Yalata-Fowlers Bay Bush Blitz
Orthoptera: Caelifera

November 2021
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Prof. Michael Kearney

Nomenclature and taxonomy used in this report is consistent with:
The Australian Faunal Directory (AFD)

http://www.environment.gov.au/biodiversity/abrs/online-resources/fauna/afd/home

Contents

List of contributors

List of contributors to this report.			
Name	**Institution/affiliation**	**Qualifications/area of expertise**	**Level/form of contribution**
Michael Kearney	***The University of Melbourne***	***PhD in Ecology and Evolution, expertise in Orthoptera***	***Undertook survey, collected specimens, preserved and photographed specimens, wrote report***

Abstract

A survey of grasshopper species (order Orthoptera, suborder Caelifera) was conducted between the 25th November and the 1st December, 2021 in the Yalata-Fowlers Bay region. Sites were in part chosen to resurvey areas that were surveyed between 1947 and 1969 by Dr Ken Key and his associates to develop the grasshopper collection of the Australian National Insect Collection. Nineteen resurvey sites and seven additional sites were surveyed during the study period and species presence was recorded as well as details on thermal conditions during the survey. Site photos and macro photos of all taxa were taken. Overall, 29 species of grasshopper were recorded from the area from 22 genera and three families. Comparison of resurvey sites revealed higher overall diversity but no correlation between historical and current site diversity, and little site-specific overlap (max 33%, mean 17%). Some very common taxa in the current survey were absent from previous surveys. The higher present diversity of grasshoppers in the area may reflect historical changes such as relaxed grazing pressure from stock and rabbits.

1. Introduction

The grasshoppers are among the most well surveyed invertebrate groups in Australia. This is largely due to the efforts of Dr Ken H. L. Key, an ecologist and entomologist who was originally recruited to the CSIR Division of Economic Entomology in Australia in 1936 to study locust ecology (Day and Rentz 2004). After the second world war, Key began to expand his studies of Australian grasshoppers and coordinated (and participated in) surveys across the entire continent between 1939 and 1989. The specimens collected in these surveys were lodged in the Australian National Insect Collection as were the field notebooks associated with each trip. In total, there are 223 notebooks comprising around ~2400 pages of notes that encompass ~2700 days of survey effort. Of these notebooks, four span the Yalata-Fowlers Bay survey region (Table 1). Thus, the aim of the present survey was to revisit as many of these sites as possible and resurvey them to assess if and how the fauna may have changed as well as searching for new taxa.

Resurveys of Key's notebooks represent a unique opportunity to study how the Australian landscape has changed over decades. A preliminary resurvey was conducted in NSW recently, demonstrating the feasibility of the concept and revealing distinct changes in the distributions of some taxa as well as evidence for shifts in vegetation (Kearney *et al.* 2021). This study applies the same methods as the latter paper.

Table 1. Key's field notebooks covering the Yalata-Fowlers Bay region

Field trip no.	Location	Start date	End date	Survey person
18	Ouyen (VIC), Port Augusta (SA), Nullarbor, Albany (WA)	7/10/1947	6/12/1947	J. H. Calaby
100	Woomera Rocket Range, SA	25/09/1960	23/10/1960	L. J. Chinnick, McCabe, Corby
156	Port Augusta to Norseman, WA	28/09/1968	23/10/1968	K. H. L. Key, M. S. Upton, J. Balderson
163	Eyre Peninsula, Nullarbor Plain, SE of WA	28/10/1969	28/11/1969	K. H. L. Key, M. S. Upton

2. Methods

2.1 Site selection

Sites were selected in an attempt to relocate previous survey sites from Key's notebooks. A total of 26 sites were surveyed and of these, I am confident that 19 of these are resurveys of the same location. The remainder were either incorrectly located or simply an additional site. The field notebooks indicate location by odometer reading, to the nearest mile. Reference points are given in the form of major population centres, homesteads, water tanks, road intersections and other general land features. The field notebooks include detailed descriptions of terrain and vegetation which could also be of assistance in narrowing down the location. Prior to the trip, sites were geocoded with the assistance of Google Earth and old 1:250000 maps (R502 series, https://data.gov.au/dataset/ds-ga-077764a5-eaa4-39d9-e054-00144fdd4fa6/details?q=R502). The latter maps were critical due to changes in the location of roads, especially the Eyre Hwy.

2.2 Survey techniques

Survey methods followed Kearney et al. (2021), and involved active search as well as bush beating into calico hoop bags. Specifically, we surveyed each location for ~30 mins, following Key's protocol (Day and Rentz 2004). The search party varied in size from two to six, but always included Kearney who was the only trained/experienced grasshopper surveyor. Active searching involved visual inspection of the ground and shrub layers, along with a sweep net and bush beating/shaking. Surveys were only conducted during daylight hours. The grasshopper samples were collected in 50 mL plastic vials and returned to the lab each day for processing.

