Yeo Lake Nature Reserve Project Report

Desert Discovery Inc.
August 2022

Naming The Hut at Yeo Lake

Geoff Young

As Senior Operations Officer with the Department of Conservation and Land Management (CALM) during the 1990's, I was fascinated by my first visit to a derelict hut located adjacent to the Anne Beadell Highway within Yeo Lake Nature Reserve.

It seemed a pity to allow this pioneering site to deteriorate into total ruin, and as the area was now managed by CALM, I decided to lead a series of work parties to tidy up the surroundings, renovate the buildings and recondition the well.

At that stage I had no information about the history of the site, so in keeping with local practice on other CALM managed estate I had a routed timber sign produced and erected which simply said, "Yeo Lake Homestead".

Years later I became aware that it was Leo Boni and his wife Betty who built the hut using second hand materials from Leonora and dug the well in the early 1960's, with the aim of establishing a pastoral lease. Although the well water was potable, four bores that were drilled proved salty and unsuitable for cattle, so the area was never stocked, and the enterprise was abandoned.

Some people refer to the site as "Boni's Hut". Others call it "Yeo Homestead", "Bonney's Hut" or "Bonny's Hut". Regardless of what name is used, many visitors continue to enjoy the surroundings and marvel at the pioneering spirit and hard work done by Leo and Betty.

During Desert Discovery 2022 I spoke to Nigel Wessels, the current Goldfields Regional Manager of the Department of Biodiversity ,Conservation and Attractions about the future of the hut. Nigel confirmed that funding has been secured to undertake another renovation of the building this winter, with the aim of allowing ongoing use while maintaining the original fabric of the structure.

Cover: Artwork of Yeo Lake Homestead: Bevan Buirchell
Photo of Yeo Lake: Graham Goods.

Contents

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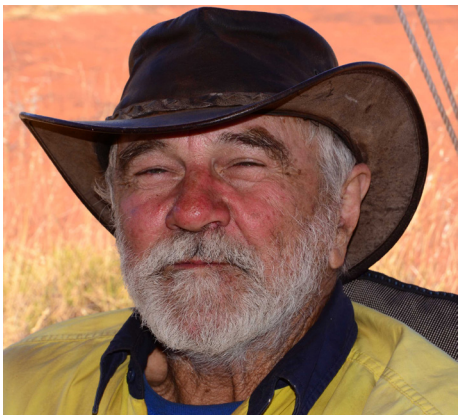
President: Mark Conlan.

Secretary: Colleen Barnes.

Committee: Ben Blomfield.



Treasurer: Mark Conlan.

Committee: Nathan Johnson

Committee: Linda Brotherton

Committee: Bevan Buirchell

Desert Discovery Inc. Team Leaders

Mammals and Reptiles:	Nathan Johnson
Birds:	Linda Brotherton
Botany:	Alan Bedggood
Invertebrates:	Bevan Buirchell
Logistics /Pioneers:	Ben Blomfield

Introduction

Mark Conlan: President, Desert Discovery Inc.

Desert Discovery Inc. has great pleasure in presenting to you the 2022 Yeo Lake Nature Reserve Project Report. The 2022 project was held at Yeo Lake Nature Reserve (YLNR), which is approximately 250km northeast of Laverton, Western Australia. The Reserve is south of the Great Central Road and the Anne Beadell Highway runs through the southern section of the Reserve. The Project was held over the period 15–28 August 2022.

Desert Discovery conducts a project every two years, although the project planned for 2020 was cancelled due to the COVID pandemic. Considerable effort goes into planning each project and it usually takes in excess of 12 months to get the project off the ground. Many factors have to be taken into account, including consultation with landholders and stakeholders, safety considerations, water availability, adequate access, access to fuel etc. Once a site has been identified a reconnaissance trip to the selected site usually occurs 12 months out from the project to assess the suitability of the site and to ascertain if it meets the various criteria for a Desert Discovery project. Once that has been completed satisfactorily, leaders of each of the teams commence planning and liaison takes place with external stakeholders.

Early on in the planning for the 2022 Project it was decided that a site would be chosen that was not on indigenous country. Western Australia's indigenous communities were closed throughout 2020 to early 2022 due to COVID and there was no certainty these closures would be lifted by the date of the Project.

The Committee did consider a number of sites across the Central Desert region but discussions with representatives from the Kalgoorlie office of the Department of Biodiversity, Conservation and Attractions (DBCA) proved fruitful in identifying a site that met our criteria. DBCA had plans to develop a Land Management Plan for the YLNR but were hindered by a lack of resources and only had limited biological survey data for the area. DBCA also indicated that a project conducted on the YLNR would greatly assist with the development of their Land Management Plan. They also offered to provide logistical support (eg additional water, repair of toilet) and would have their personnel attend the Project. Based upon this interaction and the adequacy of the site YLNR was selected as the Project site for 2022.

Desert Discovery applied for and received a project grant from the Victorian based Wettenhall Environment Trust and these funds were used to sponsor the attendance at the Project of early career scientists, the purchase of items for the Entomology Team and other sundry items. We were fortunate that three Sydney based early career scientists, at various stages of their post graduate studies, agreed to join the Project for a week. Every aspect of their participation in the Project was appreciated and enjoyed by all Project participants. The Committee would like to thank Mirinda Thorpe for her initiative in suggesting the Wettenhall Environment Trust grant application, preparing and submitting the grant application and for attending to the subsequent grant acquittal process. The Committee will work towards enticing early career scientists to participate in the 2024 Project.

On most nights there was an information session in the marquee where Team Leaders kept all members of the Project up to date on their Team's daily activities and significant discoveries. This was usually followed by a presentation on a topic of interest.

Members of Desert Discovery come from all over Australia and the projects are usually the only time when members get together. As such it is usual to conduct the Annual General Meeting of Desert Discovery Inc. and this was held at YLNR on the 19 August 2022.

Mark Conlan.

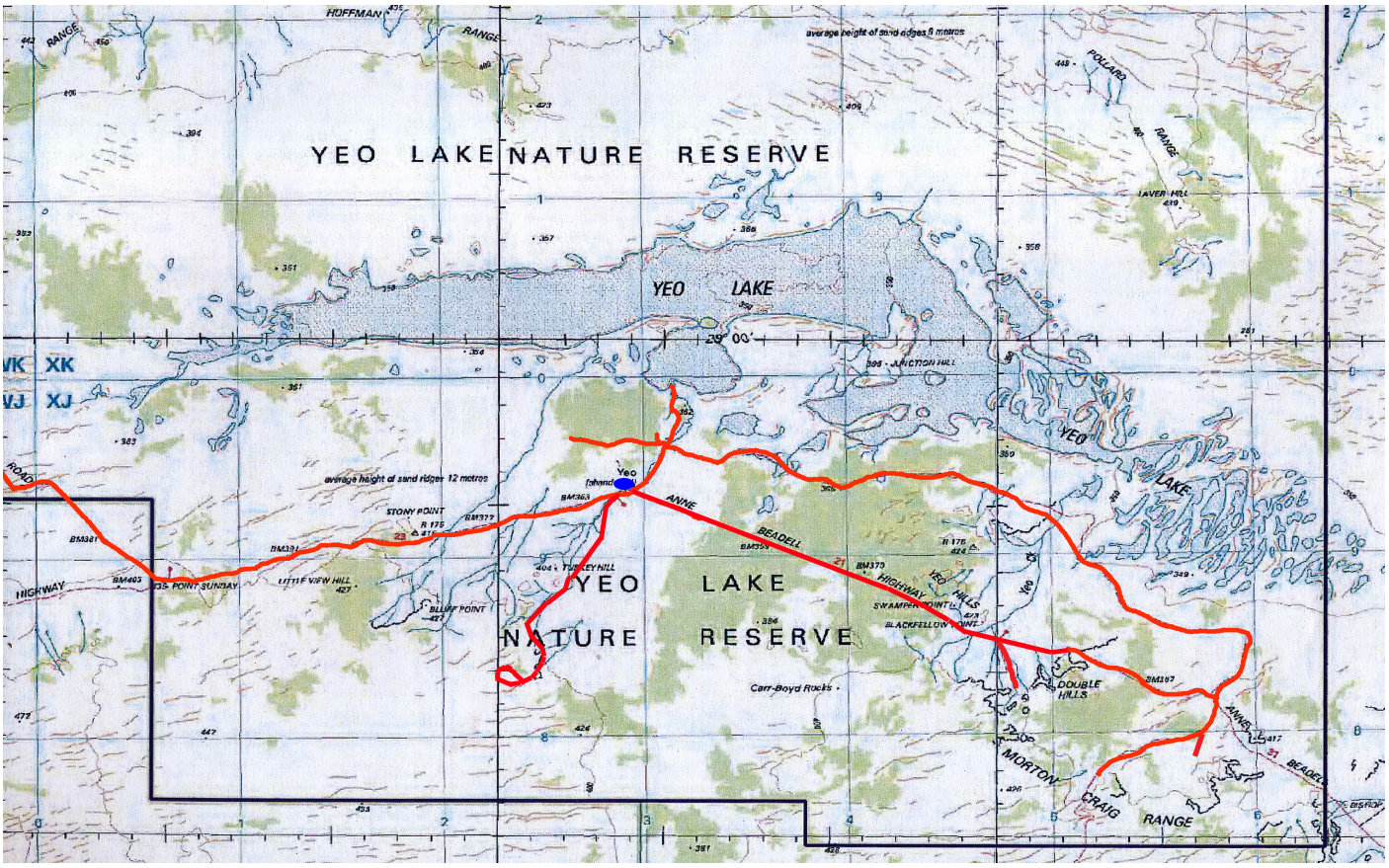
The Project Report has been prepared by the various Leaders of the Teams and includes descriptions of the Teams' activities and discoveries. The information within their Reports gets distributed to various Government agencies, including the WA Herbarium and WA Museum as well as Non-government agencies e.g. Birds Australia.

A special thank you to Maree Goods, Mal McKinty and Libby Sakker for their wonderful effort in producing the Yeo Lake Nature Reserve Project Report.

Also thank you to everyone who was involved in bringing the Yeo Lake Nature Reserve Project to fruition. We do hope you will find the Yeo Lake Nature Reserve Project Report interesting reading.

