

**SOUTHERN LINK ROAD (STAGE 3):  
S.38 ENVIRONMENTAL PROTECTION  
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**Attachment 5: Prendergast (2019)**

**City of Canning**

**ecoscape**



# Southern Link Road Native Bee Surveys

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Female *Lasioglossum* on *Goodenia pulchella*. Credit: Kit Prendergast

## Executive Summary

The City of Canning appointed Ecoscape to conduct investigations, including native bee surveys, at the Cannington Claypan where the proposed Southern Link Road is to be constructed. Kit Prendergast was appointed by Ecoscape on a short-term contract to conduct the bee investigations.

Cannington is historically known to be habitat for the only two native bee species in Australia that are listed as threatened on the EPBC Act list of threatened species - *Leioproctus (Andrenopsis) douglasiellus* (Colletidae) that has previously been collected from the site and *Neopasiphae simplicior* (Colletidae) that is known to at least historically occur in the vicinity; consequently, these species were the focus of survey efforts.

Seven surveys were conducted from late November to the end of February. Despite the host plant being present and flowering, and recording a diverse assemblage of native bees, no observations of either of the two target threatened species were made.

The survey identified 47 species and morphospecies of native bees, ranging from 4-32 species per survey. The survey effort and high species yields indicate that the survey effort was sufficient to identify if the target bees were present over the months that surveys were conducted.

Cannington Claypan provides valuable foraging and nesting habitat for a high diversity of native bees, including some that are locally uncommon and are currently undescribed.

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## 1.0 Introduction

The City of Canning appointed Ecoscape to conduct investigations, including native bee surveys, at the Cannington Claypan where the proposed Southern Link Road is to be constructed. Kit Prendergast was appointed by Ecoscape on a short-term contract to conduct the bee investigations.

The surveys were conducted to document the assemblage of native bees that occupied the Cannington Claypan site. A particular emphasis was placed on searching for two native bees that have been listed as critically endangered and threatened with extinction: *Leioproctus (Andrenopsis) douglasiellus* (Colletidae) and *Neopasiphae simplicior* (Colletidae) (Appendix 3 and Appendix 4, respectively).

This report outlines:

- Background on native bees and the target bee species
- Survey aims and objectives
- Methodology
- Survey results
- Discussion of results

### 1.1 Scope of Work

The scope of the work undertaken by Kit Prendergast, on behalf of Ecoscape, associated with the surveys included:

- Undertaking comprehensive native bee surveying across the Cannington Claypan site
- Searching for the two Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) bee species listed as threatened, one of which has historically been recorded from the site: *Leioproctus (Andrenopsis) douglasiellus* (Colletidae), and *Neopasiphae simplicior* (Colletidae) that has been recorded from the area although not specifically from the site
- Taxonomic identification of the specimens collected
- Documenting the results of the surveys in terms of the presence/absence of the target threatened species, and the species richness of the bee assemblages recorded during the surveys of Cannington Claypan.

### 1.2 Background

Bees are keystone pollinators and the ecosystem service of pollination they perform is vital to the persistence of plant populations, and thus the health and functioning of ecosystems, both natural and anthropogenic (Potts *et al.*, 2016). Urban expansion is recognised as a key threat to the abundance, diversity, and functional integrity of native bee assemblages (Cane, Johnson, & Klemens, 2005). In particular, loss and fragmentation of native vegetation has a detrimental impact on native bees (Prendergast, thesis, *in prep.*, Brown & Paxton, 2009). In Australia, many native bees have co-evolved with the native flowers, such that they are reliant upon native flowering resources in remnant vegetation in urban areas and cannot simply switch to forage on introduced species (Prendergast, thesis, *in prep.*, Batley & Hogendoorn, 2009). Co-evolution also means that loss of either mutualistic partner can in turn cause the extinction of the other (e.g. Pauw, 2007). Australia has approximately 2,000 native bees, many of which are undescribed (Houston, 2018).

### 1.2.1 Listed Threatened Native Bee Species

*Leioproctus douglasiellus* is a native bee that is listed as critically endangered under the Commonwealth EPBC Act, and as endangered on the Department of Biodiversity, Conservation and Attractions' Threatened and Priority Fauna List under the *Biodiversity Conservation Act 2016* (Department of Biodiversity, Conservation and Attractions, 2019).

*L. douglasiellus* has been recorded from only three locations ranging from Cannington (this site) to Forrestdale during the 2006-2008 Department of Environment and Conservation's (DEC) Rare Native Bee Surveys (Adamson, 2008). It has a restricted geographic distribution (24.3 km<sup>2</sup>, with an area of occupancy of only 0.2 km<sup>2</sup>). Since the first surveys documenting this species in 1954, much of its suitable habitat has declined due to large swaths of the Swan Coastal Plain being significantly altered for urban development (Threatened Species Scientific Committee, 2013). Moreover, *L. douglasiellus* appears to be highly specialised to collect pollen only from Goodeniaceae, and specimens have only been collected on two plant species: *Goodenia pulchella* (misnamed as *G. filiformis* in the *Approved Conservation Advice*) and *Anthotium junciforme* (Adamson, 2008; Threatened Species Scientific Committee, 2013).

No recovery plan or threat abatement plan is in place to ensure the persistence of this species (Department of the Environment, 2018a), and despite its clear threatened status, monitoring of this species has not occurred following the DEC Rare Native Bee Survey.

*Neophasiphae simplicior* is also listed as critically endangered under the EPBC Act (Department of the Environment, 2018b; Threatened Species Scientific Committee, 2008), listed as endangered on the Department of Biodiversity, Conservation and Attractions' Threatened and Priority Fauna List under the *Biodiversity Conservation Act 2016* (Department of Biodiversity, Conservation and Attractions, 2019), and as endangered (under IUCN redlist criteria) by the Western Australian Government (Threatened Species Scientific Committee, 2008). *N. simplicior* has undergone major declines in its geographic distribution and is believed to be only be found at a single location within the Forrestdale Lake Nature Reserve, having an extent and area of occupancy of only 1 km<sup>2</sup>. It was previously known from the region of the proposed Southern Link Road development as the holotype was collected in Cannington (Walker, 2010). The only record of this species from Cannington was the 1954 holotype collection by Dr Terry Houston (Houston, 1994), although *NatureMap* (Department of Parks and Wildlife 2007-2019) indicates eight more recent collections from between Port Gregory and Cape Arid.

Clearing of bushland for residential and industrial development is considered to be a main threat to *N. simplicior* (Threatened Species Scientific Committee, 2008). *N. simplicior* has a limited number of flowering species that it visits, having been collected only from the perennial herbs Thread-leaved Goodenia *Goodenia pulchella* and *Velleia* sp. (Goodeniaceae), and the annual herbs Slender Lobelia *Lobelia tenuior* (Campanulaceae) and *Angianthus preissianus* (Asteraceae) (only males recorded on this species, and thus is unlikely to serve as a pollen source) (Houston, 2000).

