Coleopteran fauna Survey of Credo Station, Goldfields Region, Western Australia

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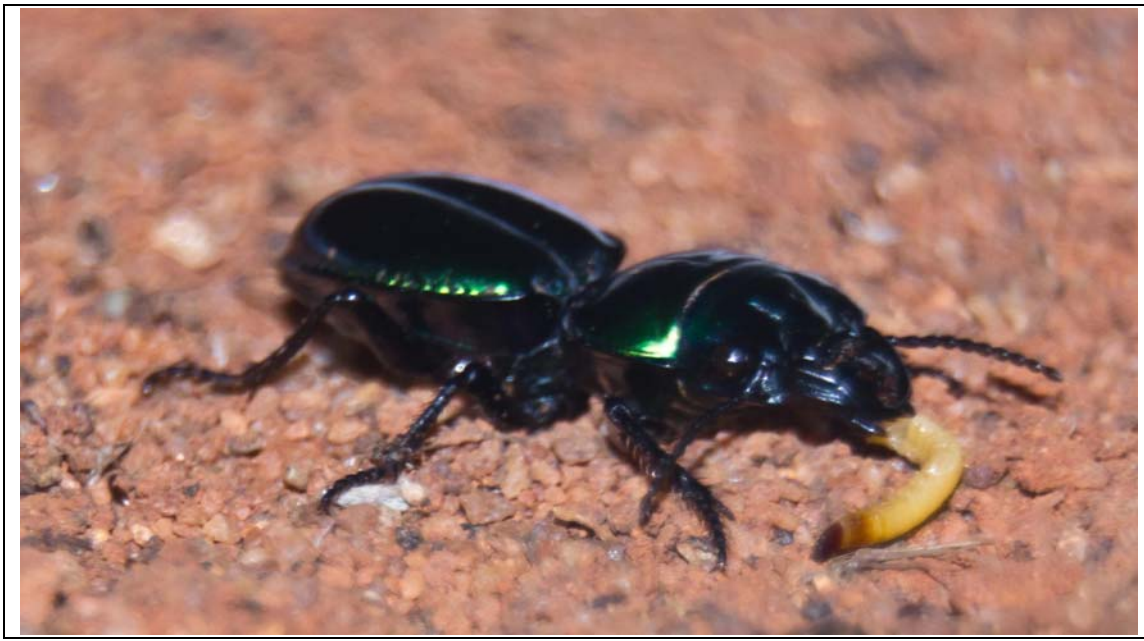

GOVERNMENT OF WESTERN AUSTRALIA

Department of Environment and Conservation

Contents

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List of contributors to this report.			
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Abstract

The Coleopteran fauna collected at Credo Station Reserve, in the Eastern Goldfields of Western Australia included large predatory ground beetles, native Scarabaeidae or dung beetles, and herbivorous beetles such as jewel beetles, weevils, pie-dish beetles and leaf beetles. The fauna represented a typical semi arid to arid community present in early spring. Several taxa are currently suspected to be new to science but require further investigation to be confirmed.

1. Introduction

Credo Station Reserve

Originally established in 1906 as part of a pastoral lease, Credo Station was acquired by the Department of Environment and Conservation in 2007. Subsequently it was destocked to form a conservation reserve of approximately 202,000 hectares with the adjacent Rowles Lagoon and Clear and Muddy Lakes reserves. Located approximately 70 km north of Coolgardie, Credo Station is within the Coolgardie Bioregion. The Coolgardie Bioregion sits on the Yilgarn Craton's 'Eastern Goldfields Terrains', consisting mainly of low greenstone belts and granites. A series of playa lakes form wetlands through low plains scattered with exposed bedrock (Department of Conservation and Land Management 2000; McKenzie *et al*. 2003). Several vegetation zones occur on Credo Station; with mallees, endemic *Acacias*, shrub-heaths and *Triodia* on the sandplains dominating in the north (Figure 1) and mixed *Eucalyptus* woodlands (Figure 2) and *Acacia* shrublands along with a series of lakes and rocky outcrops occurring in the south. From south to north, the climate varies from semi arid to arid, with rainfall ranging from 300mm to 200mm, usually falling in winter.