Location Map

Phil Bianchi and Maree Goods



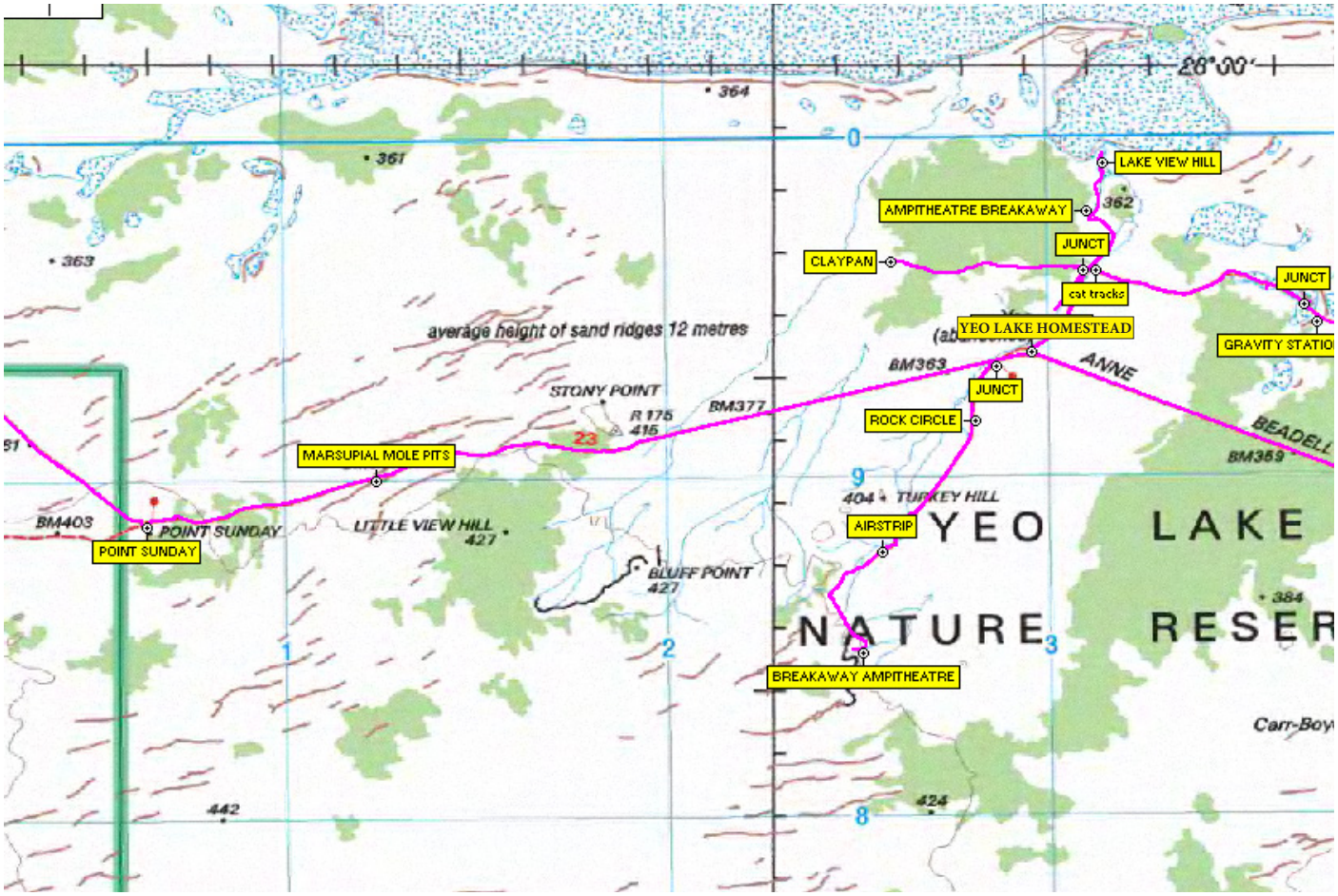
Approximate position of tracks travelled for surveying.

Approximate position of base camp - Yeo Lake Homestead.

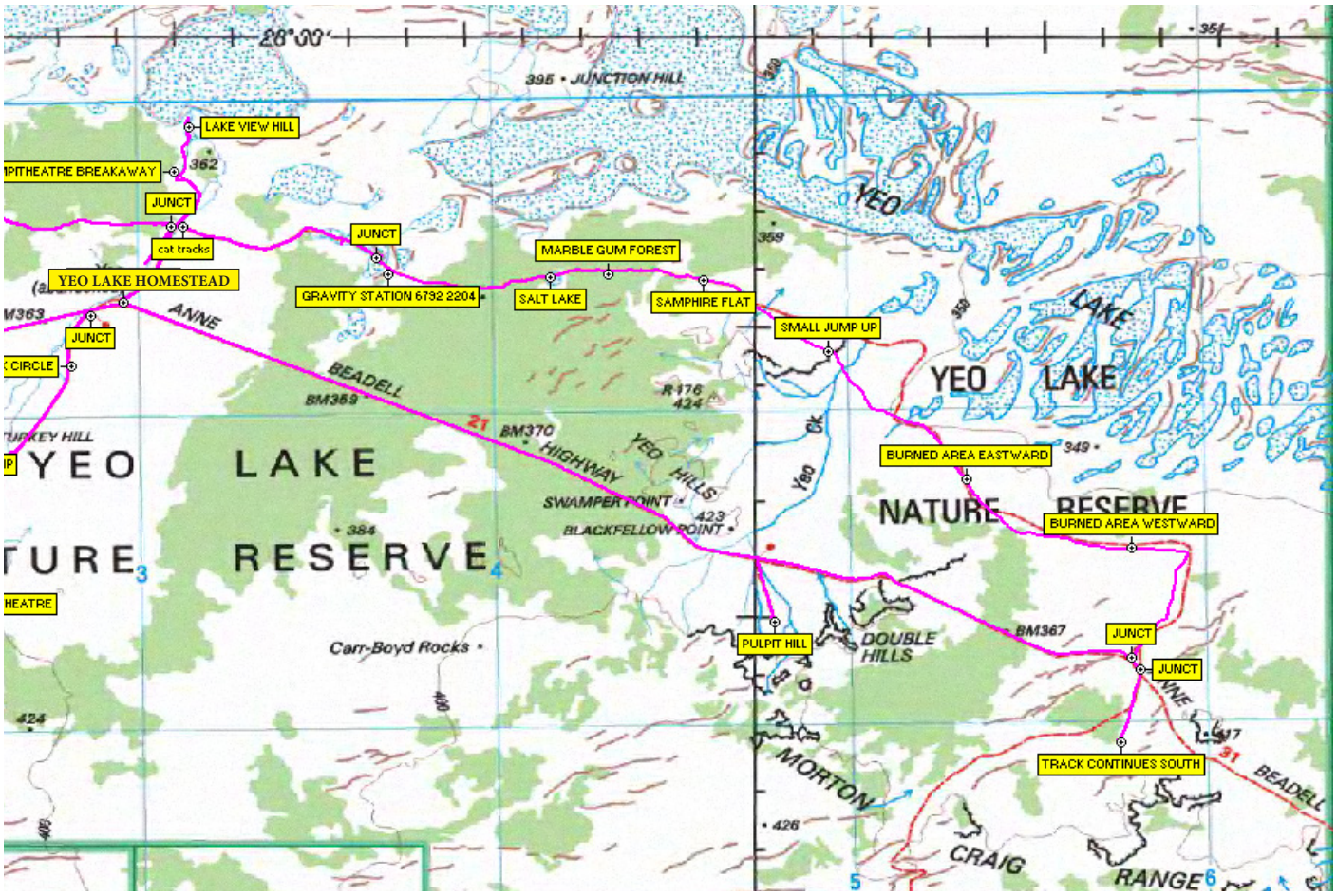
Tracks traverssed for surveying at Yeo Lake Nature Reserve. Map: Maree Goods

Phil Bianchi.

Maree Goods.



Western section of Yeo Lake Nature Reserve with waypoints. Map: Phil Bianchi.



Eastern section of Yeo Lake Nature Reserve with waypoints. Map: Phil Bianchi.

List of Teams and Participants

Colleen Barnes

Logistics/Pioneers
Ben Blomfield
Geoff Young and Jenny Taylor
Stuart and Kerrie Thorpe
Graham Young

Mammals and Reptiles
Nathan Johnson
Mirinda Thorpe and Iestyn Hosking
Libby Sakker
Graham Young
Colleen Thorne
Neil Macumber
Colleen Barnes
Allie Hanly
Stuart and Kerrie Thorpe

Moles
Geoff Young and Jenny Taylor
Stuart and Kerrie Thorpe
Mirinda Thorpe

Birds
Linda Brotherton
Wayne O'Sullivan
David and Miriam Mell
Ian Stewart
Tom Stewart

Invertebrates
Bevan Buirchell
Mark Heath
Jeremy Wallace

Botany
Alan Bedggood
Mark and Sue Conlan
Maree and Graham Goods
Russell Wait
Phil Bianchi
Richard House
John Baas
Thomas Mesaglio
Sophie Yang
Ruby Stephens

Fungi
Mal McKinty

Tracking Surveys
Joss Haiblen and Trish Macdonald
Andrew Tatnell and Libby Goodchild
Andreas and Christine Magun

Department of Biodiversity, Conservation and Attractions
Katherine Hope
Melissa Mykytiuk
Nikita Vennik
Tiana Jones
Tegan Payne

Visitors
Nigel Wessels (Regional Manager, DBCA)
Peter Batt (DBCA)
Rachel Paltridge (Indigenous Desert Alliance)
Hannah Cliff (IDA)

Yeo Lake Nature Reserve. Photo: Graham Goods.

Logistics

Text: Ben Blomfield. Photos: Jenny Taylor

In June, Police and the Royal Flying Doctor Service were advised of our proposed Yeo Lake Nature Reserve Project as a courtesy, and the Medical Chest was ordered. In early July, the Supper Supplies were purchased and packed into cartons.

The Ngaanyatjarra Council in Alice Springs and the Department of Lands and Heritage in Perth were contacted in June for assistance with Permits. Both these Departments have been of great assistance to Desert Discovery (DD) for past Projects and Group Permits were issued. Although dates and wording were a little confusing at first, we were assured they would suffice.

In mid July, the Trailer was checked, gear sorted and reloaded with the Project's requirements thanks to Mark and Sue Conlan, and Mick Corney. The Donkey Boiler and shower set up were not included as there were existing "facilities" at Yeo Lake Homestead which was to be the location of our base camp.

It was noted during the November 2021 Recce that the existing Toilet at Yeo Lake Homestead was full and the Well was observed not to be replenishing as expected, so water supplies were a concern. This was passed onto Katherine Hope at Department of Biodiversity, Conservation and Attractions (DBCA) Kalgoorlie, and the toilet was refurbished, and DBCA arranged to take a 1000L water trailer to boost water supplies.

Des Bunter happened to be passing Yeo Lake Nature Reserve (YLNR) in mid July 2022, and reported that the well covers were locked shut and the hand pump was operating slowly. He rang from Carnegie Station which is some 300kms NNW of Yeo Lake and advised that they had received a huge amount of rain and flooding there, so there was excitement that this could reach Yeo Lake. It did not!

It was reported that the existing Shower Structure at the Yeo Lake Homestead was a bit wobbly so it was decided to replace the structure. Three days before departing for the Project, we purchased new Steel Posts, a cross pipe and bags of cement, and these were jammed into the already loaded trailer.

Ben departed Perth with the Trailer on 11 August and arrived at Yeo Lake Homestead on Friday 12 August to find Geoff Young and Jenny Taylor already there. Stuart and Kerrie Thorpe arrived soon after.