At the commencement of each survey, a series of thermal measurements were made to facilitate later judgements of detectability. Specifically, I measured

- air temperature at 1.2 m height in the shade
- bare ground temperature in full sun
- 'operative' temperature (potential grasshopper body temperature) in full sun

Air temperature was measured with using a 24-gauge Type T thermocouple thermometer (Fluke 52-II). Ground temperatures were measured with an infrared thermometer (ThermaTwin TN410LCE). Operative temperature (Bakken and Angilletta 2014) was measured with a 25 mm copper tube painted brown with a thermocouple thermometer inside. This thermometer was placed on the bare ground patch in the sun and left to reach steady state over a period of ~2 mins.

2.2.1 Methods used at standard survey sites

Survey techniques at the standard survey site followed the same protocols as at the other sites except only Kearney undertook the survey and it was made over a longer time period (~2 hours). Factors influencing the survey include general weather conditions and the overall quality of the vegetation in relation to drought and grazing. The thermal measurements provide an indication of detectability (grasshoppers are increasingly likely to hop as their body temperature rises about 15 to 20 °C). Grasshoppers vary in phenology and thus timing of surveys can affect species present and the stage that they are found at. Overall, the timing of the present survey in the early summer maximises the range of species to be found, spanning the late stage of overwintering species and mid-late stages of spring hatching grasshoppers.

2.3 Identifying the collections

Specimens were identified to species or genus using Rentz. et al. (2003) and Key (1976). Digital images of live specimens were taken with a Canon EOS 650D (Canon, Ōta, Tokyo, Japan) (ISO-100, f/16, 1/200 sec) with a slave flash in RAW, and subsequently processed in Digital Photo Professional 4 to adjust the white balance and remove distractions in the background. Genetic samples were preserved in ethanol with a unique label and all photographs were given a unique label. All photos were cross-referenced to the genetic samples.

3. Results and Discussion

The details of the sites sampled, including survey duration and effort (number of people), thermal conditions and a rough estimate of abundance are provided in Table 2.

Table 2. Collection sites and details including details on air (T_a), ground (T_s) and potential grasshopper (operative) temperatures (T_e).

Date	Time	Site	Latitude	Longitude	Duration (min)	People	T_a °C	T_s °C	T_e °C	Abundance	Key site
25/11/2021	12:20	19 km NNE Colona H.S.	-31.4535	132.1045	20	7				2	n
25/11/2021	13:30	156_3350.8	-31.184	132.0805	20	7	17.7	20.4	20.1	2	y
25/11/2021	14:20	156_3347.4	-31.2901	131.5653	38	7	18.6	19.9	20.3	2	y
25/11/2021	15:20	100_7816	-31.2361	132.0803	30	7	18.2	20.4	21.2	2	y
25/11/2021	16:45	100_7831	-31.4498	132.0675	30	3	19.3	20.4	20.4	3	y
25/11/2021	17:20	156_3331.5	-31.4558	132.0658	30	3	17.6	20.2	19.7	3	y
27/11/2021	15:15	156_5207	-31.8596	132.5937	50	2	22.2	43.8	39.8	3	y
27/11/2021	16:25	156_3276.9	-31.8383	132.6384	50	2	21.5	36.1	32.9	2	y
28/11/2021	8:30	SS3_grassland	-31.8195	132.285	180	1				3	n
28/11/2021	11:30	SS3_mallee	-31.8186	132.2841	60	1				1	n
28/11/2021	14:29	156_5180	-31.8829	132.2807	45	3	25.6	48	37.5	3	y
28/11/2021	15:29	156_5188.2	-31.9576	132.3846	37	3	25	41.8	38.2	1	y
29/11/2021	10:10	18_9942	-31.4319	131.8143	40	2	25.6	35.5	36.2	2	n
29/11/2021	11:47	18_9956	-31.5695	131.9832	35	2	29.5	40	40.8	2	y
29/11/2021	13:00	163_18246.6	-31.6034	132.031	45	2	32.5	47	45	2	y
29/11/2021	14:30	156_5152.5	-31.5558	132.062	45	2	36	60		1	y
29/11/2021	15:45	156_3316.3	-31.6434	132.0762	50	2	32.6	60.4	48.9	2	y
29/11/2021	16:54	18_9966	-31.6828	132.1169	35	2	35.7	45.7	49.7	2	y
29/11/2021	17:43	156_5168.6	-31.7514	132.1836	30	2	32.8	44.4	44.7	2	y
1/12/2021	9:45	163_18285.7	-31.2901	131.5653	35	3	19.3	33	28.5	2	y
1/12/2021	10:48	156_5103.2	-31.2608	131.532	40	7	23.6	31.7	39.5	1	y
1/12/2021	13:31	18_9891	-31.4737	131.1161	45	2	23.6	31.7	39.5	1	n
1/12/2021	14:54	163_18339.4	-31.41	131.1232	35	7	25	42.3	26.6	1	y
1/12/2021	16:00	163_18332.6	-31.42	131.1694	35	7	20.3	35.6	33	2	y
1/12/2021	17:10	24B	-31.3686	131.1986	20	7	19.2	31.3	26.8	2	n
1/12/2021	18:00	24A	-31.3141	131.1876	35	2	20.2	28.5	26.8	2	n

Appendix 1 lists all specimens of Caelifera collected and preserved during the Bush Blitz. Collections made during this Bush Blitz will result in 217 specimens being added to public collections and an equivalent number of records added to publicly accessible databases. Site photos are collated in Appendix 2. Photos of individual grasshoppers are collated in Appendix 3. Locations of sites are presented in Figure 1.