Figure 1. Vegetation at Credo Station Reserve, mixed open shrubland and woodland over spinifex (*Triodia* spp). © J. Waldock 2011

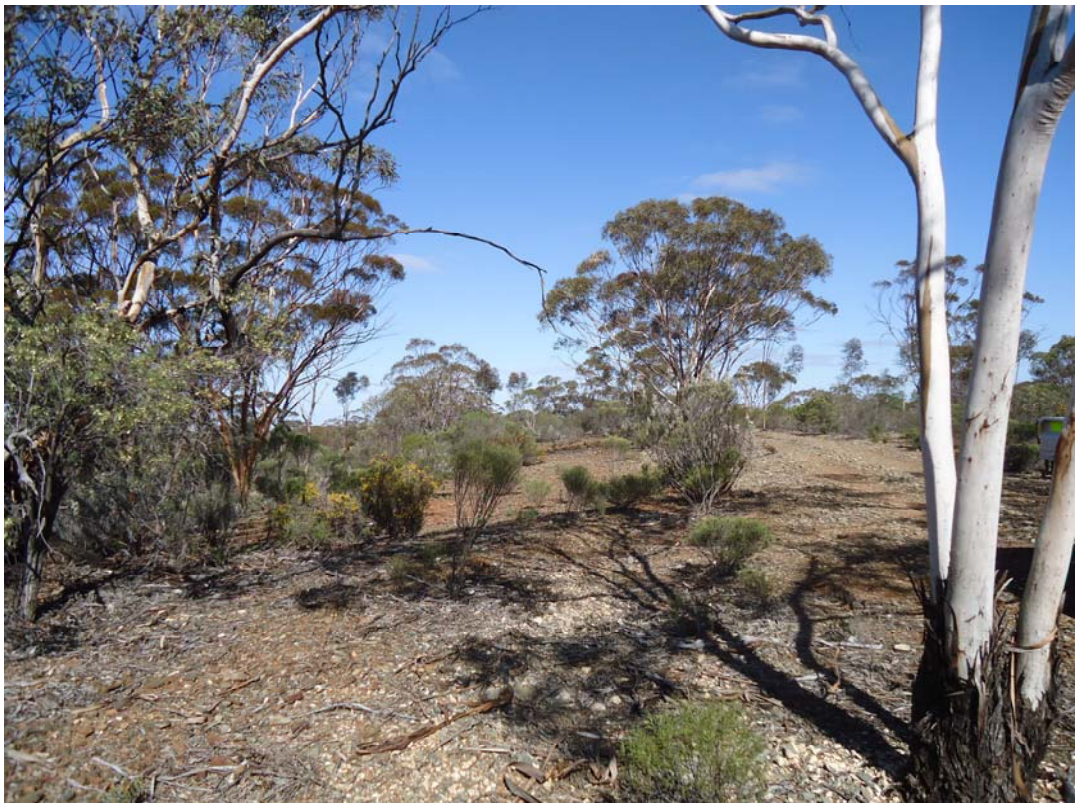

Figure 2. Vegetation at Credo Station Reserve, *Eucalyptus* spp woodland. © J. Waldock 2011

Beetle Fauna

There are three major elements recognisable in Australia's beetle fauna. The older two elements represent Gondwanan affinities; one is arid-adapted or xerophilic, inhabiting the ancient beaches and coastal dunes along the Tethys Sea. The other older element inhabited the forests across Gondwana; these elements are known as Tethys and Austral, respectively. The third and younger element invaded from south-east Asia and consists of both arid-adapted and forest dwelling taxa (Matthews 2000; Matthews and Bouchard 2008).