As is the case for many invertebrate taxonomic groups, the conservation status of native bees is unknown as most have not been assessed nor subject to monitoring. These two species are the sole native bees listed as threatened in Australia. There are an estimated 2,000 Australian native bees (Australian Government Department of the Environment and Energy, 2018). Given the specialisation of many, their restricted distribution, and being subjected to habitat loss, fragmentation and

degradation (Batley & Hogendoorn, 2009), it is possible that other species may meet the criteria for listing, however, are currently considered to be data deficient.

The only known systematic survey of native bees in the Perth metropolitan region was conducted in 2016-18 by Kit Prendergast, as part of her PhD thesis (*in prep.*). Prendergast's surveys revealed an exceptionally high diversity of species present in the region, emphasising the conservation value of urban areas as habitat for native bees (Prendergast, 2018). In particular, bushland remnants, such as the Clayton Claypan (although not specifically included), were found to be significant for conserving the full suite of native bees, with a significantly greater abundance, species richness and diversity, and number of rare species occurring in bushland remnants compared with residential gardens (Prendergast, 2018).

Prendergast's comprehensive surveys for her PhD (Prendergast, thesis, *in prep.*) did not include the Cannington Claypan, with the closest sites geographically being Maniana Reserve in Queens Park, and a residential garden in Wilson. None of her PhD survey sites included claypan areas.

### 1.3 Cannington Claypan Site Description

The Cannington Claypan is a Conservation Category Wetland and Threatened Ecological Community (TEC) covering 6.71 ha. The *Shrublands and Woodlands on Muchea Limestone of the Swan Coastal Plain* TEC occupies 5.8 ha (Natural Area Holdings Pty Ltd, 2016), and is listed as endangered by the Department of the Environment under the EPBC Act (Department of the Environment, 2018c).

It is an important patch of remnant bushland embedded within an urban matrix, surrounded by the Western Power facility near Carousel Shopping Centre. A survey conducted in 2015 on the flora and fauna recorded 111 plant species (57 native and 54 introduced flora species were present) (Natural Area Holdings Pty Ltd, 2016). Although 42 invertebrates were recorded, none of these were bees, however this is likely due to inappropriate sampling.

## 2.0 Methodology

Surveys were conducted over late spring to summer 2018/19 in late November (23<sup>rd</sup>), late December (20<sup>th</sup>), in early, mid and late January (5<sup>th</sup>, 16<sup>th</sup> and 26<sup>th</sup>), and early and late February (5<sup>th</sup> and 23<sup>rd</sup>). Months of surveys were timed to coincide with the documented activity time of the target bee species (with *Leioproctus douglasiellus* having previously been recorded October-November, and how the host plants of *Neopasiphae simplicior* flower October-January (Adamson, 2008; Hollister & Thiele, 2018; Threatened Species Scientific Committee, 2008). Each survey commenced at approx. 1000h and ended at approx. 1500h.

Although the Southern Link Road extension is not proposed to go through the whole site as bees are mobile the whole site was surveyed.

The survey on 23 November 2018 was conducted by Kit Prendergast (PhD researcher, native bee expert), and Dr Rob Manning (honeybee expert). All other surveys were conducted by Kit Prendergast.

Both sweepnetting with an entomological sweepnet, and passive collections using bee bowls, were used to sample bees. Sweepnetting involved using the random walk method to collect native bees, with a focus on areas where host plants were. Bee bowls consisted of four types: fluorescent blue soufflé cups (10), fluorescent yellow soufflé cups (10), yellow party bowls (10) and yellow rectangular take-away containers (10). Each bowl was filled two-thirds with water, with a few drops of unscented detergent to reduce surface tension. Bowls were placed on the ground in open, bare patches not obscured by vegetation, with distances between bowls of at least 10 m. The bowls were set out at the start of the survey, and collected at the end of each survey day (approximately 5.5 hours).

Sampling methodology chosen was optimal for sampling native bees based on previous evaluations of methods by Prendergast (thesis, *in prep.*). Bowl colours chosen are those known to attract native bees (Prendergast, thesis, *in prep.*), and also correspond to the colours of the host plants of the target native bee species.



### 3.0 Native Bee Survey Results

#### 3.1. November 23<sup>rd</sup> 2018 Survey

##### Summary:

Despite extensive surveying across the whole site there were no observations or specimens of the target species, *Leioproctus douglasiellus* (Colletidae).

All observations of foraging native bees occurred on *Goodenia pulchella* (Goodeniaceae). The survey yielded a low species diversity. A total of 51 specimens were collected belonging to five species (Table 1). Except for the cuckoo bee, *Thyreus waroonensis*, all were collected whilst foraging. *T. waroonensis* was collected whilst traversing the ground, most likely looking for a nest of its host, bees in the genus *Amegilla*. An *Amegilla* species was observed but evaded capture.

Bees in the genus *Lasioglossum* were extremely abundant, with hundreds of individuals being recorded. Both male and females were present, and nesting activity of females was observed (this is a ground-nesting species).

No cavity-nesting species were observed, despite megachilids being a dominant component of the urban southwest Western Australia (SWWA) bee fauna (Prendergast, thesis, *in prep.*), and flora they have observed to visit (*Viminaria juncea* and *Goodenia pulchella*) being present at high abundances.

Honeybees were present at the site, and unlike the native bees, foraged on most flora present, including; *Viminaria juncea*, *Goodenia pulchella*, *Verticordia densiflora*, *Pimelea imbricata* var. *major*, *Beaufortia sparsa*, and *Astartea affinis*. Although also using the host plant of the native bees including the target species *Leioproctus douglasiellus*, this was not their main foraging resources, and only 39 honeybees were observed on *Goodenia pulchella* with the majority observed on *Astartea affinis*.

The presence of *Thyreus waroonensis* suggests that Cannington Claypan is home to a healthy population of the host, *Amegilla*. Indeed, parasitoid species have been advocated to be bioindicators for the health of a habitat (Anderson *et al.*, 2011).

**Weather conditions:** sunny weather, minimal cloud cover. Gentle wind, increasing from 1400 h. Temperature 20-25°C.

**Table 1. Native bee specimens collected 23<sup>rd</sup> November 2018**

Species	Family	Number
<i>Thyreus waroonensis</i>	Apidae	1
<i>Lasioglossum (Chilalictus) castor</i>	Halictidae	33
<i>Lasioglossum (Chilalictus) cf. bullatum</i>	Halictidae	2
<i>Lasioglossum (Chilalictus) cognatum</i>	Halictidae	12
<i>Lipotriches (Austronomia) flavoviridis</i>	Halictidae	2

Bee bowls yielded 7 native bees, as well as other invertebrates (Table 2).