On Saturday the old Shower supports were removed and the new steel structure concreted in. Meanwhile the Trailer was unloaded, and three toilet tents erected and holes dug using a Petrol Powered Post Hole Digger borrowed for the job. The door on the existing Shower Enclosure (which actually is an old corrugated Iron Tank with the door cut into one side) was repaired to make it more serviceable. The verandah on Yeo Lake Homestead was deemed unsafe so it was flagged off to prevent entry. More participants had arrived on Sunday so the Marquee was erected. Unfortunately, Ben had to leave the Project at this time for family reasons. Meanwhile, Graham Young arrived to assist the Logistics Team.

Preparations for camp operations were started with furniture set up in the Marquee and a general clean up made of the area.

Yeo Lake Homestead, trailer unpacked and ready for setting up the Project.

Marquee ready for setting up.

Marquee ready for the walls to be erected.

Headquarters ready to go.

Shower ready for use.

Geoff Young and Stuart Thorpe unloading wood for nightly campfire.

Throughout the two weeks of the Project, Logistics Team Members serviced the toilets, went out to collect firewood for evening gatherings, kept an eye on the operation of the well and hand pump and undertook other small tasks and assisted where required.

There was also liaison with passing members of the general public who were very surprised to see lots of people camping at the Yeo Lake Homestead! This included commercial motorcycle and four wheel drive tour groups.

Once the camp was set up and running, Logistic's Team members assisted in survey work with the Mammals and Reptiles Team and with Marsupial Mole surveys – as well as having some time to explore the YLNR.

There were many hands that assisted in the 'striking' of the camp and packing the trailer that Mark Conlan towed back to the metro area.

A huge **Thank You** to all who assisted in the smooth running of the camp and especially to Katherine and her DBCA Team at Kalgoorlie.

An example of a tour group who briefly stopped at Yeo Lake Homestead. Jenny Taylor would greet the tour groups and outline Desert Discovery activities and why so many people were camped there. Visitors were very impressed with the focus and purpose of DD.

Logistics Team. Graham Young, Geoff Young, Jenny Taylor, Stuart and Kerrie Thorpe.

Mammals and Reptiles

Text and Photos: Nathan Johnson

Introduction

The 'Mammal and Reptile Team' consisted of Nathan Johnson, Colleen Barnes, Elizabeth Sakker, Mirinda Thorpe, Iestyn Hosking, Stuart Thorpe, Kerrie Thorpe, Graham Young, Colleen Thorne, Allie Hanly and Neil Macumber. Surveys for mammals, reptiles and amphibians were conducted between 15 August and 28 August 2022. A range of survey techniques was employed around three main locations: two to the north and one to the north-east of basecamp at Yeo Lake Homestead. Other locations were surveyed opportunistically.

While the landscape and vegetation varied widely throughout the survey area, the logistical restrictions and size of the survey area meant that only those types within a ten-minute drive of the three base camps were surveyed. However, great effort was made to sample all those vegetation types in the local areas.

The team would like to thank the Department of Biodiversity, Conservation and Attractions (DBCA) for assistance in providing survey equipment as well as for their help with survey activities. Without their assistance the high number of total trap-nights would not have been possible.

This survey was conducted following the terms and conditions of *Licence to take Fauna for Scientific Purposes* No. *U299* issued by the Western Australian Department of Primary Industries and Regional Development and approved by the Wildlife Animal Ethics Committee.

Trapping Methods

The following techniques were used at various times during the survey:

- Pitfall Traps
- Crouch Box Traps
- Elliott Traps
- Funnel Traps
- Remote Cameras
- Active Search

Trapping Effort

Site	Dates	Survey Method					
		Pitfall	Box	Elliott	Funnel	Camera	Active
Site 1	17/8/22 -21/8/22	45	49	50	50		
Site 2		50	50	50	50		
Site 3		50	30	50			
Site 4			20	50	40		
Site 5	23/8/22 - 27/8/22	40	49	40	50		
Site 6		50	45	50	50		
Site 7		40	40	100	50		
Camera 1	16/8/22 - 25/8/22					9	
Camera 2	17/8/22 - 25/8/22					8	
Camera 3	16/8/22 - 24/8/22					8	
Camera 4	16/8/22 - 24/8/22					8	
Camera 5	19/8/22 - 24/8/22					5	
Basecamp	15/8/22 - 28/8/22						6
	Subtotal	275	283	390	290	38	6
	Total Trap Nights	**1282**					

Results

Species List

Mammals	
Austronomus australis	White-striped Free-tailed Bat
Camelus dromedarius	One-humped Camel*
Canis familiaris dingo	Dingo
Felis catus	Cat*
Macropus fuliginosus	Western Grey Kangaroo
Macropus rufus	Red Kangaroo
Ningaui ridei	Wongai Ningaui
Notomys alexis	Spinifex Hopping-mouse
Oryctolagus cuniculus	Rabbit*
Pseudomys hermannsburgensis	Sandy Inland Mouse
Sminthopsis ooldea	Ooldea Dunnart
Vulpes vulpes	Fox*
Reptiles	
Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink
Ctenophorus isolepis	Central Military Dragon
Ctenophorus nuchalis	Central Netted Dragon
Ctenophorus salinarum	Claypan Dragon
Ctenophorus scutulatus	Lozenge-marked Dragon
Ctenotus quattuordecimlineatus	Fourteen-lined Skink
Ctenotus schomburgkii	Barred Wedge-snouted Ctenotus
Ctenotus severus	Stern Rock Ctenotus
Diplodactylus conspicillatus	Variable Fat-tailed Gecko
Gehyra variegata	Tree Dtella
Heteronotia binoei	Binoe's Gecko
Lerista bipes	Western Two-toed Slider
Lerista desertorum	Great Desert Slider
Lialis burtonis	Burton's Legless Lizard
Lucasium stenodactylus	Sand-plain Gecko
Menetia greyii	Grey's Skink
Moloch horridus	Thorny Devil
Tiliqua sp.	Bluetongue
Amphibians	
Neobatrachus sp.	Burrowing Frog

* = introduced species.

Site Results

Site 1	Community	Coordinates
	Grassy Woodland	-28.05375, 124.31727
Description		**Estimated Fire History**
Mulga and mallee overstorey, mixed shrubs, long unburnt spinifex and grass understorey. Lots of logs and leaf litter.		20+ years

Species	Common Name	Survey Method			
		Pitfall	Box	Elliott	Funnel
Skinks					
Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink	1			
Menetia greyii	Grey's Skink	1			
Geckos					
Gehyra variegata	Tree Dtella	2			
	Subtotal	4	0	0	0
	Total Individuals	4			
	Total Species	3			
	Total Trap Nights	194			

Site 2	Community	Coordinates
	Grassy Woodland	-28.05426, 124.32922

Description	Estimated Fire History
Mulga overstorey, mixed shrubs, long unburnt spinifex understorey. Some fallen logs and leaf litter.	20+ years

Species	Common Name	Survey Method			
		Pitfall	Box	Elliott	Funnel
Mammals					
Notomys alexis	Spinifex Hopping-mouse			1	
Sminthopsis ooldea	Ooldea Dunnart	2			
Skinks					
Ctenotus quattuordecimlineatus	Fourteen-lined Skink	1			
	Subtotal	3		1	
	Total Individuals	4			
	Total Species	3			
	Total Trap Nights	200			

Site 3	Community	Coordinates
	Dune Shrubland	-28.04749, 124.34051
Description		**Estimated Fire History**
Mixed large shrub and mallee overstorey, mixed small shrub, spinifex and grass understorey.		20+ years

Species	Common Name	Survey Method			
		Pitfall	Box	Elliott	Funnel
Mammals					
Ningaui ridei	Wongai Ningaui	2			
Skinks					
Ctenotus quattuordecimlineatus	Fourteen-lined Skink	1			
Lerista bipes		1			
	Subtotal	4	0	0	0
	Total Individuals	4			
	Total Species	3			
	Total Trap Nights	130			

Site 4	Community	Coordinates
	Gibber Woodland	-28.04711, 124.33907
Description		**Estimated Fire History**
Short mulga overstorey, sparse small shrub, grass and chenopod understorey.		20+ years

Species	Common Name	Survey Method		
		Box	Elliott	Funnel
	Total Individuals	0		
	Total Species	0		
	Total Trap Nights	110		

Site 5	Community	Coordinates
	Chenopod Shrubland	-28.05904, 124.35239
Description		**Estimated Fire History**
Chenopod flat between mulga overstorey, mixed shrub midstorey and spinifex understorey.		20+ years

Species	Common Name	Survey Method			
		Pitfall	Box	Elliott	Funnel
Mammals					
Pseudomys hermannsburgensis	Sandy Inland Mouse		1	3	
Sminthopsis ooldea	Ooldea Dunnart	2			
Dragons					
Ctenophorus nuchalis	Central Netted Dragon	1			
Skinks					
Ctenotus severus	Stern Rock Ctenotus	1			
	Subtotal	4	1	3	0
	Total Individuals	8			
	Total Species	4			
	Total Trap Nights	179			

Site 6	Community	Coordinates
	Sandy Rise	-28.06042, 124.35696
Description		**Estimated Fire History**
Mulga overstorey, mixed shrub midstorey, spinifex understorey.		20+ years

Species	Common Name	Survey Method			
		Pitfall	Box	Elliott	Funnel
Mammals					
Pseudomys hermannsburgensis	Sandy Inland Mouse		1	2	
Sminthopsis ooldea	Ooldea Dunnart	2	1		
Skinks					
Ctenotus quattuordecimlineatus	Fourteen-lined Skink			1	
	Subtotal	2	2	3	0
	Total Individuals	7			
	Total Species	3			
	Total Trap Nights	195			

Site 7	Community	Coordinates
	Woodland	-28.08046, 124.33171
Description		**Estimated Fire History**
Mulga and mallee overstorey, sparse mixed shrub midstorey, sparse spinifex understorey. Some fallen logs.		20+ years

Species	Common Name	Survey Method			
		Pitfall	Box	Elliott	Funnel
Mammals					
Pseudomys hermannsburgensis	Sandy Inland Mouse			2	
Sminthopsis ooldea	Ooldea Dunnart	1		1	1
Skinks					
Ctenotus schomburgkii	Barred Wedge-snouted Ctenotus	3			1
	Subtotal	4	0	3	2
	Total Individuals	9			
	Total Species	3			
	Total Trap Nights	290			

Camera Traps

	Coordinates	Species	Common Name	Number
Camera 1	-28.05088, 124.28085	*Macropus rufus*	Red Kangaroo	10+
		Canis familiaris dingo	Dingo	2
		Vulpes vulpes	Fox	1
Camera 2	-28.03851, 124.33496	-	-	-
Camera 3	-28.15736, 124.27446	-	-	-
Camera 4	-28.15663, 124.27161	*Macropus rufus*	Red Kangaroo	1
Camera 5	-28.15985, 124.27245	-	-	-

Canis familiaris dingo, Dingoes.

Vulpes vulpes, Fox.