Each of these faunal elements have had to adapt to the extremely long geological isolation of the continent, and repeated retreat and expansion of rainforests with radiation of *Eucalyptus* and *Acacia* communities in response to Miocene aridification (also reflected in other Australian fauna and flora; Austin *et al.* 2004; Beard *et al.* 2000; Cowling and Lamont 1998; Hopper *et al*., 1996; Main 1996, 2000; Ślipiński 2007). This has led towards many localized species, with a high proportion of flightless forms, reflecting limited available habitat within a generally stable environment (Baehr 2005; Howden 1981; Matthews 1974).

Attempts to estimate and document beetle species richness in Australia have been affected by the state of taxonomic knowledge, in addition to difficulties in access to many habitats and environments (Austin *et al.* 2004). Currently approximately 19,500 species across nearly 2850 genera from 116 families have been recorded in Australia (ABRS 2009). However there are mega diverse genera among the Scarabaeoids, weevils and Chrysomeloids plus many other genera requiring revisions incorporating the large numbers of unidentified forms present in museum collections which will undoubtedly increase these numbers considerably.

Very little is known about the beetle fauna of the arid zone, with only sporadic, opportunistic or taxon or habitat specific surveys carried out (e.g. Baehr, 1990; Majer and Recher, 1988 and others). A systematic search of the Western Australian Museum's database has revealed some survey work in the surrounding goldfield regions around Credo Station (see Appendix1).

2. Methods

Several collecting methods were employed in a range of different habitats and geological areas. Accumulated leaf and bark litter at the base and in the forks of trees and shrubs were sifted for beetles in addition to hand searching under peeled bark, turned logs, stones, cow pats and human habitation debris. Other specimens were opportunistically caught while beating and sweeping vegetation or through the use of light traps. Two grids of dry pitfall traps were established in scattered mallee and heath over *Triodia* on red loam sand in the northern section of the Station to catch some larger nocturnally active specimens and checked every morning. Opportunistic captures in concurrent live vertebrate pitfall traps in the southern section of the Station were also examined.

All specimens were preserved whole in 95-100% ethanol during the survey and once brought back to Perth they were pinned and mounted; identifications were made as far as possible and incorporated into the Western Australian Museum collection. The names of personnel who were involved in this process are listed on page 2.

3. Results and Discussion

3.1 Overview of collecting

A relatively small number of beetles were collected at Credo Station during the survey and belonged to the families Anthicidae, Bolboceratidae, Buprestidae, Carabidae, Chrysomelidae, Cleridae, Curculionidae, Melyridae, Scarabaeidae, Tenebrionidae and Trogidae.

The different collecting methods employed during the survey facilitated the capture of different components of the beetle fauna present at Credo Station. Sweep netting captured 14 specimens within ten taxa: all the Buprestidae, Chrysomelidae, Cleridae, and Melyridae recorded along with a variety of other small volant species. Sifting leaf and bark litter revealed six Tenebrionidae species, two Scarabaeidae and three Curculionidae species for a total of 16 specimens. Dry pitfall traps captured the larger nocturnal species of Carabidae in addition to an Anthicidae, Tenebrionidae and Trogidae. Only five specimens were opportunistically collected by hand searching, of these two were already dead specimens. Night time weather conditions (windy and cold) appeared to restrict light trap captures to two Scarabaeidae, three Bolboceratidae and one Carabidae.

There appeared to be very little insect activity in the leaf and bark litter, in many instances the beetles collected appeared to be congregating (such as various individuals of *Maechidius*) under bark, waiting for warmer weather to arrive before becoming active. A number of Tenebrionid larvae were seen during sifting of the leaf litter but were not collected due to the difficulty of identification of native larvae.

3.2 Taxa recorded for the reserve

Appendix 1 lists the 42 taxa recorded on Credo Station during the survey.

Phylum Arthropoda
Subphylum Uniramia
Class Insecta
Order Coleoptera
Suborder Adephaga

Family Carabidae

The Carabidae were represented at Credo Station by nine species across eight genera, with the Scaritinae subfamily represented by four aggressive species, all captured in dry pitfall traps: *Euryscaphus obesus* (Macleay, 1863), *Philoscaphus costalis* Macleay, 1873 and two unidentified *Carenum* species (Figures 3 & 4). The single *Adotela* specimen was already dead and damaged when collected so specific identification is not possible.