**Table 2. Specimens caught in bee bowls on 23<sup>rd</sup> November 2018**

<b>Taxonomic group</b>	<b>Small UV- fluorescent yellow</b>	<b>Small UV- fluorescent blue</b>	<b>Large round yellow bowls</b>	<b>Large rectangular yellow trays</b>
Native bees	1	6	7	3
Honeybees			2	
Beetles	5		4	5
Orthoptera	1		3	4
Ants				5
Wasps			2	
Diptera			1	

### 3.2 December 20<sup>th</sup> 2018 Survey

#### Summary:

*Leioproctus douglasiellus* was not observed, nor was *Neopasiphae simplicior*. The host plant *Goodenia pulchella* was still blooming prolifically across the site. Thirty-two specimens comprising 13 species were collected (Table 3).

A higher species richness of native bees were observed in this survey than the November survey. The most common species was *Lasioglossum (Chilalictus) castor* which dominated the native bee fauna in November, however, this species was far less abundant than in November. Four *Thyreus waroonensis*, kleptoparasites of *Amegilla*, as well as two *Amegilla*, were observed, all foraging on *Goodenia*. The high numbers of *Thyreus*, which by virtue of their life-history strategy, are rare, indicates a healthy population present at this site, and of their host as well. Despite *Viminaria juncea* flowers being abundant in the previous November survey, no *Megachile* were observed - a taxon known to favour this genera. Interestingly, despite only a few plants remaining in flower, *Megachile* were observed foraging on them. *Megachile* were also observed foraging on *Goodenia*. Another new record was *Lasioglossum (Chilalictus) platytilum*, of which only a single individual was recorded, foraging on *Goodenia*. Although this species has a broad distribution, it is infrequently encountered in the Perth region: Prendergast has only recorded it once out of her 143 surveys, at Alison Baird Reserve, also foraging on *Goodenia*.

All native bee taxa were foraging on *Goodenia*, except for male *Homalictus*, which foraged on *Astartea affinis*, and *Megachile speluncarum*, foraging on *Viminaria juncea*. Honeybees were at low abundances (13 observed), with six foraging on *Goodenia*, one on *Verticordia densiflora*, four on *Beaufortia sparsa*, and two on *Astartea affinis*.

**Weather conditions:** 32°C, light breeze, hot and dry.

**Table 3. Native bee specimens collected 20<sup>th</sup> December 2018**

Species	Family	N
<i>Amegilla (Notomegilla) chlorocyanea</i>	Apidae	1
<i>Thyreus waroonensis</i>	Apidae	3
<i>Lasioglossum (Chilalictus) castor</i>	Halictidae	9
<i>Lasioglossum (Chilalictus) cf. bullatum</i>	Halictidae	1
<i>Lasioglossum (Chilalictus) cognatum</i>	Halictidae	8
<i>Lipotriches (Austronomia) flavoviridis</i>	Halictidae	2
<i>Lasioglossum (Chilalictus) platytilum</i>	Halictidae	1
<i>Lasioglossum (Chilalictus) sp. 29</i>	Halictidae	1
<i>Lasioglossum (Chilalictus) sp. 23</i>	Halictidae	1
<i>Megachile (Austrochile) remotula</i>	Megachilidae	1
<i>Megachile (Eutricharaea) obtusa</i>	Megachilidae	1
<i>Megachile apicata</i>	Megachilidae	1
<i>Megachile speluncarum</i>	Megachilidae	2

Bee bowls yielded only four native bees, as well as other invertebrates (Table 4).

**Table 4. Specimens caught in bee bowls 20<sup>th</sup> December 2018**

<b>Taxonomic group</b>	<b>Small UV- fluorescent yellow</b>	<b>Small UV- fluorescent blue</b>	<b>Large round yellow bowls</b>	<b>Large rectangular yellow trays</b>
Native bees		3 (halictids)		1 ( <i>Megachile</i> )
Beetles		2		1
Orthoptera				1
Ants			20	
Wasps				1
Hemiptera		1		

### 3.3 January 5<sup>th</sup> 2019 Survey

#### Summary:

*Leioproctus douglasiellus* and *Neopasiphae simplicior* were not observed. Thirty-three specimens belonging to seven species were collected (Table 5).

Both host plants of *L. douglasiellus* were present, including for the first time *Anthotium junciforme*. *Goodenia pulchella* was again the dominant flowering plant, but was reduced in abundance compared with previous surveys. Floral diversity was low, and the vegetation and substrate dry due to high temperatures over the last few weeks. A female *Lipotriches (Austronomia) flavoviridis* was captured on *Anthotium junciforme*, and four *Megachile* were observed foraging on the same host, of which one specimen was captured. The main visitors to *Anthotium junciforme*, however, were bombyliids, which also were common visitors to *Goodenia*. The high density of bombyliids may represent a threat and potential explanation to the absence of the threatened native bee species. Bombyliids are parasitoids of native bees (Prendergast & David, 2018), and if they have generalist host preferences, they may be able to limit recruitment of hosts that are already at low abundances.

*Lasioglossum (Chilalictus)* spp. were again the most abundant native bee taxa present. Small *Megachile* were at greater abundances in this survey than previous surveys. No large megachilids were observed, as their host plant (*Viminaria juncea*) had ceased flowering. All native bees were foraging on *Goodenia pulchella* except for the four megachilids mentioned previously, three *Lasioglossum* sp. that were foraging on *Cassytha glabella* and two *Amegilla (Notomegilla) chlorocyanea* foraging on *Beaufortia sparsa*. In addition to the two *Amegilla (Notomegilla) chlorocyanea*, a further three were observed foraging on *Goodenia pulchella*, however, no specimens were collected. A *Thyreus waroonensis* was collected, and another observed, both on *Goodenia pulchella*. The presence of this cleptoparasitic species again reveals that this site has a healthy nesting population of *Amegilla*. A female *Lasioglossum (Chilalictus) castor* was observed entering a nesting hole, confirming Cannington Claypan is a nesting site for this species, and provides both food and nesting resources.

As with previous surveys the introduced *Apis mellifera* was at low abundances: one was observed in flight, four on *Beaufortia sparsa*, and three on *Goodenia pulchella*. This indicates competition by honeybees is unlikely at this site.

