestris petrina*) and host sugar ant (*Camponotus terebrans*)

Survey results from *Camponotus terebrans* sites GIM 01, GIM 03, GIM 09, GIM 10, GIM 11, GIM 13, GIM 14, GIM 51, GIM 63, GIM 66, and GIM 68 south of Southern Cross (2014), and from *C. terebrans* site east of Merredin.

Summary Report

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GOVERNMENT OF WESTERN AUSTRALIA

Department of **Biodiversity, Conservation and Attractions**

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Cover photo: Matthew Williams (left), Andrew Williams (right) and Rebecca Coppen (seated) at the pictorial sign of the endangered Arid Bronze Azure Butterfly, Barbalin Nature Reserve, Mukinbudin

(Photo: Tim Gamblin)

We acknowledge with gratitude the long-term contribution of the Mukinbudin Conservation Group in caring for and promoting the critically endangered Arid Bronze Azure Butterfly at Barbalin Nature Reserve, Mukinbudin.

Introduction

In 2005 the status of the critically endangered Arid Bronze Azure Butterfly *Ogyris subterrestris petrina* Field 1999 (Figure 1) was a matter of concern for Departmental conservation scientists given that the only known population from near Kalgoorlie had recently become extinct (Williams and Williams 2005). However, a new population was subsequently located by Geoff Walker at Barbalin Nature Reserve in 2006 (Ref: 3♂ and 2♀ specimens, label data WA, Barbalin Nature Reserve, Mukinbudin, 20th October 2006, Coll. A.A.E. Williams, in DBCA Lepidoptera Reference Collection).

Figure 1: Freshly emerged female Arid Bronze Azure Butterfly *Ogyris subterrestris petrina*

Photo: Andrew Williams

Reports by Williams *et al*. (2008) and Williams & Williams (2008) identified two major threats to the *O. s. petrina* population at Barbalin Nature Reserve: one being road-kills of butterflies by vehicles travelling through the reserve, the other a proposal to clear roadside vegetation through a crucial area of butterfly habitat. This dual problem was resolved by realigning the main road from within the nature reserve to outside the northern boundary. Another report (Gamblin *et al.* 2009) summarised baseline data for the 'pale form' of the ant *Camponotus terebrans*, which has a symbiotic relationship with the larval stages of the butterfly (Figure 2). This report recommended "*targeted surveys for known populations of the pale form of C. terebrans in WA* (from vouchered specimens)" and noted that "*translocations of the ant and / or butterfly from Barbalin Nature Reserve might be a future translocation strategy*". We therefore undertook to examine sites where the host ant had previously been recorded in the eastern WA Wheatbelt and semi-arid zone. Some previously-documented *C. terebrans* location and habitat information (A.A.E. Williams 2014 unpublished report data) is presented here, along with additional habitat photographs and a "*Google Earth*" site location map (Figure 3). Data from a recent survey of "dark form" *C. terebrans* ants in bushland east of Merredin is also presented.

Figure 2: Mature larva of Arid Bronze Azure Butterfly tended by pale form *Camponotus terebrans* ant