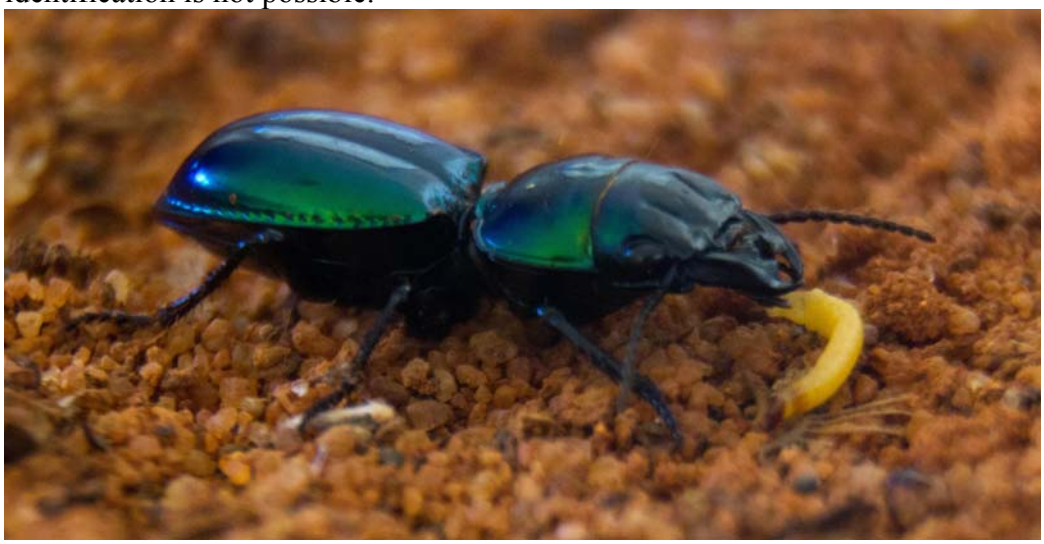

Figure 3. Ground Beetle, *Carenum* sp.1, (Carabidae) from Credo Station eating a Tenebrionidae larvae. © Shawn Fox