**Weather conditions:** 32°C, light breeze, hot and dry.

**Table 5. Native bee specimens collected January 5<sup>th</sup> 2019**

Species	Family	N
<i>Lasioglossum (Chilalictus) castor</i>	Halictidae	4
<i>Lasioglossum (Chilalictus) cf. bullatum</i>	Halictidae	1
<i>Lasioglossum (Chilalictus) cognatum</i>	Halictidae	17
<i>Lipotriches (Austronomia) flavoviridis</i>	Halictidae	1
<i>Megachile apicata</i>	Megachilidae	2
<i>Megachile "houstoni" M306/F367</i>	Megachilidae	1
<i>Megachile callura</i>	Megachilidae	3

Bee bowls catch rate was low. Only a single native bee was caught in the bee bowls. The majority of insects caught were wasps (Table 6).

**Table 6. Specimens caught in bee bowls January 5<sup>th</sup> 2019**

<b>Taxonomic group</b>	<b>Small UV-fluorescent yellow</b>	<b>Small UV-fluorescent blue</b>	<b>Large round yellow bowls</b>	<b>Large rectangular yellow trays</b>
Native bees		1 <i>Lasioglossum</i>		
Orthoptera			1	
Ants				1
Wasps		1	2	4
Hemiptera				2

### 3.4 January 16<sup>th</sup> 2019 Survey

#### Summary:

The target rare native bee species were not observed. Twelve specimens belonging to six species were collected (Table 7).

Bee activity was lower than previous surveys. This is likely due to how flowering resources were much lower – *Goodenia pulchella* was now sparse. Few other plants were in flower, with *Anthotium junciforme* and *Cassytha glabella* being the only other plants in flower, but also flowering sparsely. Small megachilids and *Lasioglossum* were the only taxa present – no *Amegilla* or *Thyreus* were observed. All native bees were foraging on *Goodenia pulchella*, except for one female *Lasioglossum* and a male *Megachile* which were foraging on *Anthotium junciforme*. Only a single honeybee was observed. Bombyliid activity and activity of wasps, especially sphecids, was high. A megachilid specimen (male) [specimen ID: Megachilidae (Hackeriapis) 62 M CanningtonClaypan, 0127] was collected that had not been collected previously in any of the Cannington Claypan surveys, nor the extensive surveys of native bees across the Perth Metropolitan region, covering 14 sites over two years, by Prendergast (thesis, *in prep.*).

**Weather conditions:** 29°C, clear skies. Light breeze, increasing to more windy conditions midday.

**Table 7. Native bee specimens collected January 16<sup>th</sup> 2019**

Species	Family	N
<i>Lasioglossum (Chilalictus) castor</i>	Halictidae	1
<i>Lasioglossum (Chilalictus) cognatum</i>	Halictidae	6
<i>Lasioglossum (Chilalictus) sp. 29</i>	Halictidae	1
<i>Megachile (Eutricharaea) obtusa</i>	Megachilidae	1
<i>Megachile apicata</i>	Megachilidae	2
<i>Megachilidae (Hackeriapis) sp. 62</i>	Megachilidae	1

Bee bowls catch rate was very low, and no native bees were collected (Table 8).

**Table 8. Specimens caught in bee bowls January 16<sup>th</sup> 2019**

Taxonomic group	Small UV-fluorescent yellow	Small UV-fluorescent blue	Large round yellow bowls	Large rectangular yellow trays
Flies				1
Wasps				1

3.5 January 26<sup>th</sup> 2019 Survey**Summary:**

There were no observations of *Leioproctus douglasiellus* and *Neopasiphae simplicior*.

However, 32 species of native bee were observed. A total of 148 specimens, comprising 31 species were collected, including a *Lipotriches* species that is undescribed and may be new to science. The host plants *Goodenia* and *Anthotium* were few and scattered. Only two native bees were observed foraging on *Goodenia* (both *Lasioglossum* females, one collected). The claypan was dry, despite some rain two days earlier, making the ground unsuitable for nesting. The vast majority of native bees were foraging on a single *Eucalyptus* sp. on the edge of the site, which hosted an extremely high diversity of native bees. *Lasioglossum* were also observed foraging on *Andersonia gracilis* (threatened flora), of which specimens were collected, and *Megachile (Eutricharaea) obtusa*, both males and females, were observed foraging on a single *Comesperma* plant (*Comesperma aff. polygaloides* (C. Tauss 4160) (no *M. obtusa* specimens were collected, but this species was collected in the previous survey). The activity on the mallee was extremely high, with thousands of native bees, as well as many wasps, honeybees and beetles foraging. A jewel beetle (*Castiarina*) was also collected.

**Weather conditions:** 32°C, sunny. Some rain two days prior. Cloudless. Light breeze.

**Table 9. Native bee specimens collected January 26<sup>th</sup> 2019**

Species	Family	N
<i>Lasioglossum (Chilalictus) castor</i>	Halictidae	1
<i>Lasioglossum (Chilalictus) cognatum</i>	Halictidae	3
<i>Lasioglossum (Chilalictus) hemichalceum</i>	Halictidae	1
<i>Lasioglossum (Chilalictus) sp. 13</i>	Halictidae	2
<i>Lasioglossum (Chilalictus) sp. 29</i>	Halictidae	2
<i>Lasioglossum sp. 32 Lasioglossum (Chilalictus) cf. melanopterum</i>	Halictidae	1
<i>Lipotriches (Austronomia) flavoviridis</i>	Halictidae	6
<i>Lipotriches sp. nov. Lipotriches sp. 6</i>	Halictidae	1
<i>Homalictus (Homalictus) dotatus</i>	Halictidae	23
<i>Megachile tosticauda</i>	Megachilidae	1
<i>Megachile (Eutricharaea) chrysopyga</i>	Megachilidae	2
<i>Megachile (Hackeriapis) oblonga</i>	Megachilidae	1
<i>Megachile (Schizomegachile) monstrosa</i>	Megachilidae	1
<i>Euryglossina (Euryglossina) 52</i>	Colletidae	7
<i>Euryglossina (Microdontura) mellea</i>	Colletidae	14
<i>Euryglossina (Turnerella) argocephala</i>	Colletidae	10
<i>Euryglossina (Euryglossina) narifera</i>	Colletidae	7
<i>Euryglossina (Turnerella) glauerti</i>	Colletidae	4
<i>Euryglossina (Euryglossina) hypochroma</i>	Colletidae	10
<i>Euryglossinae Euryglossula sp. 4</i>	Colletidae	2
<i>Hylaeus (Prosopisteron) sp. 26</i>	Colletidae	3
<i>Hylaeus (Gnathoprosopis) euxanthus</i>	Colletidae	3
<i>Hylaeus (Euprosopis) violaceus</i>	Colletidae	1
<i>Hylaeus (Euprosopoides) ruficeps kalamundae</i>	Colletidae	4
<i>Hylaeus (Gnathoprosopis) amicus</i>	Colletidae	2
<i>Hylaeus (Prosopisteron) aralis</i>	Colletidae	11
<i>Hylaeus (Euprosopis) elegans</i>	Colletidae	23