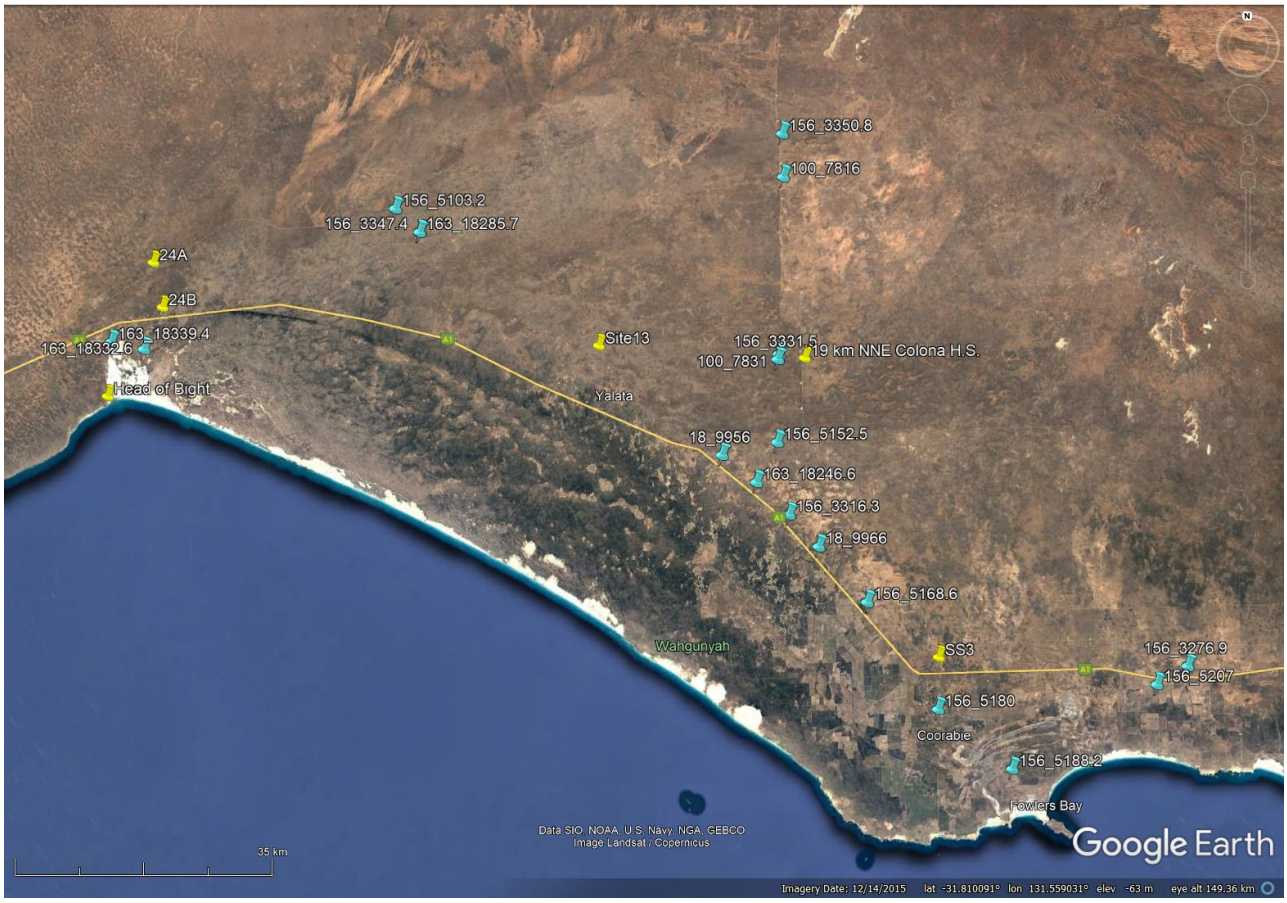

Figure 1. Locations of resurvey sites (blue) and new survey site (yellow).

3.1 Un-named or not formalised taxa

Most Australian grasshopper taxa have been assigned provisional names if they are yet to be formally described. Some of these species are documented in Rentz et al. 2003 but many are not. Some very common genera also are presently lacking names.

Table 3. Putatively un-named or not formalised taxa

Taxon	Comment
Beplessia sp3	Distribution well known but not yet described
GenusNovum95 ochrachea	Extremely common yet lacking a genus name
GenusNovum32 sp1	Very common yet lacking a genus name
GenusNovum6 sp2	Not previously recorded in the area but very common
Goniaea sp1	Possibly this species – recorded previously from the site it was collected, different leg colour to described species. Poorly documented

Pespulia sp9	Poorly documented
Achurimima P33	Abundant but poorly documented
Prorifera 187	Poorly documented

3.2 Putative new species (new to science)

In this report, 'putative new species' means an unnamed species that, as far as can be ascertained, was identified as a new species as a direct result of this Bush Blitz.