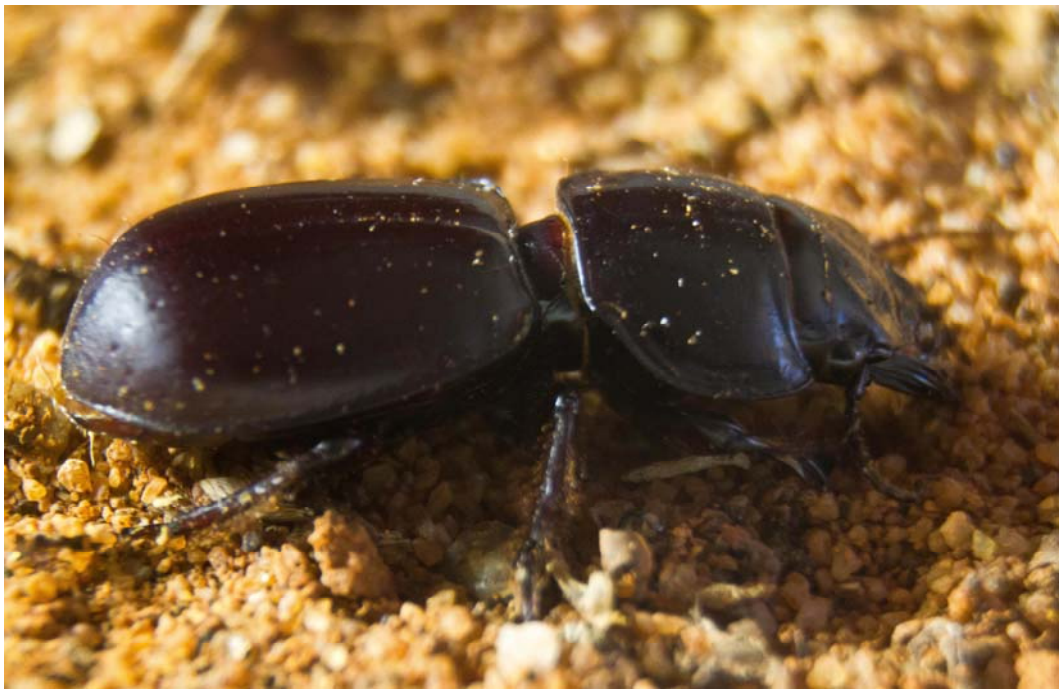

Figure 4. Ground Beetle, *Carenum* sp.2, (Carabidae) from Credo Station. © Shawn Fox

Phylum Arthropoda
Subphylum Uniramia
Class Insecta
Order Coleoptera
Suborder Polyphaga
Superfamily Buprestoidea
Family Buprestidae

The genus *Castiarina* was represented at Credo Station by one *Castiarina rufolimbata* (Carter, 1916) (Figure 5) and four individuals of the *Castiarina parallela* group complex.

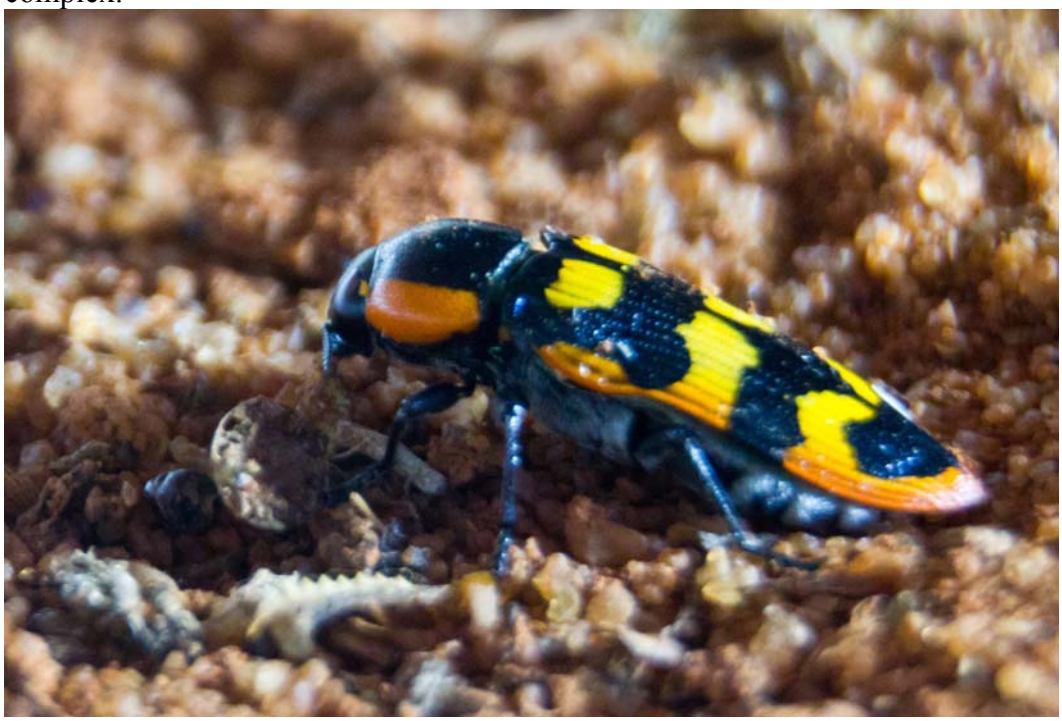

Figure 5. The Jewel Beetle *Castiarina rufolimbata* (Carter, 1916), Buprestidae, from Credo Station. © Shawn Fox

Superfamily Chrysomeloidea
Family Chrysomelidae
Two different, presently, unidentifiable species of *Paropsis* were collected.

Superfamily Cleroidea
Family Cleridae
Two specimens of *Lemidia suturalis* Gorham, 1877 were collected at Credo Station using sweep nets from *Eucalyptus* and *Eremophila* and *Acacia* heath.