Species	Family	N
<i>Hylaeus (Prosopisteron) "curviscapatus"</i>	Colletidae	1
<i>Hylaeus (Rhodohylaeus) proximus</i>	Colletidae	1
<i>Leioproctus (Leioproctus) clarki</i>	Colletidae	6
<i>Leioproctus (Leioproctus) plumosus</i>	Colletidae	3
<i>Megachile (Schizomegachile) monstrosa</i>	Megachilidae	1
<i>Euryglossina (Euryglossina) 52</i>	Colletidae	7
<i>Euryglossina (Microdontura) mellea</i>	Colletidae	14
<i>Euryglossina (Turnerella) argocephala</i>	Colletidae	10
<i>Euryglossina (Euryglossina) narifera</i>	Colletidae	7
<i>Euryglossina (Turnerella) glauerti</i>	Colletidae	4
<i>Euryglossina (Euryglossina) hypochroma</i>	Colletidae	10
<i>Euryglossinae Euryglossula sp. 4</i>	Colletidae	2
<i>Hylaeus (Prosopisteron) sp. 26</i>	Colletidae	3
<i>Hylaeus (Gnathoprosopis) euxanthus</i>	Colletidae	3
<i>Hylaeus (Euprosopis) violaceus</i>	Colletidae	1
<i>Hylaeus (Euprosopoides) ruficeps kalamundae</i>	Colletidae	4
<i>Hylaeus (Gnathoprosopis) amicus</i>	Colletidae	2
<i>Hylaeus (Prosopisteron) aralis</i>	Colletidae	11
<i>Hylaeus (Euprosopis) elegans</i>	Colletidae	23
<i>Hylaeus (Prosopisteron) "curviscapatus"</i>	Colletidae	1
<i>Hylaeus (Rhodohylaeus) proximus</i>	Colletidae	1
<i>Leioproctus (Leioproctus) clarki</i>	Colletidae	6
<i>Leioproctus (Leioproctus) plumosus</i>	Colletidae	3

Bee bowl catch rates were low, with only one native bee caught, in a fluorescent blue bee bowl (Table 10).

**Table 10. Specimens caught in bee bowls January 16<sup>th</sup> 2019**

Taxonomic group	Small UV-fluorescent yellow	Small UV-fluorescent blue	Large round yellow bowls	Large rectangular yellow trays
Flies				3
Wasps	3		1	6
Native bee ( <i>Lasioglossum</i> sp. Female)		1		
Honeybee				1
Spider				1

### 3.6 February 5<sup>th</sup> Survey

#### Summary:

The target rare native bee species were not observed.

A total of 77 specimens were collected, representing 21 species, including two not previously recorded (Table 11). Both host plants of *L. douglasiellus* had largely ceased flowering. The only plant species in flower were *Eucalyptus* sp. on the edge of the site, that hosted a high diversity of native bees, as well as honeybees and wasps; *Andersonia gracilis*, from which *Lasioglossum* were also observed foraging on; and a single *Comesperma* plant (*Comesperma* aff. *polygaloides* (C. Tausch 4160), which a *Megachile obtusa* was observed foraging on (but not collected). Conditions were very dry.

*Amegilla chlorocynea* was collected in a bee bowl but not observed. Bee bowl catch rates overall were low (Table 12).

**Weather:** 32°C, sunny. Cloudless, light breeze.

**Table 11. Native bee specimens collected February 5<sup>th</sup> 2019**

Species	Family	N
<i>Amegilla (Notomegilla) chlorocyanea</i>	Apidae	1
<i>Lasioglossum (Chilalictus) cognatum</i>	Halictidae	4
<i>Lasioglossum (Chilalictus) hemichalceum</i>	Halictidae	1
<i>Lasioglossum (Chilalictus) sp. 29</i>	Halictidae	1
<i>Lipotriches (Austronomia) flavoviridis</i>	Halictidae	2
<i>Homalictus (Homalictus) dotatus</i>	Halictidae	9
<i>Megachile (Hackeriapis) oblonga</i>	Megachilidae	2
<i>Euryglossina (Euryglossina) 52</i>	Colletidae	2
<i>Euryglossina (Microdontura) mellea</i>	Colletidae	7
<i>Euryglossina (Turnerella) argocephala</i>	Colletidae	3
<i>Euryglossina (Euryglossina) narifera</i>	Colletidae	6
<i>Euryglossina (Euryglossina) hypochroma</i>	Colletidae	7
<i>Euryglossula fultoni</i>	Colletidae	1
<i>Euryglossinae Euryglossina 33 F [var Euryglossina 22 (Euryglossina) cf. lynettae?]</i>	Colletidae	1
<i>Hylaeus (Euprosopoides) ruficeps kalamundae</i>	Colletidae	3
<i>Hylaeus (Gnathoprosopis) amicus</i>	Colletidae	1
<i>Hylaeus (Prosopisteron) aralis</i>	Colletidae	7
<i>Hylaeus (Euprosopis) elegans</i>	Colletidae	11
<i>Hylaeus (Prosopisteron) "breviscapatus"</i>	Colletidae	3
<i>Hylaeus (Macrohylaeus) alcyoneus</i>	Colletidae	1
<i>Leioproctus (Leioproctus) clarki</i>	Colletidae	4

**Table 12. Specimens caught in bee bowls February 5<sup>th</sup> 2019**

<b>Taxonomic group</b>	<b>Small UV- fluorescent yellow</b>	<b>Small UV- fluorescent blue</b>	<b>Large round yellow bowls</b>	<b>Large rectangular yellow trays</b>
Flies				1
Wasps				1
Native bee ( <i>Amegilla chlorocyanea</i> )		1		

### 3.7 February 23<sup>rd</sup> Survey

#### Summary:

The target species were not observed.

Very few native bees present, attributable to the very low abundance and diversity of flowers. Only ten specimens belonging to four species were collected (Table 13). Only a few *Goodenia* were in bloom, and no *Anthotium* were in flower. The conditions were very dry, with no rain since before the previous survey on February 5<sup>th</sup>. The only flowers in bloom were a few patches of *Oenothera drummondii* (Onagraceae) – a weed, from which a single *Lasioglossum* was observed (captured), and 11 *Amegilla* (1 specimen collected); a few patches of *Andersonia gracilis*, from a couple of *Lasioglossum* and a *Lipotriches flavoviridis* were observed foraging on and collected; a single *Comesperma* plant from which a *Megachile* was collected from; and a small patch of *Goodenia pulchella* from which a few *Megachile* were foraging on (three collected). *Cassytha glabella* was the most abundant plant but no native bees were observed visiting it. A single *Megachile* was collected in a large yellow bee bowl; the only other bee bowl capture was an ant (Table 14). No honeybees were observed, likely driven by the very low floral resources.