Table 4. Putative new species (new to science)	
Species	**Comment**
NA	NA

3.3 Exotic and pest species

No exotic species were sighted. The Australian Plague Locust *Chortoicetes terminifera* was observed at some locations but in low numbers and was not collected. The Spur-throated Locust *Austracris guttulosa* was also sighted at a couple of locations (SS3, Head of the Bight) but it does not cause problems in southern Australia.

Table 5. Exotic and pest species recorded			
Exotic/pest species	**Location sighted/observed**	**Indication of abundance**	**Comments**

3.4 Threatened species

None encountered.

Table 6. Threatened species			
Species	**Listing status and level (EBPC, State/Territory)**	**Location sighted/observed**	**Indication of abundance**

3.5 Range extensions

Spotted Neenan, Genus Novum 6 sp2

Table 7. Range extensions or significant infill in distribution records for species			
Species	**Location sighted/observed**	**Distance from nearest known record (km)**	**Comments**
Genus Novum 6 sp2	-31.455813, 132.065774 -31.183972, 132.080535 -31.453524, 132.104538	~150 km	One of the more common species so appears to have either shifted range or recovered to high density.

3.6 Genetic information

All vouchers collected were stored in ethanol after photographing them.

4. Information on species lists

I am confident with most identifications based on existing photographic references (esp. Rentz et al. 2003) and the previous survey work in the area. However, some specimens were nymphs (e.g., *Monistria*) and so were not identified to species.

5. Information for land managers

In general, the presence of 'matchstick grasshoppers' (Family Morabidae) indicates that habitats have had low historical disturbance. This is particularly so for terrestrial species which in the present survey include *Achurimima P33* (a grass feeder), where overgrazing can displace species that are then unable to return unless moving in from contiguous, adjacent habitat. The shrub-dwelling taxa, e.g., *Prorifera* species, are also vulnerable to extensive wildfire. Surveying for matchstick grasshoppers is a potentially rapid way to assay historical disturbance levels.

6. Other significant findings

The resurvey of previous collection sites from last century provides a rare perspective on change in invertebrate fauna over time. I resurveyed 19 sites and found slightly more species than were found in the earlier surveys (29 vs. 26 species). Significantly more species were found per site in the current survey compared to the past surveys of the same sites (paired t-test, $p = 0.039$, $t = 2.23$) and the overlap in species ranged from 0 to 33% with a mean of 17%. There was no correlation between the number of species seen at each site between surveys ($r = 0.01$, $p = 0.692$). Four species from historical surveys were not encountered in the present survey, and seven species from the present survey were not encountered in the historical surveys (Table 8).

Historical	Resurvey
Achurimima P33	*Achurimima P33*
Apotropis sp9	-

Apotropis vittata	*Apotropis vittata*
Austracris guttulosa	*Austracris guttulosa*
Austroicetes frater	*Austroicetes frater*
-	*Austroicetes nullarborensis*
Austroicetes pusilla	*Austroicetes pusilla*
Azelota sp	-
Beplessia sp3	*Beplessia sp3*
Chortoicetes terminifera	*Chortoicetes terminifera*
Coryphistes ruricola	*Coryphistes ruricola*
-	*Ecphantus quadrilobus*
GenusNov32 sp1	*GenusNov32 sp1*
GenusNov39 sp1	-
GenusNov41 sp1	-
GenusNov95 ochracea	*GenusNov95 ochrachea*
-	*GenusNov6 sp2*
Goniaea australasiae	*Goniaea australasiae*
-	*Goniaea opomaloides*
Goniaea sp1	*Goniaea sp1*
Macrotona sp16	*Macrotona sp*
-	*Monistria*
Pespulia sp9	*Pespulia sp9*
Prorifera granulosa	*Prorifera granulosa*
Prorifera spanner	*Prorifera spanner*
-	*Prorifera P187*
Pycnostictus seriatus	*Pycnostictus seriatus*
Qualetta maculata	*Qualetta maculata*
Tapesta carneipes	*Tapesta carnipes*
Typaya semicristata	*Typaya semicristata*
Urnisa guttulosa	*Urnisa guttulosa*
Urnisa rugosa	*Urnisa rugosa*
-	*Urnisiella sp*

The historical surveys were done over a wider range of times and thus might have been expected to yield more taxa. Moreover, some taxa seen in the current survey, particularly *Monistria sp.*, *Genus Novum 6 sp2* and *Urnisiella sp.*, were quite commonly encountered and very distinctive. The apparent rise in abundance of the latter species and the overall increase in observed diversity per site may reflect changes in habitat since the historical surveys and one major factor that has happened since then is a dramatic reduction in rabbit numbers with the introduction of the calcivirus in 1996.

7. Conclusions

This survey of grasshoppers (Caelifera) in the Yalata-Fowlers Bay area found 29 species present over 26 locations, 22 of which had been surveyed over 50 years ago. No new species (to science) were discovered, and most species encountered had been encountered in previous surveys. However, some taxa are now common that were apparently absent in the previous surveys, and one of these taxa represents a range extension of ~150 km. Thus although the

grasshopper fauna has not changed dramatically in the past 50 years, there may be some changes in species composition and relative abundance that reflect the dramatic changes in vegetation cover that have likely occurred with the reduction in rabbit numbers due to calicivirus. This possibility warrants future study.