Family Melyridae
A single representative of the Melyrid genus *Helcogaster* was collected but currently can not be identified due to a lack of recent revisions.

Superfamily Curculionoidea
Family Curculionidae
Four weevil genera were collected; *Hypera*, *Melanterius*, *Rhinaria*, and *Titinia* each represented by single individuals. Specimens can not be identified further at present due to a lack of recent revisions.

Superfamily Scarabaeoidea
Family Bolboceratidae
All three Bolboceratid specimens (*Blackburnium reichei* (Guérin-Méneville, 1838), *Bolborhachium recticorne* (Guérin-Méneville, 1838), and *Bolborhachium deceptum* Howden, 1985) were collected at Credo Station using light as an attractant.

Family Scarabaeidae
Seven species from four genera of melolonthine Scarabaeidae were found at Credo Station. Of these only *Sphaeroscelis pectoralis* Burmeister, 1855 and *Liparetrus jenkinsi* Britton, 1959 could be positively identified to species. Two of the four undetermined but separate and distinctive species of *Maechidius* that were collected, were found in groups of individuals hidden among bark litter. Further identifications are currently not possible until revisions of these highly speciose genera are completed.

Family Trogidae
A single specimen of *Omorgus gigas* (Harold, 1872) (Figure 6) was collected from a dry pitfall trap in an area of scattered mallee and *Acacia* over *Triodia* on red loam soil.

Figure 6, Carcass or Hide Beetle, *Omorgus gigas* (Harold, 1872) Trogidae, from Credo Station. © Shawn Fox

Superfamily Tenebrionoidea
Family Anthicidae
Two specimens, representing separate Anthicidae subfamilies were collected, currently unidentifiable to generic level.

Family Tenebrionidae
The Tenebrionidae were represented by at least nine species across six genera, with *Helea* and *Pterohelaeus* represented by two and three species respectively. Only the two specimens of *Aethyssius* `sp.` were collected by sweep netting, the majority of others were collected by either sifting leaf and bark litter from the base or forks of trees or from dry pitfall traps.

3.3 Un-named taxa or new species

A number of taxa from Credo Station could not be currently aligned with known species, using current keys and diagnostic descriptions or comparisons with previously determined specimens. Many genera of beetles in Australia require revisions incorporating the large amounts of undetermined material currently residing in collections around the country. Until these revisions are completed, these specimens are tentatively considered 'morphospecies' and potentially represent new taxa.

3.4 Weed or pest species

None of the beetles recorded in the survey are specifically considered either weed or pest species. However, in agricultural regions with dryland crops, *Pterohelaeus* spp. can become root pests at high densities.

3.5 Vulnerable, threatened or endangered species

Currently, under the Environment Protection and Biodiversity Conservation Act (1999) (Commonwealth) no beetle species are listed as vulnerable, threatened or endangered. However, under Western Australian State legislation all jewel beetles (Buprestidae) are classified as protected throughout the whole of the State: Schedule 1 on the Wildlife Conservation (Protected Invertebrate Fauna) Notice (W.A. GG0045, 1994). No other taxon of beetle (family, genus or species) is given a classification.

4. General comment on species lists

Previous data based records for the area are limited to the few groups currently processed, and does not necessarily reflect the complete collection of curated specimens from the region. Nearly half the known records were collected close to 40 years ago from around Menzies, Coolgardie and Comet Vale Siding. More recent collections were from Goongarrie Station using pitfall traps.

5. Conclusions

Credo Station lies across a south-north vegetation and climatic transitional zone, from semi arid woodlands to arid shrublands. The beetle fauna collected during the survey comprised primarily of semi arid and arid adapted species, many of which are known to have very widespread distributions across the State in addition to several taxa which are currently undeterminable.

The survey was carried out in early spring, during which the weather was relatively cold and windy at night, and cool during the day; this may have had an impact on capture rates. The actual activity levels of the few adults (and some of these were found hibernating) and larvae seen were relatively low, with individuals often sluggish and slow moving.