**Weather:** 26°C, sunny, breeze

**Table 13. Native bee specimens collected February 23<sup>rd</sup> 2019**

Species	Family	N
<i>Amegilla (Notomegilla) chlorocyanea</i>	Apidae	1
<i>Lasioglossum (Chilalictus) cognatum</i>	Halictidae	3
<i>Lipotriches (Austronomia) flavoviridis</i>	Halictidae	1
<i>Megachile apicata</i>	Megachilidae	5

**Table 14. Specimens caught in bee bowls February 23<sup>rd</sup> 2019**

Taxonomic group	Small UV-fluorescent yellow	Small UV-fluorescent blue	Large round yellow bowls	Large rectangular yellow trays
Native bee ( <i>Megachile</i> )			1	
Ant				1

## 4.0 Conclusions

Over the total 32 hours of surveying from late November to late February, *Leioproctus douglasiellus* and *Neopasiphae simplicior*, the native bees listed as threatened under the EPBC list, were not observed.

A total of 47 species/morphospecies were recorded overall, with total species richness per survey ranging from 4 – 31 species (Appendix 1, Table 15). Based on the bee survey experience of Prendergast (thesis, *in prep.*), the site is considered to have high value as native bee habitat, with observations indicating Cannington Claypan serves as both a foraging and nesting habitat for native bees.

**Table 5. Number of specimens collected and number of species collected per survey**

Date	Total N	Species richness
23-Nov-18	51	5
20-Dec-18	32	12
5-Jan-19	33	7
16-Jan-19	12	5
26-Jan-19	148	31
5-Feb-19	77	21
23-Feb-19	10	4

The comprehensive surveying supports the conclusion that the two target species were not present at the time of sampling.

The survey results indicate that *Leioproctus douglasiellus* was not present at the time of surveying, given that the whole site was comprehensively surveyed, focussing on its host plant. However, due to limited records, its adult activity period is not definitively known and earlier survey (September/October) would provide greater certainty.

The cause of the absence of *Leioproctus douglasiellus* is unclear, however, it may be that the population was already reduced such that negative effects of small population size have resulted in the extirpation of *Leioproctus douglasiellus* since it was last recorded at this site (last record unknown). The site is highly isolated, being surrounded by an electricity substation, shopping centre, greyhound track, parking and residential development that appears to have little in the way of native vegetation that could serve to connect the Cannington Claypan population with any other populations in the region.

The absence of *Neopasiphae simplicior*, however, can be taken as more conclusive evidence that this bee does not occur at the site, given that its entire flight season was covered. It has not been recorded in the vicinity for over 60 years and may never have occurred at the site as the holotype collection record from 'Cannington' is too broad to precisely identify the location (geocode precision 4, indicating location accuracy of 10-50 km).

Even though the two target native bee species were not recorded, Cannington Claypan boasts a high diversity of native bees. In a single survey (January 26<sup>th</sup>), a total of 32 species were recorded. Of the 140 x 3 hr-long surveys conducted by Prendergast (thesis, *in prep.*) across 14 sites in urbanised

southwest WA, the highest total species richness recorded was 35 species, with the average number of species being 10.2 (range: 1-35 species).

At Cannington Claypan, the range of species recorded per survey varied, from a minimum of 4 to a maximum of 35 species recorded. This is evidence of the shifting phenology of native bee species, and confirms that the survey design of multiple sampling events was appropriate to accurately identify the diversity and assemblage composition of native bees at the site.

Despite the high abundance of weeds, during the early months *Goodenia pulchella* dominated. Even during the final survey when most flora had ceased blooming, native bees were present, and two bee species included weeds in their diet. Hence, despite the high weed incursion, Cannington Claypan cannot be written off as poor habitat for bees because of this feature.

European honeybees were not hyper-abundant, and in most surveys were only a minor component of the bee fauna present. Moreover, European honeybees did not focus their foraging activity on the host plants of the targeted threatened bee species. This indicates that competition for resources is low, and the bee assemblages at this site are unlikely to suffer from adverse impacts of competition by the introduced honeybee. Although the evidence is mixed, there are concerns that high abundances of honeybees can have adverse impacts on native bees (Paini, 2004). The relatively low honeybee abundance observed is another aspect of the value of the Cannington Claypan site as habitat for native bees.

In a previous flora and fauna survey conducted by Natural Area Holdings Pty Ltd during November 17-26 2016, despite 42 invertebrate species being recorded, no native bees were listed. This cannot be due to the lack of native bees being present, given that in the single survey conducted on November 23<sup>rd</sup> hundreds of native bee individuals were observed, representing six species (of which five were collected). The discrepancy is likely due to lack of specific expertise and the sampling methodology being inappropriate for sampling native bees. Given that native bees are keystone species in ecosystems, and as the most important pollinators, are vital to the health of floral communities, surveying and monitoring native bee populations by a specialist should be a component of any environmental assessment (Potts *et al.*, 2016).

The proposed Southern Link Road expansion will go through habitat where many native bees were collected. Although native bees are mobile, most have small flight ranges (Gathmann & Tscharrntke, 2002) and, being hemmed in on all sides by an inhospitable urban matrix, Cannington Claypan represents their sole local habitat. Prendergast's PhD research (thesis, *in prep.*) identifies a statistically significant positive correlation between native bee abundance and diversity with the area of a site. Removal of part of the bee habitat may have adverse effects on the native bees present due to loss of habitat, edge effects which further degrade the amount of available habitat, pollution, and road mortality which can have a significant toll on invertebrates (Baxter-Gilbert, Riley, Neufeld, Litzgus, & Lesbarrères, 2015; Muñoz, Torres, & Megías, 2015).