Photo: Andrew Williams

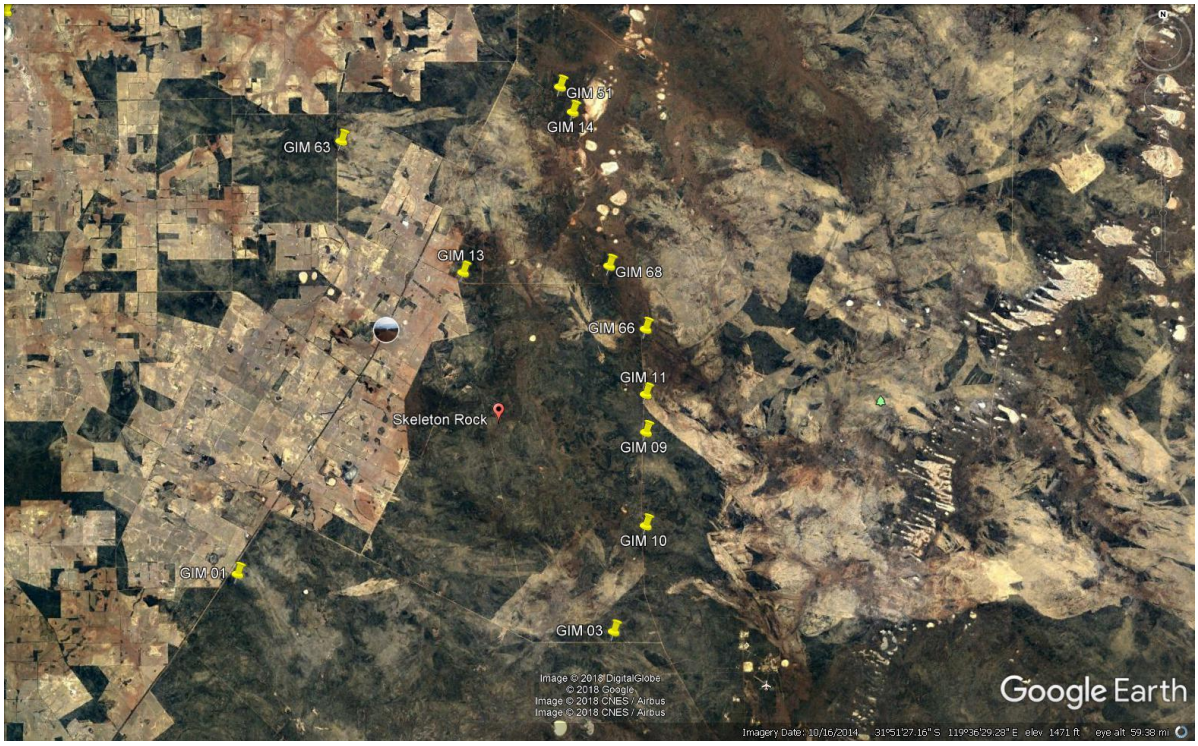

Figure 3: "*Google Earth"* view of gimlet (GIM) sites south of Southern Cross where surveys were conducted for (pale form) *Camponotus terebrans* ants in October and November 2014

Methods

1. In October and November 2014, two visits were made to the Yilgarn district south of Southern Cross where the pale "Goldfields form" of *C. terebrans* ants had previously been recorded. The site locations GIM 01, GIM 03, GIM 09, GIM 10, GIM 11, GIM 13, GIM 14, GIM 51, GIM 63, GIM 66 and GIM 68 were plotted on Google Earth photographs, and then located on the ground using a Garmin GPS 76 navigation device. In most instances the sample site's original flagged metal fence dropper was found. Habitat photographs were taken at each site, and searches conducted looking for ants at the bases of suitable *Eucalyptus* spp. and other trees within 100 metres of the central point. The information recorded included the site #, date, location, habitat details, soil type, weather conditions and findings (i.e. presence / absence of *C. terebrans* ants). The 2014 surveys were undertaken in October and November as this is the peak spring flying time for *O. s. petrina*. Voucher specimens of pale form *C. terebrans* ants from site GIM 13 were collected and preserved in ethanol for morphological study and further genetic analysis.

2. In May 2018 an area of bushland immediately east of Merredin was briefly surveyed to determine the significance of a population of "dark form" *Camponotus terebrans* ants in *Eucalyptus* mallee woodland between the Great Eastern Highway and the Merredin Rifle Club firing range. The root bases of ribbon-bark mallees and other smooth-barked *Eucalyptus* sp. trees were examined for *C. terebrans* ants. The locations were entered on a Garmin *E-trex* GPS, with habitat and other details being recorded in a field notebook. Voucher specimens of this "dark form" *C. terebrans* ant were collected and preserved in ethanol for morphological study and genetic analysis.

Results

1. Detailed information for each site is presented. A result summary is given, followed by recommendations for future actions.

1.

Yilgarn District: GIM sites surveyed October and November 2014

SITE GIM 01: 50H 0711824; 6454145 (21 x *Camponotus terebrans* previously reported).

Date: 01 October 2014

Location: Newly fenced area, south-east of Emu Fence Road.

Habitat: Extensive area of dense spindly gimlet woodland, with ~ 95% leaf litter cover on the ground below the trees.