Macropus rufus, Red Kangaroo.

Additional Incidental Records

Species	Common Name	Date	Coordinates	Number
Diplodactylus conspicillatus	Variable Fat-tailed Gecko	16/8/22	-28.07536, 124.31983	1
Lucasium stenodactylus	Sand-plain Gecko	16/8/22	-28.07536, 124.31983	1
Lialis burtonis	Burton's Legless Lizard	16/8/22	-28.025165, 124.338501	1
Ctenophorus nuchalis	Central Netted Dragon	16/8/22	-28.02364, 124.33938	1
Ctenophorus scutulatus	Lozenge-marked Dragon	17/8/22	-28.07536, 124.31983	1
Austronomus australis	White-striped Free-tailed Bat	17/8/22	-28.07536, 124.31983	1
Austronomus australis	White-striped Free-tailed Bat	18/8/22	-28.07536, 124.31983	1
Ctenophorus isolepis	Central Military Dragon	19/8/22	-28076094, 124.318815	1
Macropus rufus	Red Kangaroo	19/8/22	-28.22229, 124.65567	1
Heteronotia binoei	Binoe's Gecko	19/8/22	-28.07536, 124.31983	1
Austronomus australis	White-striped Free-tailed Bat	19/8/22	-28.07536, 124.31983	1
Canis familiaris dingo	Dingo	19/8/22	-28.07536, 124.31983	1
Ctenophorus isolepis	Central Military Dragon	20/8/22	-28.11059, 124.14594	1
Austronomus australis	White-striped Free-tailed Bat	21/8/22	-28.07536, 124.31983	1
Lerista desertorum	Great Desert Slider	22/8/22	-28.07536, 124.31983	1
Canis familiaris dingo	Dingo	23/8/22	-28.07536, 124.31983	1
Austronomus australis	White-striped Free-tailed Bat	23/8/22	-28.07536, 124.31983	1
Macropus fuliginosus	Western Grey Kangaroo	23/8/22	-28.17299, 124.57573	1
Ctenophorus scutulatus	Lozenge-marked Dragon	23/8/22	-28.07536, 124.31983	1
Canis familiaris dingo	Dingo	24/8/22	-28.13411, 124.46896	1
Neobatrachus sp.	Burrowing Frog	25/8/22	-28.07561, 124.31976	1
Austronomus australis	White-striped Free-tailed Bat	25/8/22	-28.07536, 124.31983	1

Ctenophorus salinarum	Claypan Dragon	26/8/22	-28.02375, 124.33678	1
Macropus rufus	Red Kangaroo	26/8/22	-28.07149, 124.32446	2
Heteronotia binoei	Binoe's Gecko	26/8/22	-28.07561, 124.31976	1
Austronomus australis	White-striped Free-tailed Bat	26/8/22	-28.07536, 124.31983	1
Austronomus australis	White-striped Free-tailed Bat	27/8/22	-28.07536, 124.31983	1
Moloch horridus	Thorny Devil	27/8/22	-28.03859, 124.33451	1
Tiliqua sp.	Bluetongue	27/8/22	-28.02598, 124.33952	1

Discussion

Overall, the results for this survey were very good given that the survey was conducted at the end of winter with a total of 18 reptile species, 12 mammal species and 1 amphibian species recorded for a total of 31 species.

While the total number of individuals captured was very low compared to surveys from previous Projects, the results are very good when the weather conditions are considered, with many overnight lows reaching below 10°C, daytime temperatures rarely exceeding 25°C and quite a few days with a lot of wind, conditions which are not ideal for terrestrial vertebrates in this region.

Another major factor to consider is the lack of rain in the three years leading up to the survey which (as is discussed in several other Team Reports) has resulted in diminished food resources available for many desert animal species.

Notable records for this survey include Spinifex Hopping-mouse (*Notomys alexis*), Sandy Inland Mouse (*Pseudomys hermannsburgensis*) and Central Military Dragon (*Ctenophorus isolepis*) which all had low incidences compared to similar surveys. Under more favourable conditions these species would be expected to occur in much higher numbers.

Several species were recorded by secondary evidence; White-striped Free-tailed Bat (*Austronomus australis*) was heard most nights around basecamp, many tracks of One-humped Camels (*Camelus dromedarius*) and cats (*Felis catus*) as well as diggings and scats of rabbits (*Oryctolagus cuniculus*) were recorded across the survey area although none was seen, and the remains of a Bluetongue (*Tiliqua* sp.) and a Thorny Devil (*Moloch horridus*) were discovered in predator scats. Two species were recorded by their desiccated remains: Great Desert Slider (*Lerista desertorum*) and a Burrowing Frog (*Neobatrachus* sp.).

A large snake was also observed but it was not identifiable, so is not included in the species list.

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Mammal and Reptile Team

Left to right: Phil Bianchi (observer) Libby Sakker, Richard House (observer), Peter Batt (DBCA) Nigel Wessels (DBCA), Stuart Thorpe; DBCA staff - Tiana Jones, Katherine Hope, Tegan Payne and Nikita Vennik; Nathan Johnson (Team Leader) Iestyn Hosking, Neil Macumber. Kneeling - Melissa Mykutiuk (DBCA) and Mirinda Thorpe.

Kerrie Thorpe.

Allie Hanly.

Graham Young.

Colleen Thorne.

Photographers of Team members: Phil Bianchi, Neil Macumber, Nathan Johnson, Colleen Barnes and Maree Goods.

Sminthopsis ooldea, Ooldea Dunnart.

Ctenophorus nuchalis, Central Netted Dragon.

Pseudomys hermannsburgensis, Sandy Inland Mouse.
Photo: Neil Macumber.

Ctenophorus scutulatus, Lozenge-marked Dragon.

Ctenotus schomburgkii, Barred Wedge-snout Ctenotus.

Ctenotus severus, Stern Rock Ctenotus.

Marsupial Moles

Text: Mirinda Thorpe

Introduction

Two species of Marsupial Mole occur in Australia: the Northern Marsupial Mole or Kakarratul (*Notoryctes caurinus*) and Southern Marsupial Mole or Itjaritjari (*Notoryctes typhlops*) (Menkhorst and Knight 2011 and Van Dyck *et al.* 2013). Based on the current known distribution of both species of Marsupial Mole, Itjaritjari is more likely to occur at Yeo Lake Nature Reserve than Kakarratul (Van Dyck *et al.* 2013). A habitat suitability model was developed for Kakarratul (NESP, Threatened Species Recovery Hub 2021), indicating that Yeo Lake Nature Reserve is located within the area of low habitat suitability. A similar habitat suitability model could not be developed for Itjaritjari due to low detections (NESP, Threatened Species Recovery Hub, 2021).

Both Itjaritjari and Kakarrautul currently have a global assessment of 'Least concern' (IUCN Redlist 2016), after being delisted in 2015 from 'Endangered' under the Environment Protection Biodiversity Conservation Act 1999 (TSSC 2015). More extensive mole trench surveys were undertaken between 2004 and 2010, where signs of Marsupial Mole were found to be more common and widespread than originally thought (TSSC 2015). There was a lack of evidence of ongoing decline of populations and their distribution (Woinarski *et al.* 2014), resulting in their delisting as a threatened species. Due to their illusive nature of burrowing underground (Moseby *et al.* 2012), surveying new areas and previously surveyed populations are valuable for better understanding of the current distribution of the species.

Aim

The August 2022 Desert Discovery expedition aimed to undertake mole trench surveys within Yeo Lake Nature Reserve, to gain information of the presence of moles within a small section of the Reserve surveyed.

Methods

Trenches were dug at two main locations (A & B, see Figure 3.) adjoining Neale Junction Road/Anne Beadell Highway within Yeo Lake Nature Reserve. Sites were selected based on potential habitat suitability (sand dunes) and ease of vehicle access. The method of trench surveys was done in accordance with the Manual for Marsupial Mole Survey and Monitoring by Trenches (Benshemesh 2005), with trench size averaging about 100-110cm in length and 70-75cm deep. Each site (1-4) had 3 trenches dug at different levels on sand dunes (base, middle and crest), with a total of 12 trenches dug and surveyed for mole holes (Table 1). Trenches were dug during cool, overcast weather (17/08/2022) and checked on day 3 (20/08/2022) and day 5 (22/08/2022) of being open. Trenches were closed on day 5.

Table 1. Trench site location description at Yeo Lake Nature Reserve, August 2022.

Location	Site no.	No of trenches	Distance from Yeo Homestead	Trench location description	Site description
A	1,2,3	9	18kms West	Sites 1 & 3 south side of road, Site 2 north side of road, all trenches on north side of dune.	Evidence of recent fire history, with burnt tree/shrub stems & regrowth vegetation.
B	4	3	17kms West	Site 4 on north side of road, trenches on north side of dune.	Evidence of longer unburnt vegetation consisting of trees & shrubs.

Figure 1. Example of the habitat surveyed at Site 1, notice the recently burnt vegetation. The trench seen here is at the base of one of the sand dunes. Photo: Iestyn Hosking.

Figure 2. Map of Mole trench survey sites within Yeo Lake Nature Reserve.