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## Appendix 1. Native bee species list by survey

Species	Family	11/23/18	20/12/18	5/1/19	16/1/19	16/1/19	5/2/19	23/2/19
<i>Thyreus waroonensis</i>	Apidae	1	3					
<i>Amegilla (Notomegilla) chlorocyanea</i>	Apidae	x	1	x				1
<i>Lasioglossum (Chilalictus) castor</i>	Halictidae	33	9	6	1	1		
<i>Lasioglossum (Chilalictus) cf. bullatum</i>	Halictidae	2	1	1				
<i>Lasioglossum (Chilalictus) cognatum</i>	Halictidae	12	8	15	6	3	4	3
<i>Lasioglossum (Chilalictus) platychilum</i>	Halictidae		1					
<i>Lasioglossum (Chilalictus) hemichalceum</i>	Halictidae					1	1	
<i>Lasioglossum (Chilalictus) sp. 13</i>	Halictidae					2		
<i>Lasioglossum (Chilalictus) sp. 29</i>	Halictidae		1		1	2	1	
<i>Lasioglossum (Chilalictus) sp. 23</i>	Halictidae		1					
<i>Lasioglossum sp. 32 Lasioglossum (Chilalictus) cf. melanopterum</i>	Halictidae					1		
<i>Lipotriches (Austronomia) flavoviridis</i>	Halictidae	2	2	1		6	2	1
<i>Lipotriches sp. nov. Lipotriches sp. 6</i>	Halictidae					1		
<i>Homalictus (Homalictus) dotatus</i>	Halictidae					23	9	
<i>Megachile (Austrochile) remotula</i>	Megachilidae		1					
<i>Megachile (Eutricharaea) obtusa</i>	Megachilidae		1		1	x		
<i>Megachile apicata</i>	Megachilidae		1	2	2			5
<i>Megachile speluncarum</i>	Megachilidae		2					
<i>Megachile "houstoni" M306/F367</i>	Megachilidae			1				
<i>Megachile callura</i>	Megachilidae			3				
<i>Megachile tosticauda</i>	Megachilidae					1		
<i>Megachile (Eutricharaea) chrysopyga</i>	Megachilidae					2		
<i>Megachile (Hackeriapis) oblonga</i>	Megachilidae					1	2	
<i>Megachilidae (Hackeriapis) sp. 62</i>	Megachilidae				1			
<i>Megachile (Schizomegachile) monstrosa</i>	Megachilidae					1		
<i>Euryglossina (Euryglossina) 52</i>	Colletidae					7	2	

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Species	Family	11/23/18	20/12/18	5/1/19	16/1/19	16/1/19	5/2/19	23/2/19
<i>Euryglossina (Microdontura) mellea</i>	Colletidae					14	7	
<i>Euryglossina (Turnerella) argocephala</i>	Colletidae					10	3	
<i>Euryglossina (Euryglossina) narifera</i>	Colletidae					7	6	
<i>Euryglossina (Turnerella) glauerti</i>	Colletidae					4		
<i>Euryglossina (Euryglossina) hypochroma</i>	Colletidae					10	7	
<i>Euryglossinae Euryglossula sp. 4</i>	Colletidae					2		
<i>Euryglossula fultoni</i>	Colletidae						1	
<i>Euryglossinae Euryglossina 53 F [var Euryglossina 22 (Euryglossina) cf. lynettae?]</i>	Colletidae						1	
<i>Hylaeus (Prosopistemon) sp. 26</i>	Colletidae					3		
<i>Hylaeus (Gnathoprosopis) euxanthus</i>	Colletidae					3		
<i>Hylaeus (Euprosopis) violaceus</i>	Colletidae					1		
<i>Hylaeus (Euprosopoides) ruficeps kalamundae</i>	Colletidae					4	3	
<i>Hylaeus (Gnathoprosopis) amicus</i>	Colletidae					2	1	
<i>Hylaeus (Prosopistemon) aralis</i>	Colletidae					11	7	
<i>Hylaeus (Euprosopis) elegans</i>	Colletidae					23	11	
<i>Hylaeus (Prosopistemon) "curviscapatus"</i>	Colletidae					1		
<i>Hylaeus (Rhodohylaeus) proximus</i>	Colletidae					1		
<i>Hylaeus (Prosopistemon) "breviscapatus"</i>	Colletidae						3	
<i>Hylaeus (Macrohylaeus) alcyoneus</i>	Colletidae						1	
<i>Leioproctus (Leioproctus) clarki</i>	Colletidae					6	4	
<i>Leioproctus (Leioproctus) plumosus</i>	Colletidae					3		

\* X = seen, not collected

## Appendix 2. Native bee photographs

Photograph credits: Kit Prendergast



Female *Lasioglossum (Chilalictus) cognatum*, the most common visitor to *Goodenia pulchella*, host plant of the two threatened bee species. Photographed during the survey conducted on November 23<sup>rd</sup> 2018.

Southern Link Road Native Bee Surveys



Specimen collection of native bees collected during the Cannington Claypan surveys



*Thyreus waroonensis*, female, kleptoparasite of *Amegilla*. This species was collected at Cannington Claypan, photographed by K. Prendergast at a different site.



*Megachile (Shizomegachile) monstrosa*, female, largest megachilid in Australia. This species was collected at Cannington Claypan, photographed by K. Prendergast at a different site.



*Hylaeus (Euprosopis) elegans*, female. One of the most common species during the latter surveys collected on *Eucalyptus*, otherwise rare in previous surveys conducted by K. Prendergast across the Perth metropolitan region. Males collected for the first time at this site. Photograph by K. Prendergast of specimen collected at another site.



*Euryglossina (Microdontura) mellea* male (above) and female (below). Smallest species collected. Monotypic for the subgenus. Photos of specimens collected by K. Prendergast at other sites.





*Lasioglossum (Chilalictus) platychilum*, female. Rarely observed across SWWA: one specimen collected at Cannington Claypan, and only collected once by K. Prendergast at Alison Baird Reserve, also on *Goodenia pulchella*. Specimen photographed by K. Prendergast collected at Alison Baird Reserve.

**Appendix 3. PaDIL profile of *Leioproctus (Andrenopsis) douglasiellus***

**Source:** <http://www.padil.gov.au/pollinators/pest/main/139407/51829>

# 1. PaDIL Species Factsheet



## Scientific Name:

*Leioproctus (Andrenopsis) douglasiellus* Michener, 1965  
(Hymenoptera: Colletidae: Colletinae)

## Common Name

Native douglasiellus colletid

Live link: <http://www.padil.gov.au:80/pollinators/Pest/Main/139407>

## Image Library

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Museum Victoria  
<http://museumvictoria.com.au/>



Australian Museum  
<http://australianmuseum.net.au/>

## 2. Species Information

### 2.1. Details

**Specimen Contact:** Museum Victoria - [discoverycentre@museum.vic.gov.au](mailto:discoverycentre@museum.vic.gov.au)

**Author:** Walker, K.

**Citation:** Walker, K. (2010) Native douglasiellus colletid (*Leioproctus (Andrenopsis) douglasiellus*) Updated on 1/30/2015 Available online: PaDIL - <http://www.padil.gov.au>

**Image Use:** Free for use under the Creative Commons Attribution 3.0 Australia licence

### 2.2. URL

Live link: <http://www.padil.gov.au:80/pollinators/Pest/Main/139407>

### 2.3. Facets

**Status:** Native Australian Beneficial Species

**Host Genera:** Fresh Flowers

**Bio-Region:** Australasian - Oceanian

**Host Family:** Goodeniaceae

### 2.4. Diagnostic Notes

*Leioproctus (Andrenopsis) douglasiellus* Michener, 1965

*Leioproctus (Andrenopsis) douglasiellus* Michener, C.D. 1965. A classification of the bees of the Australian and South Pacific regions. *Bulletin of the American Museum of Natural History* 130: 1–362 [259].