Different collecting methods were employed to access different habitats and niches occupied by beetles. Each method made contributions and captured a different suite of species, indicating the usefulness of a multiple sampling method approach rather than relying on just one technique. Additional surveying in surrounding habitats using a variety of collection methods, undertaken during warmer times of the year when beetles are more active, will most likely reveal a much richer beetle fauna.

Acknowledgements

We would like to thank Kate Gillespie, Karl Newport and Mim Jambrecina from Bush Blitz for coordinating the survey and Cassandra Nichols from Earthwatch for coordinating the BHP participants. Thanks to the BHP participants for their enthusiastic participation and help during the survey. And finally, thanks go to Julianne Waldock and Shawn Fox for use of photos.

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Appendices

Appendix 1. List of Beetles occurring on Credo Station; number of taxa: 42 native species collected during BushBlitz Survey 2011.
*****Schedule 1; Wildlife Conservation (Protected Invertebrate Fauna) Notice 1994, Western Australian Government Gazette, 8 April 1994 No. 45

Family	Species	Common name	Previously Recorded	BushBlitz Survey 2011	Putative new species	EPBC Listed	State or Territory Listed	Weed or Pest
Anthicidae	`unknown genus 1` ` bush blitz credo sp.1`	**Ant beetle**		✓	✓			
Anthicidae	`unknown genus 2` ` bush blitz credo sp.1`	**Ant beetle**		✓	✓			
Bolboceratidae	*Blackburnium reichei*	**Earth-boring beetle**		✓				
Bolboceratidae	*Bolboleaus trifoveicollis*	**Earth-boring beetle**	✓					
Bolboceratidae	*Bolboleaus truncatus*	**Earth-boring beetle**	✓					
Bolboceratidae	*Bolborhachium anneae*	**Earth-boring beetle**	✓					
Bolboceratidae	*Bolborhachium deceptum*	**Earth-boring beetle**	✓	✓				
Bolboceratidae	*Bolborhachium pastinum*	**Earth-boring beetle**	✓					
Bolboceratidae	*Bolborhachium recticorne*	**Earth-boring beetle**		✓				
Buprestidae	*Castiarina acuticeps*	**Jewel beetle**	✓				✓*	
Buprestidae	*Castiarina aeraticollis*	**Jewel beetle**	✓				✓*	
Buprestidae	*Castiarina bakeri*	**Jewel beetle**	✓				✓*	
Buprestidae	*Castiarina pallidiventris*	**Jewel beetle**	✓				✓*	
Buprestidae	*Castiarina parallela grp*	**Parallel Jewel beetle**		✓			✓*	
Buprestidae	*Castiarina recta*	**Jewel beetle**	✓				✓*	
Buprestidae	*Castiarina rufolimbata*	**Jewel beetle**		✓			✓*	
Buprestidae	*Castiarina subacuticeps*	**Jewel beetle**	✓				✓*	
Buprestidae	*Castiarina subcuticeps*	**Jewel beetle**	✓				✓*	
Buprestidae	*Chalcotaenia martini*	**Jewel beetle**	✓				✓*	
Buprestidae	*Diadoxus scalaris*	**Jewel beetle**	✓				✓*	