Soil: Grey-brown sandy loam

Findings: *Camponotus terebrans* NOT located. Searches conducted at bases of many spindly Gimlet trees within 100 metre radius of the original site. The only ants located were two *Iridomyrmex purpureus* (meat ants)

Weather: Warm and sunny, very light breeze.

Note: *Camponotus trerebrans* ants were located at the base of two trees on the northern side of Emu Fence Road, in a small patch of Salmon Gum / Gimlet woodland opposite GIM 01. This small isolated patch of roadside vegetation is surrounded by cleared farmland.

Habitat: GIM SITE # 01

SITE GIM 03: 50H 0747155; 6447629 (1 x *Camponotus terebrans* previously reported).

Date: 12 November 2014

Location: North side of King Ingram Road. Location marker metal dropper with faded pink flagging tape located.

Habitat: Single stem gimlets and other eucalypt species open woodland 8-10 metres tall, average DBH 30-70mm, over dense *Melaleuca* sp under storey 1.5-2.0 metres tall. Little ground cover.

Soil: Grey-brown clay.

Findings: *Camponotus terebrans* NOT located. Searches conducted at bases of likely trees within 100 metre radius of the original site.

Weather: Overcast, warm hazy sunny periods

Habitat: GIM SITE # 03

SITE GIM 09: 50J 0750556; 6465872 (4 x *Camponotus terebrans* previously reported).

Date: 12 November 2014

Location: East of Forrestania – Marvel Loch Road – Jilbadji Nature Reserve. Location marker metal dropper with faded pink flagging tape located.

Habitat: Uniform slender-stemmed gimlet woodland 7-8 metres tall, average DBH 50-100mm. Dense *Melaleuca* shrub understorey 1-1.5 metres tall. Ground cover nil.

Soil: Grey-brown clay.

Findings: *Camponotus terebrans* NOT located. Searches conducted at bases of likely trees within 100 metre radius of the original site.

Weather: Overcast, warm hazy sunny periods

Habitat: GIM SITE # 09

SITE GIM 10: 50J 0750336; 6457290 (2 x *Camponotus terebrans* previously reported).

Date: 12 November 2014

Location: East of Forrestania – Marvel Loch Road, Jilbadji Nature Reserve. Location marker metal dropper with faded pink flagging tape located.

Habitat: Predominantly slender **s**ingle stem gimlet woodland, 8-10 metres tall, average DBH 50-150mm. Medium dense *Melaleuca* shrub understorey 1-2 metres tall.

Soil: Grey-brown clay.

Findings: *Camponotus terebrans* NOT located. Searches conducted at bases of likely trees within 100 metre radius of the original site.

Weather: Overcast, warm hazy sunny periods

Habitat: GIM SITE # 10

SITE GIM 11: 50J 0750618; 6469344 (9 x *Camponotus terebrans* previously reported).

Date: 12 November 2014

Location: West of Forrestania – Marvel Loch Road – south of Cheriton's Mine. Location marker metal dropper with faded pink flagging tape located.

Habitat: Scattered slender single stem gimlets and other eucalypts 8 metres tall, average DBH 30-100mm. *Melaleuca* dominated shrub understorey to 1.0 metres. The location marker is within the shrub-land (see photo).

Soil: Brown clay-loam.

Findings: *Camponotus terebrans* NOT located. Searches conducted at bases of likely trees within 100 metre radius of the original site.

Weather: Overcast, warm hazy sunny periods

Habitat: GIM SITE # 11

SITE GIM 13: 50J 0734203; 6480901 (377 x *Camponotus terebrans* previously recorded)

Date: 01 October 2014

Location: South side of Dunbar Road, an extensive area of *Eucalyptus* dominated woodland, recently fenced for vermin control.

Habitat: The habitat is mixed Salmon Gum / Gimlet and *Eucalyptus loxophleba* mallee woodland with a generally open understory. Some areas are subject to seasonal water flow.

Soil: Pinkish-brown sandy clay soils, similar to the soils at Barbalin Nature Reserve.