Type data: Holotype WAM 54–128 ?, Pearce, WA.

### 3. Diagnostic Images



Clarence, Blue Mountains, NSW, 30 Dec 1993, N.W.Rodd  
**Dorsal Image - Female:** M. Batley Australian Museum



3 km N Clarence, NSW, 22 Dec 2004, M. Batley  
**Dorsal Image - Male:** M. Batley Australian Museum



Clarence, Blue Mountains, NSW, 30 Dec 1993, N.W.Rodd  
**Head Front Image - Female:** M. Batley Australian Museum



3 km N Clarence, NSW, 22 Dec 2004, M. Batley  
**Head Front Image - Male:** M. Batley Australian Museum



Clarence, Blue Mountains, NSW, 30 Dec 1993, N.W.Rodd  
**Lateral Image - Female:** M. Batley Australian Museum



3 km N Clarence, NSW, 22 Dec 2004, M. Batley  
**Lateral Image - Male:** M. Batley Australian Museum

Results Generated:

Monday, March 25, 2019

## Appendix 4. PaDIL profile of *Neopasiphae simplicior*

Source: <http://www.padil.gov.au/pollinators/pest/main/139572>

# 1. PaDIL Species Factsheet



## Scientific Name:

*Neopasiphae simplicior* Michener, 1965  
(Hymenoptera: Colletidae: Colletinae)

## Common Name

Native simplicior colletine

Live link: <http://www.padil.gov.au:80/pollinators/Pest/Main/139572>

## Image Library

Australian Pollinators

Live link: <http://www.padil.gov.au:80/pollinators/>

## Partners for Australian Pollinators image library



Western Australian Museum

<http://www.museum.wa.gov.au/>



South Australian Museum

<http://www.samuseum.sa.gov.au/>



Museum Victoria

<http://museumvictoria.com.au/>



Australian Museum

<http://australianmuseum.net.au/>

## 2. Species Information

### 2.1. Details

**Specimen Contact:** Museum Victoria - [discoverycentre@museum.vic.gov.au](mailto:discoverycentre@museum.vic.gov.au)

**Author:** Walker, K.

**Citation:** Walker, K. (2010) Native simplicior colletine (*Neopasiphae simplicior*) Updated on 10/1/2011 Available online: PaDIL - <http://www.padil.gov.au>

**Image Use:** Free for use under the Creative Commons Attribution 3.0 Australia licence

### 2.2. URL

Live link: <http://www.padil.gov.au:80/pollinators/Pest/Main/139572>

### 2.3. Facets

**Status:** Native Australian Beneficial Species

**Host Genera:** Fresh Flowers

**Bio-Region:** Australasian - Oceanian

**Host Family:** Asteraceae, Goodeniaceae, Lobeliaceae

### 2.4. Diagnostic Notes

\_Neopasiphae simplicior\_ Michener, 1965

\_Neopasiphae simplicior\_ Michener, C.D. 1965. A classification of the bees of the Australian and South Pacific regions. Bulletin of the American Museum of Natural History 130: 1–362 [262].

Type data: Holotype WAM 65–726, Cannington (as Camington), WA.



### 3. Diagnostic Images



WA, 0.5 km E Forest-Dale Lake. 25 km West of Perth. 28 October 1987. T. F. Houston on flowers of *Goodenia filiformis*  
**Dorsal Image - Female:** Clare McLellan Museum Victoria



WA, 0.5 km E Forest-Dale Lake. 25 km West of Perth. 28 October 1987. T. F. Houston  
**Dorsal Image - Male:** Clare McLellan Museum Victoria



WA, 0.5 km E Forest-Dale Lake. 25 km West of Perth. 28 October 1987. T. F. Houston  
**Gaster Ventral Image - Male:** Clare McLellan Museum Victoria



WA, 0.5 km E Forest-Dale Lake. 25 km West of Perth. 28 October 1987. T. F. Houston on flowers of *Goodenia filiformis*  
**Head Front Image - Female:** Clare McLellan Museum Victoria



WA, 0.5 km E Forest-Dale Lake. 25 km West of Perth. 28 October 1987. T. F. Houston  
**Head Front Image - Male:** Clare McLellan Museum Victoria



WA, 0.5 km E Forest-Dale Lake. 25 km West of Perth. 28 October 1987. T. F. Houston on flowers of *Goodenia filiformis*  
**Lateral Image - Female:** Clare McLellan Museum Victoria



WA, 0.5 km E Forest-Dale Lake. 25 km West of Perth. 28 October 1987. T. F. Houston

**Lateral Image - Male:** Clare McLellan Museum Victoria

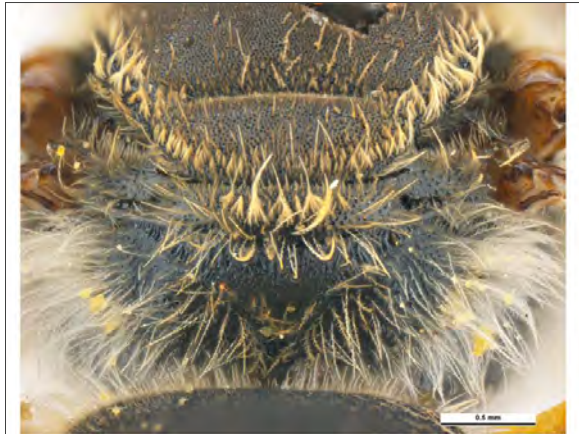


WA, 0.5 km E Forest-Dale Lake. 25 km West of Perth. 28 October 1987. T. F. Houston on flowers of *Goodenia filiformis*

**Mesoscutum Image - Female:** Clare Museum Victoria



WA, 0.5 km E Forest-Dale Lake. 25 km West of Perth. 28 October 1987. T. F. Houston on flowers of *Goodenia filiformis*  
**Metasoma Image - Female:** Clare McLellan Museum Victoria



WA, 0.5 km E Forest-Dale Lake. 25 km West of Perth. 28 October 1987. T. F. Houston on flowers of *Goodenia filiformis*  
**Propodeum Image - Female:** Clare McLellan Museum Victoria

Results Generated:

Monday, March 25, 2019