Acknowledgements

I thank Matt Shaw for the invitation, Courtney Webber and Helen Cross for logistics, Neville Miller, Brandon Willis, Isaac Willis, Charlie Coleman, Scotty (surname unknown), Dave Armstrong, Sabrina Trocini, Andrea Stiglingh and Valerie Bradshaw for help in the field, Allesandro Madonna for advice and historical perspectives, and Jess Viersma for all the food!

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Appendices

Appendix 1. List of Orthopteroidea recorded during the Yalata-Fowlers Bush Blitz

Family	Species	Common name	Putative new species	Threatened (EPBC Act)	Threatened (State/Territory Act)	Exotic/pest
Acrididae	*Apotropis vittatum*	Common Striped Grasshopper	No	No	No	No
Acrididae	*Austracris guttulosa*	Spur-throated Locust	No	No	No	No/Yes
Acrididae	*Austroicetes frater*	Southern Austroicetes	No	No	No	No
Acrididae	*Austroicetes nullarborensis*	Nullarbor Austroicetes	No	No	No	No
Acrididae	*Austroicetes pusilla*	Confusing Austroicetes	No	No	No	No
Acrididae	*Beplessia sp3*	Nullarbor Beplessia	No	No	No	No
Acrididae	*Chortoicetes terminifera*	Australian Plague Locust	No	No	No	No/Yes
Acrididae	*Coryphistes ruricola*	Bark Mimicking Grasshopper	No	No	No	No
Acrididae	*Ecphantus quadrilobus*	Crested Tooth-grinder	No	No	No	No
Acrididae	*GenusNovum6 sp2*	Spotted Neenan	No	No	No	No
Acrididae	*GenusNovum32 sp1*	Reluctant Stonehopper	No	No	No	No
Acrididae	*GenusNovum95 ochrachea*	Common Red-leg	No	No	No	No
Acrididae	*Goniaea australis*	Gumleaf Grasshopper	No	No	No	No
Acrididae	*Goniaea opomaloides*	Mimetic Gumleaf Grasshopper	No	No	No	No
Acrididae	*Goniaea sp1*		No	No	No	No
Acrididae	*Macrotona sp.*		No	No	No	No
Acrididae	*Pespulia sp9*		No	No	No	No
Acrididae	*Pycnostictus seriatus*	Common Bandwing	No	No	No	No
Acrididae	*Qualetta maculata*	Spotted Bandwing	No	No	No	No
Acrididae	*Tapesta carnipes*	Blue-legged Hairy Grasshopper	No	No	No	No
Acrididae	*Typaya semicristata*	Wrinkle-headed Grasshopper	No	No	No	No
Acrididae	*Urnisa guttulosa*	Common Urnisa	No	No	No	No
Acrididae	*Urnisa rugosa*	Red-legged Urnisa	No	No	No	No

Acrididae	*Urnisiella sp*	Long-legged Sandhopper	No	No	No	No
Morabidae	*Achurimima P33*		No	No	No	No
Morabidae	*Prorifera 187*		No	No	No	No
Morabidae	*Prorifera granulosa*		No	No	No	No
Morabidae	*Prorifera spanner*		No	No	No	No
Pyrgomorphidae	*Monistria*		No	No	No	No
Tettigoniidae	Unknown		No	No	No	No
Phaneropteridae	*Tinzeda sp.*		No	No	No	No
Lonchodidae	*Sipyloidea sp.*		No	No	No	No
Mantidae	Unknown		No	No	No	No

Bush Blitz Final Report - Appendix 2

Michael Kearney

2022-05-25

Overview

This appendix provides photographs of each study site.