Buprestidae	*Melobasis* sp.	**Jewel beetle**	✓				✓*	
Buprestidae	*Merimna* sp.	**Jewel beetle**	✓				✓*	
Buprestidae	*Pseudotaenia gigas*	**Jewel beetle**	✓				✓*	
Buprestidae	*Temognatha pascoei*	**Jewel beetle**	✓				✓*	
Carabidae	*Adotela* `sp.`	**Ground beetle**		✓				
Carabidae	*Anomotarus* `sp.`	**Ground beetle**		✓				
Carabidae	*Carenum* `sp.1`	**Ground beetle**		✓				
Carabidae	*Carenum* `sp.2`	**Ground beetle**		✓				
Carabidae	*Euryscaphus obesus*	**Ground beetle**		✓				
Carabidae	*Gigadema bostocki*	**Ground beetle**		✓				
Carabidae	*Loxandrus* `sp.`	**Ground beetle**	✓	✓	✓			
Carabidae	*Philoscaphus costalis*	**Ground beetle**		✓				
Carabidae	*Sarothrocrepsis* `sp.`	**Ground beetle**		✓				
Cerambycidae	*Uracanthus* sp.	**Longicorn beetle**	✓					
Chrysomelidae	*Paropsis* ` bush blitz credo sp.1`	**Tortoise/Leaf beetle**		✓				
Chrysomelidae	*Paropsis* ` bush blitz credo sp.2`	**Tortoise/Leaf beetle**		✓				
Cleridae	*Lemidia suturalis*	**Chequered beetle**		✓				
Curculionidae	*Hypera* `sp.`	**Weevil**		✓				
Curculionidae	*Melanterius* `sp.`	**Weevil**		✓				
Curculionidae	*Rhinaria* `sp.`	**Weevil**		✓				
Curculionidae	*Titinia* `sp.`	**Weevil**		✓				
Dytiscidae	*Cybister tripunctatus*	**Water beetle**	✓					
Dytiscidae	*Eretes australis*	**Water beetle**	✓					
Hydrophilidae	*Berosus macumbensis*	**Water beetle**	✓					
Melyridae	*Helcogaster* `sp.`	**Soft-winged Flower beetle**		✓				
Scarabaeidae	*Colpochila* `sp.`	**Christmas/ leaf chafer beetle**		✓				
Scarabaeidae	*Liparetrus* `sp.` nr. *nudus*	**Christmas/ leaf chafer beetle**		✓	✓			
Scarabaeidae	*Liparetrus jenkinsi*	**Christmas/ leaf chafer beetle**		✓				
Scarabaeidae	*Maechidius* ` bush blitz	**Christmas/ leaf**		✓	✓			

	credo sp.1`	**chafer beetle**						
Scarabaeidae	*Maechidius* ` bush blitz credo sp.2`	**Christmas/ leaf chafer beetle**		✓	✓			
Scarabaeidae	*Maechidius* ` bush blitz credo sp.` nr. *geminus*	**Christmas/ leaf chafer beetle**		✓	✓			
Scarabaeidae	*Sphaeroscelis pectoralis*	**Christmas/ leaf chafer beetle**		✓				
Tenebrionidae	*Aethyssius* `sp.`	**Darkling beetle**		✓				
Tenebrionidae	*Chalcopteroides* `sp.`	**Chalcopterus beetle**		✓				
Tenebrionidae	*Helea* `bush blitz credo sp.1`	**Pie dish beetle**		✓	✓			
Tenebrionidae	*Helea* ` bush blitz credo sp.2`	**Pie dish beetle**		✓	✓			
Tenebrionidae	*Helea ellipticus*	**Pie dish beetle**	✓					
Tenebrionidae	*Helea mastersi*	**Pie dish beetle**	✓					
Tenebrionidae	*Helea opacicollis*	**Pie dish beetle**	✓					
Tenebrionidae	*Helea subserratus*	**Pie dish beetle**	✓					
Tenebrionidae	*Hypaulax ampliata*	**Pitted Darkling beetle**		✓				
Tenebrionidae	*Metistete dentipes*	**Darkling beetle**	✓					
Tenebrionidae	*Nyctozoilus major*	**Darkling beetle**		✓				
Tenebrionidae	*Pterohelaeus* ` bush blitz credo sp.1`	**False wireworm beetle**		✓	✓			
Tenebrionidae	*Pterohelaeus* ` bush blitz credo sp.2`	**False wireworm beetle**		✓	✓			
Tenebrionidae	*Pterohelaeus* ` bush blitz credo sp.3`	**False wireworm beetle**		✓	✓			
Trogidae	*Omorgus gigas*	**Carcass Beetle**		✓				

Appendix 2. Financial Statement

I hereby certify that all funds for this project have been spent in the manner and for the purposes specified by the contract.

Name: ___Nadine A. Guthrie_____

Signed: _____

Date: _____27 April 2012_____