Findings: Examination at bases of *Eucalyptus* trees within a 100 metre radius of the original site confirmed pale form *C. terebrans* ants were widespread and common. A monitoring transect (Figure 4) was established on site. The leafhopper, *Pogonoscopus myrmex*, a species tended by *C. terebrans* ants at Barbalin Nature Reserve, (Gamblin *et al*. 2010), was also found in *C. terebrans* ant galleries at GIM 13 (Figure 5).

Weather: Warm to hot sunny conditions with some light wind.

Figure 4: GIM 13 Transect - Corner coordinates alongside

N	50J 0734050; 6481082
NE	50J 0734328; 6380940
SE	50J 0734328; 6480735
SW	50J 0733866; 6480735
NW	50J 0733834; 6480935

Figure 5: The leafhopper *Pogonoscopus myrmex*
Photo: Andrew Williams

Habitat: GIM SITE # 13

Habitat: GIM SITE # 13 – (Note vermin-proof perimeter fence – Dunbar Road boundary)

Camponotus terebrans ant locations on GIM 13 Transect

UTM Location	Tree species	Comments
50J 0734321; 6480910		*C. terebrans* ants
50J 0734316; 6480872		*C. terebrans* ants
50J 0734305; 6480843		*C. terebrans* ants
50J 0734315; 6480800		*C. terebrans* ants
50J 0734336; 6480776		*C. terebrans* ants
50J 0734328; 6480735		*C. terebrans* ants - collected
50J 0734286; 6480732		*C. terebrans* ants
50J 0734238; 6480731		*C. terebrans* ants - abundant
50J 0734219; 6480744		*C. terebrans* ants
50J 0734185; 6480744		*C. terebrans* ants
50J 0734122; 6480721		*C. terebrans* ants
50J 0734029; 6480752		*C. terebrans* ants
Winter wet area	Few *Eucalyptus* trees	No ants
50J 0733921; 6480726	Salmon Gum	*C. terebrans* ants
50J 0733891; 6480723	Large Gimlet	*C. terebrans* ants
50J 0733862; 6480871		*C. terebrans* ants
50J 0733847; 6480902	Gimlet	*C. terebrans* ants - numerous
50J 0733859; 6480944		*C. terebrans* ants
50J 0733902; 6480974		*C. terebrans* ants
50J 0733963; 6481004	Gimlet	*C. terebrans* ants - numerous
50J 0733979; 6481013	Salmon Gum	*C. terebrans* ants - numerous
50J 0734016; 6481056	Gimlet	*C. terebrans* ants
50J 0734042; 6481066	Salmon Gum	*C. terebrans* ants - numerous
50J 0734096; 6481052	Young Salmon Gum	*C. terebrans* ants
50J 0734129; 6481031	Salmon Gum	*C. terebrans* ants
50J 0734232; 6480982	Gimlet	*C. terebrans* ants
50J 0734275; 6480952	*Eucalyptus loxophleba*?	*C. terebrans* ants

Camponotus terebrans ant locations opposite GIM 13 (north side of Dunbar Road)

UTM Location	Tree species	Comments
50J 0733935; 6481067		*C. terebrans* ants
50J 0734131; 6481164		*C. terebrans* ants
50J 0734145; 6481135		*C. terebrans* ants
50J 0734147; 6481099		*C. terebrans* ants
50J 0734151; 6481081		*C. terebrans* ants

50J 0734341; 6480987		*C. terebrans* ants
50J 0734371; 6480996		*C. terebrans* ants
50J 0734390; 6480967		*C. terebrans* ants

SITE GIM 14: 50J 0744481; 6495454 (4 x *Camponotus terebrans* previously reported).

Date: 11 November 2014

Location: West of Forrestania – Marvel Loch Road – south of Parker Range Road. Location marker metal dropper with faded pink flagging tape located.

Habitat: Predominantly slender stem gimlet trees and mallees 8-10 metres tall over a patchy *Melaleuca* mid-storey 1.0 metre height. Understorey open - ground cover very sparse small shrubs.

Soil: Red clay-loam.

Findings: *Camponotus terebrans* NOT located. Searches conducted at bases of likely trees within 100 metre radius of the original site.

Weather: Hot humid sunny day

Habitat: GIM SITE # 14

SITE GIM 51: 50J 0743365; 6497793 (4 x *Camponotus terebrans* previously reported).