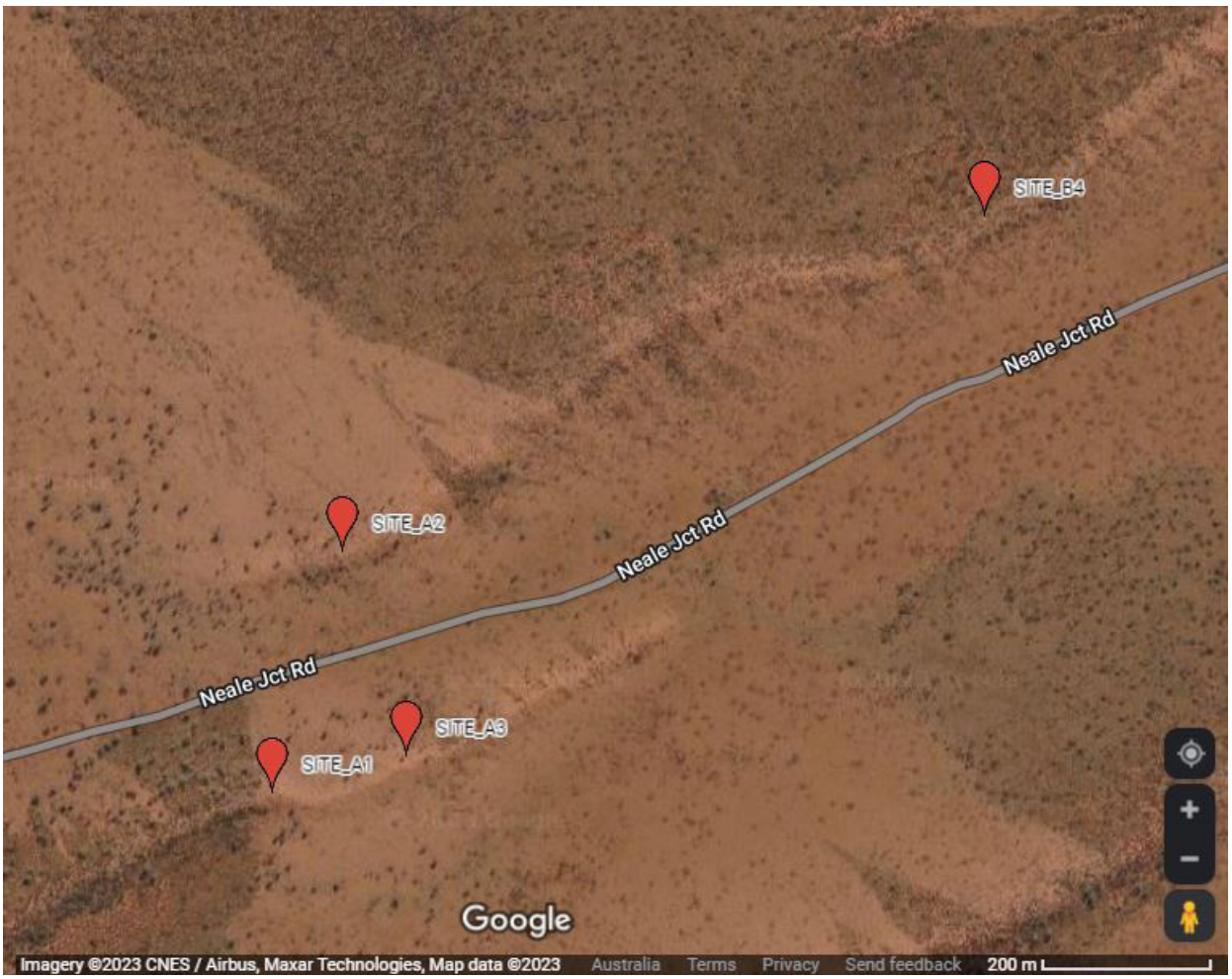

Figure 3. Map of Mole trench survey sites: A1, A2, A3 (south west) and B4 (north east), near Neale Junction Road/ Anne Beadell Highway within Yeo Lake Nature Reserve.
Note the sand dunes and varied burn scars in the aerial image.

Results

Of the twelve trenches dug, only five possible mole holes were identified (Table 2) across five different trenches. Only one of the five possible mole holes was recorded with high clarity and confidence, indicating it may have been more recently dug than the other four holes which showed with only medium clarity and confidence (Table 3). Only one possible mole hole was recorded on the third day of the trenches being open, while the remaining four holes were recorded on the fifth day of the trenches being open.

Table 2. Mole survey site data, Yeo Lake Nature Reserve 2022.

Site no.	Latitude	Longitude	Elevation*	Dig date	Days open	No. of trenches	No. of mole holes
A1	-28.11122	124.14437	381.44	17/08/2022	5	3	2
A2	-28.10862	124.14523	399.01	17/08/2022	5	3	2
A3	-28.11083	124.14599	405.64	17/08/2022	5	3	1
B4	-28.10501	124.15306	406.44	17/08/2022	5	3	0
TOTAL						**12**	**5**

** Elevation recorded at the dune crest trench.*

Table 3. Mole hole data, Yeo Lake Nature Reserve 2022.

Mole hole no.	Site no.	Record date	Trench location on dune	Penetrometer in hole	Penetrometer out hole	Depth (cm)	Min. diameter (mm)	Max. diameter (mm)	Axis (degrees)	Clarity	Confidence	Est. Age
1	**A1**	20/08/2022 (day 3)	base	1.7	2.7	26	43	50	90	medium	medium	old
2	**A1**	22/08/2022 (day 5)	crest	0.5	1.6	54	42	50	70	medium	medium	old
3	**A2**	22/08/2022 (day 5)	base	1	3.2	61	40	53	80	medium	medium	old
4	**A2**	22/08/2022 (day 5)	crest	0.2	1.9	47	35	49	85	high	high	fresh
5	**A3**	22/08/2022 (day 5)	mid	0.1	0.8	27	40	43	90	medium	medium	old

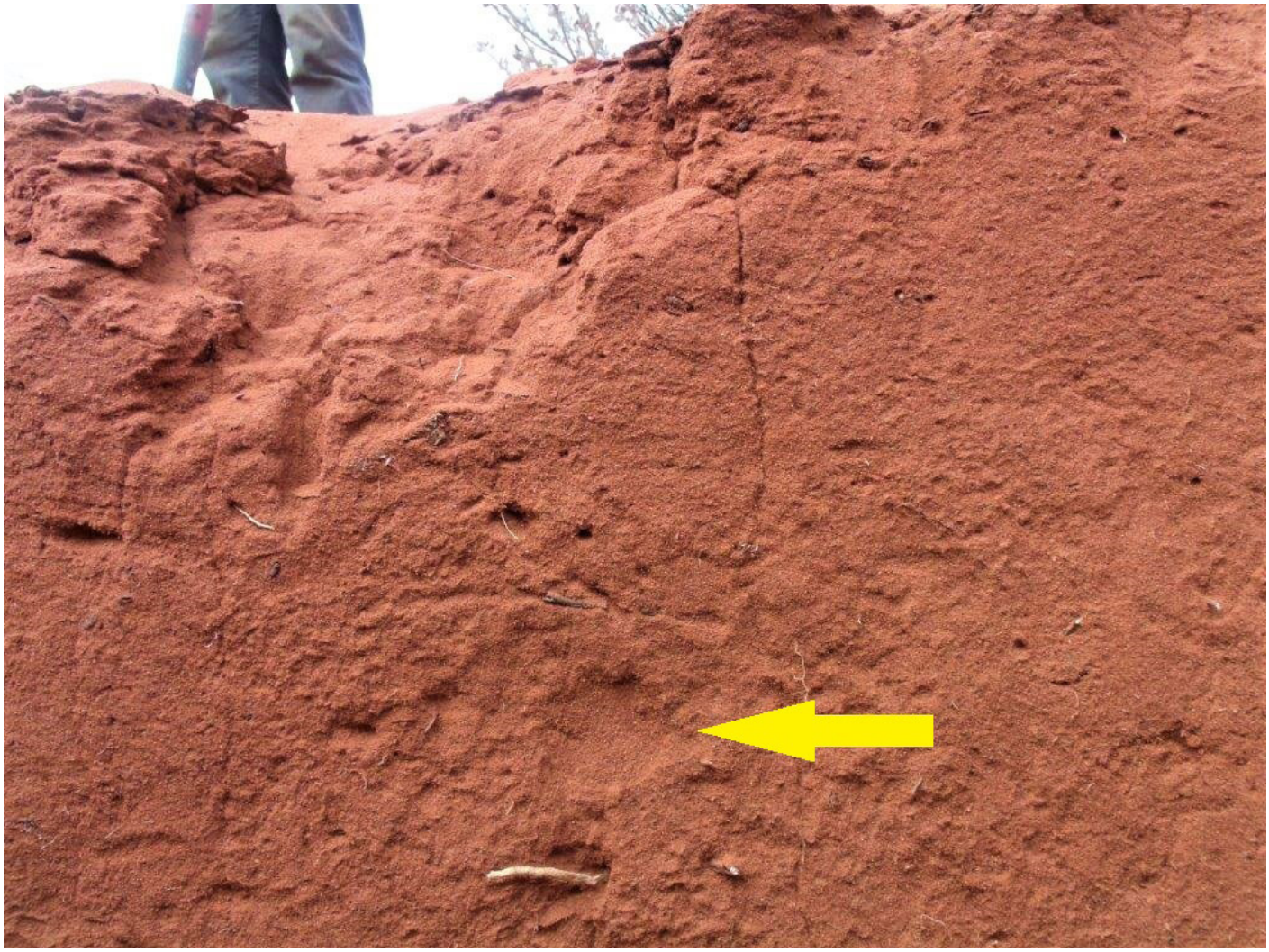

Figure 4. Example of likely mole hole with backfilled sand, recorded at dune crest survey trench, Yeo Lake Nature Reserve August 2022. Photo: Jenny Taylor.

Discussion

The number of possible mole holes recorded during mole trench surveys at Yeo Lake Nature Reserve in August 2022 is very low, compared with other surveys undertaken on previous Desert Discovery expeditions. The 2016 expedition to Kiwirrkurra and Ngururrpa Lands for example, recorded 52 possible mole holes across 15 trenches (Benshemesh and Johnson 2016), compared with only 5 possible mole holes across 12 trenches at Yeo Lake Nature Reserve in 2022. Three of the five possible mole holes fit within the typical minimum diameter (38-40mm) of mole holes recorded in Anangu-Pitjantjatjara Lands (Benshemesh 2005), while the remaining two possible mole holes are only within 1-3mm of this typical figure.

The number and extent of sand dunes within Yeo Lake Nature Reserve is somewhat limited compared with other parts of the Great Victoria Desert, limiting the amount of suitable sand dune habitat for Marsupial Moles throughout the reserve. Vegetation condition across Yeo Lake Nature Reserve and part of the Great Victoria Desert indicated that the area had experienced prolonged drought prior to the 2022 Desert Discovery expedition. Aerial images, vegetation fuel age maps and vegetation condition also indicated that large areas of Yeo Lake Nature Reserve and the surrounding area had experienced large scale bushfires in recent years. These factors, combined with recorded high predator presence (see Tracking Survey Report, by Joss Haiblen and Trish Macdonald), may influence the presence and abundance of Marsupial Moles throughout the area, reducing detectability during surveys in 2022. Cool weather conditions during the time of surveys (Weather Report, by Iestyn Hosking) influenced how quickly the sand dried within the survey trenches, resulting in limited clarity of possible mole holes within the first three days of trenches being dug.

Sand samples extracted from possible mole holes were provided to David Thuo (Postdoctoral Research Fellow) from the CSIRO for testing potential presence of Marsupial Mole eDNA (DNA shed into the environment). It is unknown if eDNA can be extracted from dry sand samples from mole holes, particularly if they are older holes. Results from these tests have not yet been received.

Desert Discovery has future plans of increasing Marsupial Mole trench surveys where possible and hopes to continue engagement with Marsupial Mole expert Joe Benshemesh to improve volunteer knowledge of the species and survey techniques. It is hoped that the advancement of eDNA sampling will allow mole hole sand samples to be tested for increased understanding of the distribution and genetics of both Marsupial Mole species (*Notoryctes caurinus* and *Notoryctes typhlops*).

Acknowledgements

Thank you to Joe Benshemesh for developing the Marsupial Mole trench survey method and mentoring past Desert Discovery members, including past Desert Discovery president Keith Johnson. Thank you to Keith Johnson and Ben Blomfield for their support in passing on the information required to undertake Marsupial Mole surveys. Great appreciation goes to Jenny Taylor and Geoff Young for their assistance and team work in undertaking the surveys and thorough data records. Thank you to the other volunteer assistants for digging/filling trenches and recording data. Finally a massive thanks to the muscle and enthusiasm of all the DBCA staff who dug the 12 trenches within 3 hours; we could not have done as many as that without their effort.