Notebook 18

Site: 18_9956



Site: 18_9966


Notebook 100

Site: 100_7186

Site: 100_7831



Notebook 156

Site: 156_3276_6




Site: 156_3316_3


Site: 156_3331_5

Site: 156_3347_4

Site: 156_3350_8

Site: 156_5103_2


Site: 156_5168_6




Site: 156_5180

Site: 156_5188_2

Site: 156_5207

Site: 156_5252_5


Notebook 163

Site: 163_18246_6




Site: 163_18285_7



Site: 163_18332_6



Site: 163_18339_4

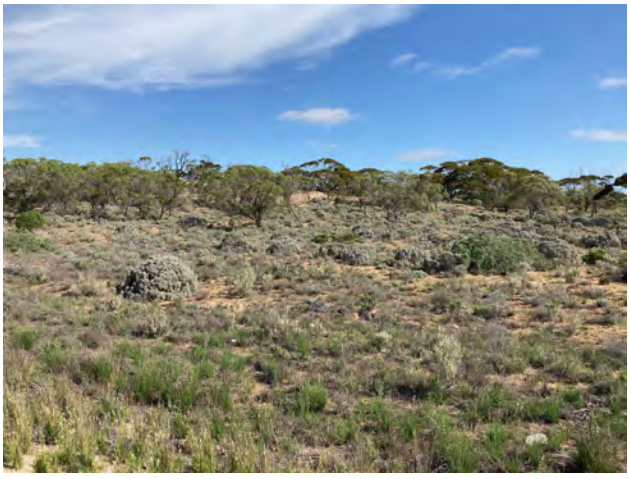



New Sites

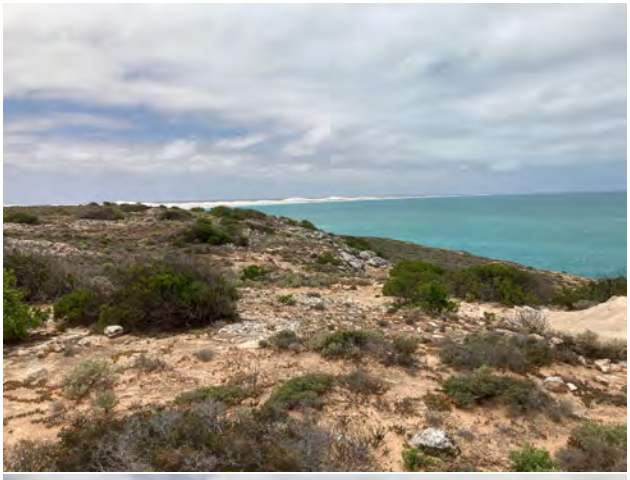
Site: 24A

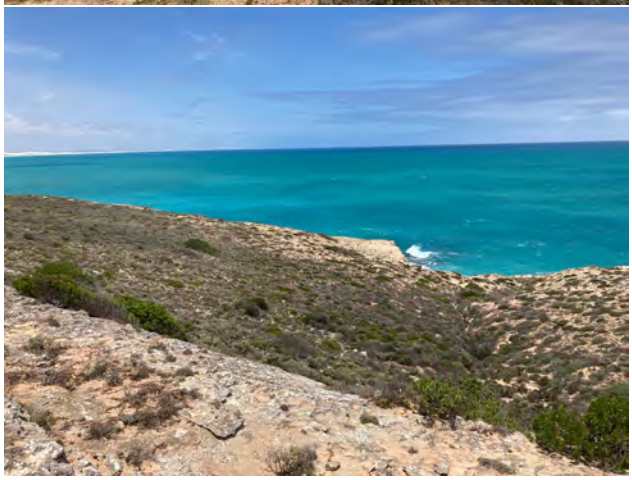


Site: 24B




Site: Head_of_Bight






Site: Site13




Site: SS3_grassy

Site: SS3_mallee


Bush Blitz Final Report - Appendix 3

Michael Kearney

2022-05-25

Overview

This appendix provides photographs of species collected.

Morabidae

Species: Achurimima P33

156_3350.8 25/11/2021 photo ID 8342

156_3350.8 25/11/2021 photo ID 8343

156_3350.8 25/11/2021 photo ID 8363

156_3350.8 25/11/2021 photo ID 8364

Site 156_3350.8 25/11/2021 photo ID 8366 genetic sample WAR7198

156_3350.8 25/11/2021 photo ID 8368

Site 156_3350.8 25/11/2021 photo ID 8370 genetic sample WAR7197

Site 156_3350.8 25/11/2021 photo ID 8371 genetic sample WAR7180

156_3350.8 25/11/2021 photo ID 8372

Site 156_3347.4 25/11/2021 photo ID 8375 genetic sample WAR7207

156_3347.4 25/11/2021 photo ID 8376

156_3347.4 25/11/2021 photo ID 8377

Species: Prorifera

Site 19 km NNE Colona H.S. 25/11/2021 photo ID 8333 genetic sample WAR7184

Site 156_3350.8 25/11/2021 photo ID 8341 genetic sample WAR7188

Species: Prorifera granulosa

Site 19 km NNE Colona H.S. 25/11/2021 photo ID 8313 genetic sample WAR7161

Site 19 km NNE Colona H.S. 25/11/2021 photo ID 8316 genetic sample WAR7162

156_3331.5 25/11/2021 photo ID 8426

156_3331.5 25/11/2021 photo ID 8427

156_3331.5 25/11/2021 photo ID 8428

Species: Prorifera P187

Site 156_3331.5 25/11/2021 photo ID 8424 genetic sample WAR7235

156_3331.5 25/11/2021 photo ID 8425

Species: Prorifera spanner

Site 156_5207 27/11/2021 photo ID 8433 genetic sample WAR7243

156_5207 27/11/2021 photo ID 8434

156_5207 27/11/2021 photo ID 8435

156_5207 27/11/2021 photo ID 8436

156_5207 27/11/2021 photo ID 8437

SS3_grassland 28/11/2021 photo ID 8485

SS3_grassland 28/11/2021 photo ID 8486

Site 156_5152.5 29/11/2021 photo ID 8521 genetic sample WAR7270

156_5152.5 29/11/2021 photo ID 8522

156_5152.5 29/11/2021 photo ID 8523

Acrididae

Species: Apotropis vittata

Site 156_3276.9 27/11/2021 photo ID 8471 genetic sample WAR7273

156_3276.9 27/11/2021 photo ID 8472

Site 156_5103.2 1/12/2021 photo ID 8532 genetic sample WAR7306

156_5103.2 1/12/2021 photo ID 8533

156_5103.2 1/12/2021 photo ID 8534

Species: Apotropis?