Date: 11 November 2014

Location: North of Parker Range Road. Location marker metal dropper with faded pink flagging tape located.

Habitat: Open eucalypt woodland and mallee with some slender gimlet saplings 8-11 metres over *Melaleuca* shrub mid-story 3-4 metres. Open understorey with few low shrubs.

Soil: Red-brown clay-loam.

Findings: *Camponotus terebrans* NOT located. Searches conducted at bases of likely trees within 100 metre radius of the original site.

Weather: Hot humid sunny day

Habitat: GIM SITE # 51

SITE GIM 63: 50J 0723066; 6493275 (1 x *Camponotus terebrans* previously reported).

Date: 11 / 12 November 2014

Location: East side of Panizza Road. Location marker metal dropper with faded pink flagging tape located.

Habitat: Narrow belt of eucalypts growing along a shallow drainage line. Original site habitat mature open woodland had been burnt a few years ago. Now supports medium dense regenerating eucalypt sapling 2-3 metres height average DBH 25mm. Understorey moderately dense mixed shrub layer 0.5 metres.

Soil: Brown clay-loam.

Findings: *Camponotus terebrans* NOT located. Searches conducted at bases of likely trees within 100 metre radius of the original site. Note: A very large *Camponotus*? sp. ant was collected at dusk on 11/11/2014 on a smooth-barked eucalypt in a nearby unburnt area – 50J 0722967; 6492926.

Weather: 12/11/2014 overcast, warm hazy sunny periods

Habitat: GIM SITE # 63

SITE GIM 66: 50J 0750744; 6475350 (12 x *Camponotus terebrans* previously reported).

Date: 12 November 2014

Location: East of Forrestania – Marvel Loch Road – south of Cheriton's Mine. Location marker metal dropper with faded pink flagging tape located.

Habitat: Clearly disturbed site. Evidence of mallee eucalypt trees being cut or pushed over. Regenerating eucalypts saplings 2-3 metres tall, moderately dense. Average DBH 20mm. Some sparse large emergent eucalypts in distance (200 - 300 metres away).

Soil: Red clay-loam, dark small gravel on surface.

Findings: *Camponotus terebrans* located. The ants were located at the bases of small eucalypt saplings along a 200 metre transect.

Weather: Overcast, warm hazy sunny periods

***Camponotus terebrans* observations:**

Location Coordinates	Sapling height	Diameter at Breast Height	*C. terebrans* ants
50 J 0750745; 6475350	3 metres	DBH – 20mm (ants)	Yes
50 J 0750742; 6475339	3 metres	DBH – 20mm (ants)	Yes
50 J 0750750; 6475350	3 metres	DBH – 15mm (ants)	Yes
50 J 0750756; 6475264	2.5 metres	DBH – 10mm (ants)	Yes

50 J 0750756; 6475264	2.5 metres	DBH – 10mm (ants)	Yes
50 J 0750755; 6475209	2 metres	DBH – 10mm (ants)	Yes
50 J 0750766; 6475235	3 metres	DBH – 15mm (ants)	Yes
50 J 0750780; 6475150	3 metres	DBH – 20mm (no ants)	No

Habitat: GIM SITE # 66

SITE GIM 68: 50J 0747522; 6481226 (3 x *Camponotus terebrans* previously reported).

Date: 11 November 2014

Location: East of Forrestania – Marvel Loch Road – north of Dunbar Road junction. Location marker metal dropper with faded pink flagging tape located.

Habitat: Mature open eucalypt woodland, gimlets and other species, over a patchy *Melaleuca* dominated mid storey 3-4 metres. Understorey open, with very sparse low shrubs. Habitat appears suitable for *C. terebrans* ants and *O. s. petrina* butterflies.

Soil: Brown clay-loam.

Findings: *Camponotus terebrans* NOT located. Searches conducted at bases of likely-looking trees within 100 metre radius of the original site.

Weather: Hot humid sunny day

Habitat: GIM SITE # 68

2.

Merredin: Camponotus terebrans survey 16 May 2018

SITE MERREDIN # 1 (*Camponotus terebrans* "dark form" ants previously reported).