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Jenny Taylor. Jenny was the scribe in the field.

Mirinda Thorpe.

An update on Mole sand eDNA in an email from David Thuo on 16 January 2023:
"I extracted eDNA in triplicate/sample and only tested them using Notorytes caurinus primers that were designed for Pat's (Pat Taggart) project. Unfortunately, none of the samples was positive for marsupial mole (I'll send you the qPCR images later in the week). My plan is to run them using Notorytes typhlops primers (if I can get enough reagents) to confirm the absence/presence of both species in the samples. I'll talk to my group and see if we need any assistance to purchase some reagents."

Predator Scats

Text and Photo: Mirinda Thorpe

Introduction/Methods

Each Team at a Desert Discovery Project aims to collect predator scats opportunistically while undertaking other survey activities. With no known existing projects in the 2022 survey area requiring predator scats for analysis, scats were collected in anticipation that they may be useful should signs of threatened species be detected using other survey techniques. Threatened species of interest included the Greater Bilby (*Macrotis lagostis*), Great Desert Skink (*Liopholis kintorei*) and Malleefowl (*Leipoa ocellata)*. Scats were opportunistically collected, bagged and labelled by all Survey Teams over a wide survey area within Yeo Lake Nature Reserve.

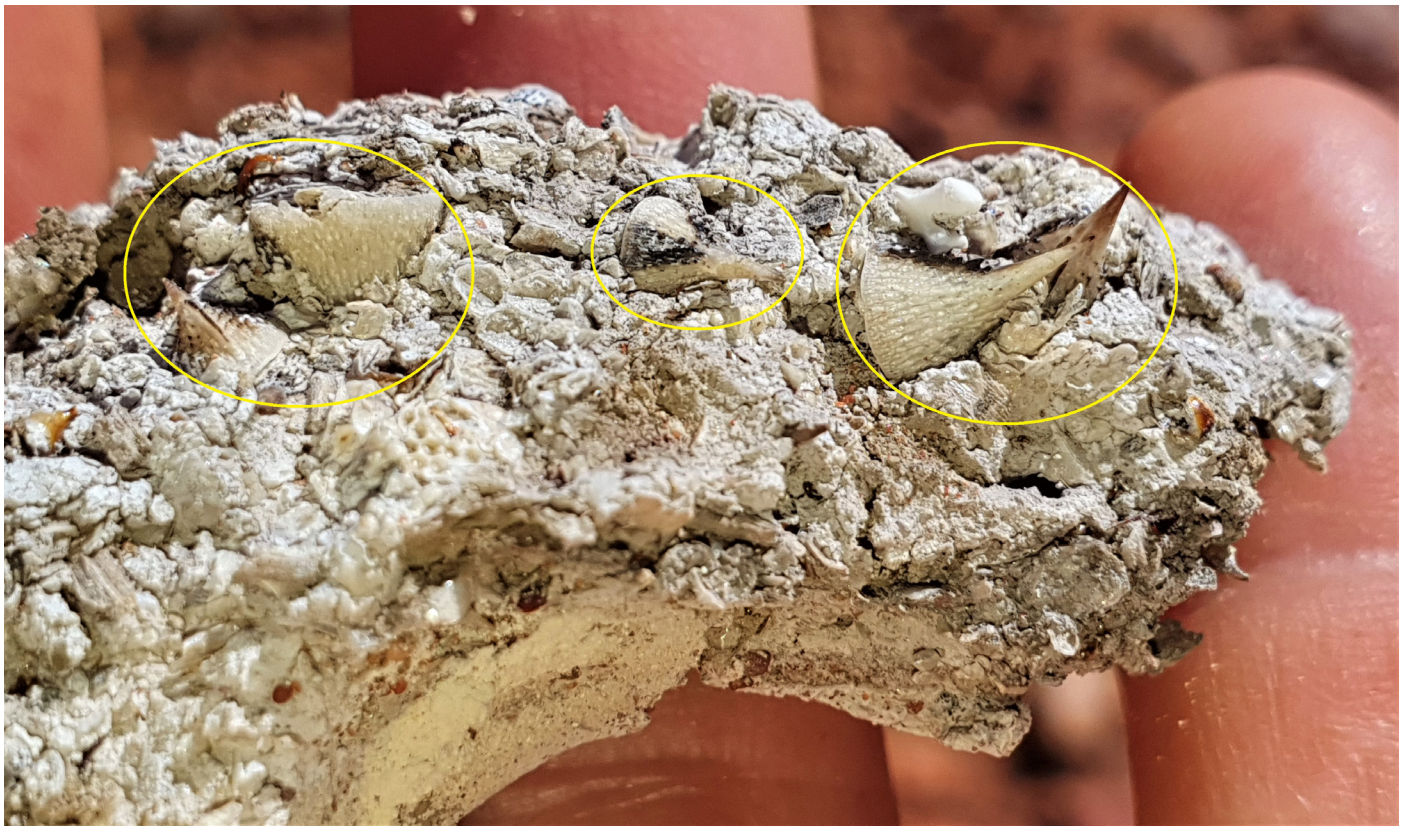
Results/Discussion

Desert Discovery participants collected a small number of predator scats (35) during the 2022 expedition to Yeo Lake Nature Reserve. Scat collections were from multiple predator species, including; Dingo (*Canis lupus dingo*), Fox (*Vulpes vulpes*), possible Cat (*Felis catus*) and two possible reptiles.

Unfortunately none of the target Threatened Species (Greater Bilby, Great Desert Skink or Malleefowl) was detected through other survey techniques during the 2022 expedition at Yeo Lake Nature Reserve (see Tracking Survey report). With no threatened species recorded or other related predator research projects in the region and a limited number of people able to process scats in Australia, the collections are yet to be processed.

Scat analysis can provide valuable insight into prey species present within a survey area, which might not be recorded using other survey techniques, such as Thorny Devil (*Moloch horridus*) remains that were visually identified in a Dingo scat (Figure 1) during the 2022 expedition at Yeo Lake Nature Reserve.

Desert Discovery aims to increase predator scat collection efforts on future expeditions, with scat processing organised with a project or organisation prior to the 2024 expedition. Funding for the processing of scats may need to be obtained prior to future expeditions to ensure that this can occur if no other known project requires scats from the planned survey area.



Predator scat circled.

Birds

Text: Linda Brotherton. Photos: David Mell

Summary

Desert Discovery volunteers gathered at Yeo Lake Nature Reserve for the 2022 DD Project which commenced on 15 August and continued until 28 August. The Bird Team was composed of six members. Fifty six bird species were recorded during the project and more than a thousand individual birds were recorded. The bird surveys contribute valuable data for the Department of Biodiversity, Conservation and Attractions (DBCA), BirdLife Australia's National Bird Atlas database and iNaturalist. The systematic surveys build a legacy of sites which could be repeatedly surveyed in the future.

Introduction

The 2022 DD Yeo Lake Project was conducted in the Yeo Lake Nature Reserve, approximately 180km north east of Laverton in the Great Victoria Desert in Western Australia. Kalgoorlie DBCA invited DD teams to conduct the project and assisted with project planning and implementation. One of the aims of the project was to survey as much of the region as possible for birds. DD bird observers and participants agreed to undertake bird surveys and all project participants were invited to contribute oportunistic, incidental records. Bird surveys commenced as DD members and observers moved into the Project region on 15th August and continued until 28th August.

Brown Falcon in flight. It was the most commonly recorded raptor. Ten of this species were recorded in Yeo Lake Nature Reserve.

Lunch break in sandy turnaround in Breakaways south of the camp.

Methods

The Project area of Yeo Lake Nature Reserve is not large (approximately 60km by 50km), with limited vehicle access, much of the Reserve has no tracks. The Bird Team of six members surveyed all roads and tracks available in the Reserve. Areas adjacent to the Reserve were also surveyed.

Yeo Lake Homestead, located in the Reserve off the Anne Beadell Highway, hosted the main DD camp and was the starting place for most tracks and survey expeditions. Tracks led north to a T-junction which branched off to a clay pan in the west; in the other direction to a lookout over Yeo Lake, and a track heading east covering the eastern part of the Reserve, ending at the Anne Beadell Highway. The Anne Beadell Highway then leads back to Yeo Lake Homestead. A track heads south from Yeo Lake Homestead to spectacular breakaways. Another track heads in a southerly direction from the Anne Beadell Highway, reaches the south boundary of the Yeo Lake Nature Reserve continuing into Cosmo Newberry country and ending up on the Anne Beadell Highway.

Outside the Project area, surveys were conducted on the southerly track which left the Reserve and entered Cosmo Newberry. The Bird Team surveyed Point Sunday Road from Point Sunday to the Great Central Road.

Surveys were conducted at planned, regular intervals both inside and outside the Reserve. We had sufficient time and number of observers for systematic surveying. Surveys were conducted at regular intervals, of one, two, and sometimes three kilometres. The Bird Team and DD participants contributed incidental records of bird sightings during the Project.

Bird Survey Methods

DD uses BirdLife Australia Atlas bird survey methods which consist of:

- surveying two hectares for birds for 20 minutes
- area searches of habitat within a radius of 500 metres (preferred) or 5 kilometres
- incidental records (i.e. records outside systematic surveys).

Observers identified and counted all individual birds so that assessment of abundance could be calculated. Members of the Bird Team provided basic descriptions of habitat for each survey site, including vegetation, landform and soil type. The presence of widespread fire damage was noted, but we were unable to identify the age of the damage and resulting revegetation. The presence of flowering, fruiting and seeding of plants was noted.

Survey data: all observers were required to enter certain data for each survey; name of observer or observers, date, time, position, and a basic description of vegetation. Data were entered into BirdLife Australia's Atlas database and provided to DBCA. Data will be entered in iNaturalist.

Brown Falcon in a typical pose, perched on a dead branch surveying the country around.

Jacky Winter an insectivore, present in mallee environments. Seven recorded at Yeo Lake Nature Reserve.

Results

Survey areas

All available tracks within the Reserve were surveyed by the Bird Team. Some adjacent areas were also surveyed where tracks ran inside and outside the Reserve.

Area surveyed inside the project area

All tracks within Yeo Lake Nature Reserve were systematically surveyed:

- From Yeo Lake Homestead - to the clay pan, and then to the lookout over Yeo Lake
- to the track which heads east across Yeo Lake Nature Reserve meeting the Anne Beadell Highway and returning to Yeo Lake Homestead

- to the track heading south to the Breakaways
- down the Anne Beadell Highway to the border of the Reserve
- to another track which heads in a southerly direction from the Anne Beadell Highway reaching to the southern boundary of Yeo Lake Nature Reserve, through Cosmo Newberry land looping back to the Anne Beadell Highway.

Area surveyed outside the Project area

The Bird Team surveyed the Point Sunday Road from Point Sunday to the Great Central Road. Surveys were conducted on the track heading south from the Anne Beadell Highway through Cosmo Newberry Road circling back to the Anne Beadell.