19 km NNE Colona H.S. 25/11/2021 photo ID 8323

Site 19 km NNE Colona H.S. 25/11/2021 photo ID 8324 genetic sample WAR7179

Species: Austroicetes

19 km NNE Colona H.S. 25/11/2021 photo ID 8327

19 km NNE Colona H.S. 25/11/2021 photo ID 8328

19 km NNE Colona H.S. 25/11/2021 photo ID 8332

156_3350.8 25/11/2021 photo ID 8344

Site 156_3350.8 25/11/2021 photo ID 8345 genetic sample WAR7186

156_3350.8 25/11/2021 photo ID 8346

156_3350.8 25/11/2021 photo ID 8347

156_3350.8 25/11/2021 photo ID 8348

Site 100_7816 25/11/2021 photo ID 8405 genetic sample WAR7200

Site13 29/11/2021 photo ID 8512

Species: Austroicetes frater

Site 156_5207 27/11/2021 photo ID 8431 genetic sample WAR7240

156_5207 27/11/2021 photo ID 8432

Species: Austroicetes nullarborensis

156_3350.8 25/11/2021 photo ID 8336

Site 156_3350.8 25/11/2021 photo ID 8337 genetic sample WAR7170

156_3350.8 25/11/2021 photo ID 8338

Site 156_3350.8 25/11/2021 photo ID 8355 genetic sample WAR7199

156_3350.8 25/11/2021 photo ID 8356

Site 156_3350.8 25/11/2021 photo ID 8357 genetic sample WAR7194 WAR7196

156_3350.8 25/11/2021 photo ID 8358

Site 156_3347.4 25/11/2021 photo ID 8378 genetic sample WAR7205

156_3347.4 25/11/2021 photo ID 8379

Site 156_3347.4 25/11/2021 photo ID 8389 genetic sample WAR7216

156_3347.4 25/11/2021 photo ID 8390

156_3347.4 25/11/2021 photo ID 8391

100_7816 25/11/2021 photo ID 8406

Site 156_3331.5 25/11/2021 photo ID 8416 genetic sample WAR7201

156_3331.5 25/11/2021 photo ID 8417

Site 156_3331.5 25/11/2021 photo ID 8421 genetic sample WAR7246

156_3331.5 25/11/2021 photo ID 8423

SS3_grassland 28/11/2021 photo ID 8488

SS3_grassland 28/11/2021 photo ID 8489

SS3_grassland 28/11/2021 photo ID 8491

Site13 29/11/2021 photo ID 8499

Site13 29/11/2021 photo ID 8500

Site13 29/11/2021 photo ID 8501

Site13 29/11/2021 photo ID 8502

Site13 29/11/2021 photo ID 8503

Site13 29/11/2021 photo ID 8504

Site Site13 29/11/2021 photo ID 8508 genetic sample WAR7309

Site13 29/11/2021 photo ID 8509

Site13 29/11/2021 photo ID 8510

Site13 29/11/2021 photo ID 8513

Site13 29/11/2021 photo ID 8514

18_9956 29/11/2021 photo ID 8516

18_9956 29/11/2021 photo ID 8517

18_9956 29/11/2021 photo ID 8518

18_9956 29/11/2021 photo ID 8520

Species: Austroicetes pusilla

156_3276.9 27/11/2021 photo ID 8492

156_3276.9 27/11/2021 photo ID 8493

156_3276.9 27/11/2021 photo ID 8494

156_3276.9 27/11/2021 photo ID 8495

156_3276.9 27/11/2021 photo ID 8496

156_3276.9 27/11/2021 photo ID 8497

156_3276.9 27/11/2021 photo ID 8498

Species: Beplessia sp3

Site 19 km NNE Colona H.S. 25/11/2021 photo ID 8325 genetic sample WAR7173

19 km NNE Colona H.S. 25/11/2021 photo ID 8326

Site 156_3347.4 25/11/2021 photo ID 8392 genetic sample WAR7187

156_3347.4 25/11/2021 photo ID 8393

Site 156_5207 27/11/2021 photo ID 8443 genetic sample WAR7238

156_5207 27/11/2021 photo ID 8444

156_5207 27/11/2021 photo ID 8445

Species: Coryphistes ruricola

Site 100_7831 25/11/2021 photo ID 8412 genetic sample WAR7223

100_7831 25/11/2021 photo ID 8413

Species: Ecphantus quadrilobus

Site SS3_grassland 28/11/2021 photo ID 8476 genetic sample WAR7266

SS3_grassland 28/11/2021 photo ID 8477

Species: GenusNov 32 sp1

Site 19 km NNE Colona H.S. 25/11/2021 photo ID 8317 genetic sample WAR7169

19 km NNE Colona H.S. 25/11/2021 photo ID 8318

19 km NNE Colona H.S. 25/11/2021 photo ID 8319

Site 156_5180 27/11/2021 photo ID 8473 genetic sample WAR7264

156_5180 27/11/2021 photo ID 8474

Site SS3_grassland 28/11/2021 photo ID 8478 genetic sample WAR7256

SS3_grassland 28/11/2021 photo ID 8479

SS3_grassland 28/11/2021 photo ID 8480

SS3_grassland 28/11/2021 photo ID 8481

Site SS3_grassland 28/11/2021 photo ID 8482 genetic sample WAR7260

SS3_grassland 28/11/2021 photo ID 8483

SS3_grassland 28/11/2021 photo ID 8484

Species: GenusNov6 sp2

Site 19 km NNE Colona H.S. 25/11/2021 photo ID 8320 genetic sample WAR7175

19 km NNE Colona H.S. 25/11/2021 photo ID 8321

Site 19 km NNE Colona H.S. 25/11/2021 photo ID 8322 genetic sample WAR7172 WAR7150