Date: 16 May 2018

Location: 3.5 km east of Merredin along Great Eastern Highway, between the Railway line and the Merredin Rifle Club's firing range.

Habitat: Mixed mallee woodland over a generally open understory. Scented mat-rush *Lomandra effusa* was common.

Soil: Grey-brown sandy clay.

Findings: *Camponotus terebrans* "dark form" ants were located at the bases of numerous multi-stemmed mallee trees and single stemmed eucalypts. Searches were conducted within an area of mallee woodland and alongside the railway track. Trees were marked with pink flagging tape; locations M1 – M16 were plotted on a "*Google Earth"* photo (Figure 6).

Weather: Clear mild sunny day.

Figure 6: *"Google Earth"* view of bushland east of Merredin, between the railway line alongside Great Eastern Highway and the Merredin Rifle Club firing range. The yellow pin markers M 1 – M 16 identify locations where "dark form" *C. terebrans* ants were located under multi-stemmed mallee trees and other smooth-barked *Eucalyptus* trees.

Habitat: MERREDIN SITE # M 6 Ribbon-bark mallee woodland.

Habitat: MERREDIN SITE # M 9 Orange-barked mallee.

CONCLUSION

GIM sites surveyed October and November 2014

Results summary

1. Eleven GIM sites were surveyed for presence / absence of pale form *C. terebrans* ants in October and November 2014.

2. Ca*mponotus terebrans* pale form ants were NOT located at nine surveyed sites; GIM 01, GIM 03, GIM 09, GIM 10, GIM 11, GIM 14, GIM 51, GIM 63 and GIM 68.

3. Ca*mponotus terebrans* pale form ants were detected at two surveyed sites; GIM 13 and GIM 66.

4. GIM 13 supports a mega-colony of pale form *C. terebrans* ants. This site is similar to Barbalin Nature Reserve in appearance, with mature smooth-barked *Eucalyptus* woodland over a mainly open understory, on pinkish-brown sandy clay soils. Like Barbalin Nature Reserve, Site GIM 13 is subject to seasonal surface water flows. The *C. terebrans* ant galleries at GIM 13 contain the same sap-sucking leafhopper (*Pogonoscopus myrmex*), which are tended by *C. terebrans* ants at Barbalin Nature Reserve. The Arid Bronze Azure Butterfly *O. s. petrina* was not observed at the GIM 13 site on 1st October 2014.

5. GIM 66 supports pale form *C. terebrans* ants at a low density. A few ants were located at the bases of six *Eucalyptus* saplings. The site is severely degraded.

Recommendation - GIM 13

1. Further monitoring is required to verify whether or not *O. s. petrina* occurs at this site. We recommend that surveys for butterflies be undertaken in October or November 2018, and in March or April 2019.

2. Further investigation is required to determine the total area occupied by *C. terebrans* (and therefore potentially available for *O. s. petrina*) in the *Eucalyptus* woodlands round GIM 13.

3. If *O. s. petrina* is not present at GIM 13 or the surrounding area, then this appears to be an ideal site for a future butterfly translocation project.

Recommendation - GIM 66

1. The site be monitored opportunistically for signs of *O. s. petrina.*

Merredin site surveyed May 2018

Results summary

1. C*amponotus terebrans* "dark form" ants were located in large numbers in an area of mallee-dominated woodland between the Railway and the Merredin Rifle Club's firing range. The surveyed *C. terebrans* ant population is centred on this woodland and does not enter the adjacent heathland habitat.

2. Examination of "*Google Earth*" images indicate that similar-looking woodland may occur nearby. These areas have not been surveyed for "dark form" *C. terebrans* ants.

Recommendation – Merredin woodland

1. The unsurveyed *Eucalyptus* woodlands round Merredin should be surveyed for *C. terebrans* ants.

2. Wherever the "dark form" *C. terebrans* ants are found, searches should be undertaken for ant-dependent *Ogyris* sp. butterflies. The 'dark form' of *C. terebrans* is the host ant for *Ogyris idmo*, an endemic Western Australian species with a generally near-coastal distribution (Braby 2000). This butterfly, which is closely related to *O. s. petrina*, is only known from one semi-arid zone site near Wubin (King and Williams 2014).

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