Numbers of surveys

- total number of surveys conducted throughout the project was 313
- total number of surveys **inside** the project area was 260 - 83% of all surveys conducted during the project
- total number of surveys conducted **outside** the project area was 53 - 17% of all surveys conducted during the project.

The Arch in Breakaways south of Yeo Lake Homestead.

Types of surveys conducted **inside the Project area**

The Bird Team conducted 260 surveys:

- 173 of these were the 2 hectare surveys (66%)
- 87 incidental sightings were recorded, 46 by the Bird Team and 41 by DD volunteers (34%)

Types of surveys conducted **outside the project area**

The Bird Team recorded 53 surveys:

- 42 of these were 2 hectare surveys (80%)
- 6 incidental sightings were recorded
- 5 area surveys were recorded

Summary

The total number of 2 hectare surveys conducted was 215.

- 173 **inside** and 53 **outside** theProject area.

The total number of incidentals recorded during the project by the Bird Team and members of DD was 93.

- 87 incidentals **inside** and 6 incidental sightings **outside** outside the Project area.

Inland Thornbill, a bird of dry habitat areas, a little bird with a wide repertoire of sounds.

Mulga parrot scraping the ground, presumably picking up grass seeds.

Surveys and Conditions

Yeo Lake Nature Reserve and the surrounding country was dry. No water birds or evidence of their presence was recorded.

As a requirement of the surveys, observers recorded descriptions of vegetation types and land conditions. This gave a basis to assess habitat preference and presence of birds.

Much of the landscape displayed signs of fire damage of various ages. Evidence of fire was recorded in 61 surveys - 28% of 2 hectare surveys. It was obvious that there were various stages of fire recovery over large areas of the Reserve. No analysis of the relationship between species of birds present and fire age was performed.

Little flowering was occurring, some eremophilas were in flower, and a few mallees were just starting to burst into blossom. Little seeding of plants was evident, spinifex was not seeding, grasses were not seeding.

The number of birds recorded in each survey was low - 1,109 individual birds were recorded in 313 surveys, an average of 3.5 birds per survey.

Nil recordings

173 two hectare surveys were recorded **inside** project area.
42 two hectare surveys were recorded **outside** project area.

- total 215 two hectare surveys recorded during project.

95 two hectare surveys recorded nil birds - 44% of two hectare surveys had nil birds.

The sandy track winding down to the edge of the lake showing scattered grass, spinifex and mulga.

Species

56 species were recorded across the Project region during the Project.

The ten most commonly recorded species:

- Singing Honeyeater in 37 surveys
- Yellow Throated Miner in 35 surveys
- Weebills in 20 surveys
- White-winged Fairy-wren in 16 surveys
- Chestnut-rumped Thornbill in 17 surveys
- Grey-fronted Honeyeater in 16 surveys
- Crested Bellbird in 13 surveys
- Rufous Whistler in 17 surveys
- Black-faced Woodswallow in 13 surveys
- Pied Butcherbird in 25 surveys

All of the most commonly recorded birds were insectivores, with insects a major part of their diet.

Exceptions to the low number count were:

- Masked Woodswallows, insectivores, 300+, seen flying very high, on a very windy day, in great moving clouds
- a group of 20 Mulga Parrots was recorded in a survey, feeding on the ground, and digging seeds
- one group of Grey-fronted Honeyeaters flying swiftly east to west was recorded in one survey
- one group of 10 White-fronted Honeyeaters flying swiftly overhead east to west was recorded in one survey.

Single sightings

There were 17 species of birds recorded once only, 11 in 2 hectare surveys, 6 recorded as incidentals.
11 Birds recorded once in 2 hectare survey:

- Brown Goshawk
- Wedge-tailed Eagle
- Southern Boobook
- Tawny Frogmouth
- Redthroat
- Western Gerygone
- Black Honeyeater
- Torresian Crow
- Zebra Finch
- Black Honeyeater
- Western Quail-thrush

Female Rufous Whistler. 17 were seen, heard and recorded.

6 Birds recorded once in incidental records:

- Varied Sitella
- Little Eagle
- Southern Whiteface
- Chiming Wedgebill
- White-winged Triller
- Tree Martin

It is not uncommon to see birds of prey and night birds singly. The count of a single zebra finch was unusual.

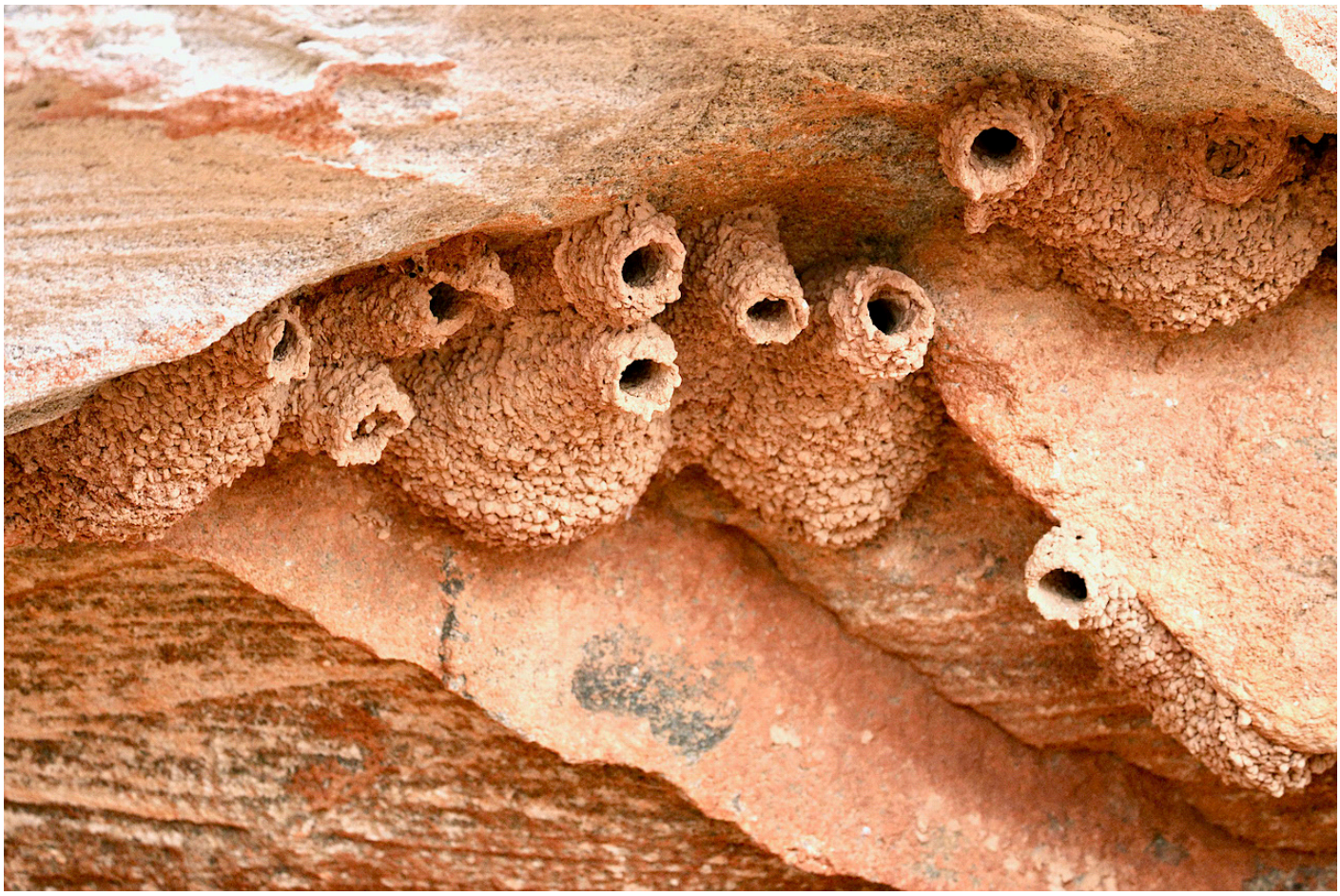
Redthroat. Photo: Graham Goods.

Western Gerygone. Photo: Graham Goods.

Family groupings and species

Nineteen family groupings of birds were recorded. The two most commonly recorded groups were Birds of Prey with 7 species and Scrubwrens and Allies with 7 species. Honeyeaters with 6 species and Woodswallows with 4 species were the next most commonly recorded.

Family Groupings	Species Recorded
Pigeons, Doves	Crested Pigeon
Babblers, Whipbird	White-browed Babbler
Bower Birds , Pipits	Australian Pipit
Sparrows, Finches	Zebra Finch
Cockatoos, Parrots	Australian Ringneck, Mulga Parrot
Magpie-Larks, Flycatchers	Grey Fantail, Willie Wagtail
Cuckoo-shrikes, Orioles	Black-faced Cuckoo-shrike, White-winged Triller
Ravens, Mud-nesters	Little Crow, Torresian Crow
Swallows	White-backed Swallow, Tree Martin
Night Birds	Southern Boobook,Tawny Frogmouth, Spotted Nightjar
Australian Wrens, Pardalotes	Splendid Fairy-wren,White-winged Fairy-wren, Spotted Pardalote
Chats, Robins	Crimson Chat, Jacky Winter, Red-capped Robin
Quail-thrushes, Allies	Chiming Wedgebill, Chestnut Quail-thrush, Varied Sitella
Whistlers, Shrike-thrushes	Crested Bellbird, Rufous Whistler, Grey Shrike-thrush
Magpies , Butcherbirds	Grey Butcherbird, Pied Butcherbird, Australian Magpie
Woodswallows	Masked Woodswallow, White-browed Woodswallow, Black-faced Woodswallow, Little Woodswallow
Honeyeaters	Singing Honeyeater, Yellow-throated Miner, Grey-fronted Honeyeater, White-fronted Honeyeater, Black Honeyeater, Spiny-cheeked Honeyeater
Scrubwrens, Allies	Chestnut-rumped Thornbill, Weebill, Inland Thornbill, Redthroat, Western Gerygone, Slaty-backed Thornbill, Southern Whiteface
Birds of Prey	Brown Goshawk, Brown Falcon, Little Eagle, Wedge-tailed Eagle, Nankeen Kestrel, Australian Hobby, Peregrine Falcon



Fairy Martin nests, old and unused at the Breakaways, south of Yeo Lake.

Discussion

The Anne Beadell Highway passes through Yeo Lake Nature Reserve and is a major thoroughfare for 4 wheel drivers to the Eastern States. Intensive bird surveys over 2 weeks proved the value of the Desert Discovery Project in maintaining the use of BirdLife Australia Atlas survey methods. Despite limited access to a great part of the Reserve these surveys provide an insight into bird distribution and numbers in current conditions. 70% of all surveys conducted in this project (215 of 313), were conducted using the 2 hectare survey method, which provides a strong basis for repeatable surveys in the future. These surveys make an important contribution to our knowledge of the distribution and abundance of bird life in this part of the country.