19 km NNE Colona H.S. 25/11/2021 photo ID 8330

19 km NNE Colona H.S. 25/11/2021 photo ID 8331

156_3350.8 25/11/2021 photo ID 8334

Site 156_3350.8 25/11/2021 photo ID 8335 genetic sample WAR7185

156_3350.8 25/11/2021 photo ID 8339

156_3350.8 25/11/2021 photo ID 8340

156_3350.8 25/11/2021 photo ID 8350

156_3350.8 25/11/2021 photo ID 8351

156_3350.8 25/11/2021 photo ID 8359

156_3350.8 25/11/2021 photo ID 8360

156_3350.8 25/11/2021 photo ID 8361

Site 156_3350.8 25/11/2021 photo ID 8362 genetic sample WAR7177

Site 156_3331.5 25/11/2021 photo ID 8414 genetic sample WAR7242

156_3331.5 25/11/2021 photo ID 8415

Species: Goniaea

156_5103.2 1/12/2021 photo ID 8539

156_5103.2 1/12/2021 photo ID 8540

Site 156_5103.2 1/12/2021 photo ID 8541 genetic sample WAR7349

Species: Goniaea sp1

Site 156_5207 27/11/2021 photo ID 8439 genetic sample WAR7233 WAR7239

156_5207 27/11/2021 photo ID 8440

Site 156_5207 27/11/2021 photo ID 8441 genetic sample WAR7239

156_5207 27/11/2021 photo ID 8442

Species: Macrotona

Site 100_7831 25/11/2021 photo ID 8410 genetic sample WAR7219

100_7831 25/11/2021 photo ID 8411

Site 156_5207 27/11/2021 photo ID 8429 genetic sample WAR7236

156_5207 27/11/2021 photo ID 8430

Site 156_3276.9 27/11/2021 photo ID 8465 genetic sample WAR7268

156_3276.9 27/11/2021 photo ID 8466

Site 156_3276.9 27/11/2021 photo ID 8467 genetic sample WAR7259

156_3276.9 27/11/2021 photo ID 8468

156_3276.9 27/11/2021 photo ID 8469

18_9966 29/11/2021 photo ID 8524

18_9966 29/11/2021 photo ID 8525

18_9966 29/11/2021 photo ID 8527

18_9966 29/11/2021 photo ID 8528

156_5168.6 29/11/2021 photo ID 8529

156_5168.6 29/11/2021 photo ID 8530

Species: Monistria

Site 156_3276.9 27/11/2021 photo ID 8470 genetic sample WAR7272

Species: Pespulia sp9

156_3350.8 25/11/2021 photo ID 8352

156_3350.8 25/11/2021 photo ID 8353

156_3350.8 25/11/2021 photo ID 8354

Site 156_3347.4 25/11/2021 photo ID 8382 genetic sample WAR7203

156_3347.4 25/11/2021 photo ID 8385

156_3347.4 25/11/2021 photo ID 8386

156_3347.4 25/11/2021 photo ID 8388

Site 156_3347.4 25/11/2021 photo ID 8394 genetic sample WAR7208

156_3347.4 25/11/2021 photo ID 8395

Species: Porraxia?

SS3_grassland 28/11/2021 photo ID 8487

Species: Qualetta maculata

Site 156_3331.5 25/11/2021 photo ID 8418 genetic sample WAR7231

156_3331.5 25/11/2021 photo ID 8419

156_3331.5 25/11/2021 photo ID 8420

Site 163_182857 1/12/2021 photo ID 8531 genetic sample WAR7340

Species: Tapesta carnipes

156_3350.8 25/11/2021 photo ID 8365

Site 156_3347.4 25/11/2021 photo ID 8399 genetic sample WAR7218

156_3347.4 25/11/2021 photo ID 8401

100_7816 25/11/2021 photo ID 8407

100_7816 25/11/2021 photo ID 8408

Species: Typaya semicristata

Site 156_3347.4 25/11/2021 photo ID 8396 genetic sample WAR7213

156_3347.4 25/11/2021 photo ID 8398

Site 100_7816 25/11/2021 photo ID 8403 genetic sample WAR7211

100_7816 25/11/2021 photo ID 8404

Species: unknown

156_5207 27/11/2021 photo ID 8446

Species: Urnisiella

156_5103.2 1/12/2021 photo ID 8543

Site 156_5103.2 1/12/2021 photo ID 8544 genetic sample WAR7332

156_5103.2 1/12/2021 photo ID 8545