Taking into account the seasonal conditions of the land, it seems likely that most of the bird species in the accessible area were recorded. Given different seasonal conditions, recording rates and species numbers would probably be very different. Yeo Lake is classified as a seasonal saline lake, large numbers of water birds have been counted there, but the lake was dry and no water birds were present during this Project.

Thirteen of the **56 species** recorded were not recorded using the 2 hectare method. These included night birds (no 2 hectare surveys were done at night) and birds that were patchily distributed and in low numbers. e.g birds of prey. Some birds were sighted around camp and during other DD activities.

On every survey which the bird team conducted, evidence of the presence of camels and of cats was seen. We only saw one small group of camels, but camel tracks, droppings, footprints, and resting places were always present. The overall damage done to trees and shrubs in the area was undeniable. The land was being degraded by camels. Certain species of trees and shrubs targeted by camels were scarce and showed signs of severe damage. And cats! On every survey we saw cat tracks. These two very destructive feral species were present on every site we surveyed, in every habitat we explored.

The devastation as a result of very hot fires was noted and discussed. Some surveys were conducted, knowing that the results were probably going to be nil birds, but recognising that a zero result is a result to be considered

and is indicative of the condition of the land. Fires have created their own landscape of destruction and regrowth. It would be interesting to undertake regular systematic 2 hectare surveys in this region to accumulate data in different seasons.

An interesting incident was the appearance of two groups of different honeyeaters flying fast and purposefully from the east to the west. None of us had witnessed this behaviour before, but on our return from the Project, we learned that various honeyeaters have been recorded displaying similar behaviours. Perhaps good rains in the north could have enticed them up, and the beginnings of the flowering could be calling them back.

The Pinnacle.

Acknowledgements

The Yeo Lake Nature Reserve is not large, but provided a variety of habitats and conditions to explore. The experienced Bird Team, of David and Miriam Mell, Tom and Ian Stewart, Wayne O'Sullivan and Linda Brotherton enjoyed the land, walked many kilometres and completed surveys - thanks to all! Thanks to Cheryl Gole who has provided so much support and encouragement to the new leader of the Bird Team. Thanks also to the following DD members and participants who provided incidental reports while at camp and on other team activities; Bevan Buirchill, Jeremy Wallace, Mal McKinty, Neil Macumber, Thomas Mesaglio, Sophie Yang, Joss Haiblen, Richard House and of course others (apologies for any people missed out). All your contributions were vital to our Project. Thanks to David Mell for the photos. Thanks to the DD teams.

Bird Team: Tom Stewart, Miriam Mell, David Mell, Ian Stewart, Linda Brotherton (Team Leader) and Wayne O'Sullivan.
Photo: Maree Goods.

Appendix

Annotated species list of all birds recorded in the 2022 Yeo Lake Nature Reserve project. The table includes the number of birds of each species recorded, the number of sightings of each species, and in what type of survey they were recorded, 2 hectare or incidental. Plus a little space for anecdotal information. The annotated bird list shows that most species were recorded in 2 hectare surveys. A total of 56 species was recorded.

Species	Total	Sightings	2 Hectare Survey	Incidental	Anecdotal
Brown Goshawk *Accipiter fasciatus*	1	1	1		A single record in open mulga scrub. Morning sighting.
Wedge-tailed Eagle *Aquila audax*	1	1	1		Single record of wedge tailed eagle - a welcome sighting after many surveys!
Little Eagle *Hieraaetus morphnoides*	1	1		1	
Brown Falcon *Falco berigora*	10	10	7	3	One youngster on the Anne Beadell Highway, flying erratically in heavy wind, landed precariously in a tree and proceeded to protest loudly to the bird team member below.
Australian Hobby *Falco longipennis*	3	2	2	1	Flying high over Breakaways south of Yeo Lake Homestead.
Peregrine Falcon *Falco peregrinus*	2	2		2	Windy day on the track to the Breakaways, flying high among clouds of masked woodswallows - spectacular!
Nankeen Kestrel *Falco cenchroides*	5	5	2	3	On windy day flying over the Breakaways.
Crested Pigeon *Ocyphaps lophotes*	3	3	2	1	Very few crested pigeons were recorded.
Australian Ringneck *Barnardius zonarius*	11	6	9	2	
Mulga Parrot *Psephotus varius*	36	6	30	6	20 birds feeding intensely on possible grass seeds. One bird observed excavating a small scrape in the soil.
Southern Boobook *Ninox boobook*	1	1		1	Observed near the Breakaways.
Tawny Frogmouth *Podargus strigoides*	1	1		1	Observed near the Breakaways - morning.

Species	Total	Sightings	2 Hectare Survey	Incidental	Anecdotal
Spotted Nightjar *Eurostopodus argus*	4	4	3	1	A few observations. Clear night calls in camp. At dusk observed flying low down the Anne Beadell Highway.
Splendid Fairy-wren *Malurus splendens*	16	4	3	13	Incidental sighting of group of 7 in mulga scrub on the Anne Beadell.
White-winged Fairy-wren *Malurus leucopterus*	31	16	30	1	Group of 15 sighted on windy, dusty day in a depression in open samphire country, with *Acacia* on higher ground.
Striated Pardalote *Pardalotus striatus*	2	2		2	Sighted on the eastern track from Yeo Lake Homestead to the highway. Some tall mallees and eucalypts.
Redthroat *Pyrrholaemus brunneus*	1	1	1		Sighted on the track from Breakaways back to the Anne Beadell Highway.
Weebill *Smicrornis brevirostris*	55	20	45	10	Scattered throughout in eucalypt and mulga, *Acacia* woodland.
Western Gerygone *Gerygone fusca*	1	1	1		1 sighting on Anne Beadell Highway among scattered mallee.
Inland Thornbill *Acanthiza apicalis*	41	10	36	5	Sightings in mixed mulga and mallee scrub.
Chestnut-rumped Thornbill *Acanthiza uropygialis*	49	17	48	1	Scattered among samphire and mixed mulga and mallee scrub.
Slaty-backed Thornbill *Acanthiza robustirostris*	22	7	20	2	A few slaty-backs close to Yeo Lake Homestead camp.
Southern Whiteface *Aphelocephala leucopsis*	1	1		1	Sighted near the track to the lake at the main camp. Only 1!
Spiny-cheeked Honeyeater *Acanthagenys rufogularis*	2	2	1	1	
Singing Honeyeater *Lichenostomus virescens*	50	37	42	8	Scattered throughout the Reserve.
Grey-fronted Honeyeater *Ptilotula plumula*	48	16	22	26	Scattered in eucalypt and mulga, *Acacia* woodland. One large group flying purposefully east to west across Point Sunday Road.

Species	Total	Sightings	2 Hectare Survey	Incidental	Anecdotal
White-fronted Honeyeater *Purnella albifrons*	13	3	2	11	Occasional sightings, but one large group of 11 birds landed on dead branches of a Marble Gum then continued east to west in purposeful flight.
Black Honeyeater *Sugamel nigrum*	1	1	1		
Yellow–throated Miner *Manorina flavigula*	96	35	81	15	Spread throughout. Large groups along Anne Beadell Highway in Marble Gums.
Crimson Chat *Epithianura tricolor*	4	2	3	1	Rare sightings in low open shrub country with scattered grasses.
Jacky Winter *Microeca fascinans*	5	3	3		In open eucalypt /mulga scrub.
Red-capped Robin *Petroica goodenovii*	4	4	3	1	
White-browed Babbler *Pomatostomus superciliosus*	11	3	9	2	Sighted foraging among bark and leaf litter Anne Beadell Highway.
Chiming Wedgebill *Psophodes occidentalis*	1	1		1	
Western Quail-thrush *Cinclosoma castanotum*	1	1	1		Where were they? Perfect country to see them.We kept scanning habitat but only 2 sightings, one not confirmed.
Varied Sitella *Daphoenositta chrysoptera*	1	1		1	
Crested Bellbird *Oreoica gutturalis*	13	13	10	3	Loamy sand country - mallee and mulga.
Rufous Whistler *Pachycephala rufiventris*	17	11	12	5	Mostly single sightings - eucalypt and mallee scrub.
Grey Shrike-thrush *Colluricincla harmonica*	7	7	7		Not many seen or heard. Recorded in open Marble Gum woodland.
Grey Fantail *Rhipidura albiscapa*	2	2		2	
Willie Wagtail *Rhipidura leucophrys*	20	11	15	5	Scattered across low mulga / spinifex scrub.
Black-faced Cuckoo-shrike *Coracina novaehollandiae*	5	4	5		

Species	Total	Sightings	2 Hectare Survey	Incidental	Anecdotal
White-winged Triller *Lalage tricolor*	1	1		1	
Masked Woodswallow *Artamus personatus*	374	6	240	134	Noisy clouds of them, on a windy, cloudy day - spectacular!
White-browed Woodswallow *Artamus superciliosus*	5	1	5		
Black-faced Woodswallow *Artamus cinereus*	70	13	18	52	Group of 50 flew over, high - on windy, cloudy day.
Little Woodswallow *Artamus minor*	4	2	1	3	
Pied Butcherbird *Cracticus nigrogularis*	30	25	16	14	Single sightings. Open mulga scrub and grassland. In fire regenerating scrub.
Grey Butcherbird *Cracticus torquatus*	9	7	8	1	
Australian Magpie *Cracticus tibicen*	12	7	6	12	
Little Crow *Corvus bennetti*	4	2	2	2	
Torresian Crow *Corvus orru*	1	1	1		
Australian Pipit *Anthus australis*	2	2		2	
Zebra Finch *Taeniopygia guttata*	1	1	1		Lone zebra finch!
White-backed Swallow *Cheramoeca leucosterna*	2	1	2		
Tree Martin *Petrochelidon nigricans*	1	1		1	

Striated Pardalote. Photo: Graham Goods.

Black Honeyeater. Photo: Graham Goods.

Invertebrates

Text and Photos: Bevan Buirchell

"**Invertebrates make up 97% of animal life** and drive key processes such as pollination and cycling nutrients." May, R.M. *How many species are there on Earth*, Science (1988) 241 (4872).

This is the first Desert Discovery (DD) expedition, since 2013, that a formal team, interested in collecting and recording invertebrates, has attended. The Invertebrate Team consisted of Bevan Buirchell, Jeremy Wallace and Mark Heath, an eclectic bunch with "none to a lot" of knowledge of invertebrates. While the Yeo Lake Nature Reserve was still in drought (desert?) conditions it was surprising to us what a great diversity of invertebrates was around. It shows how resilient animals have to be to survive in desert environments.

The Team spent a lot of time turning over rocks and peeling bark off eucalypts searching for animals residing in those environments. Since there was very little vegetation flowering, those invertebrates feeding on flowers were in short supply, so other environments had to be explored. The use of specialist lights to attract insects at night proved productive. Not only were moths collected, but a number of other species that are attracted to light. The Mammal and Reptile Team kindly collected all the invertebrates from their pitfall traps and this added another dimension to the Invertebrate Team's efforts. The Department of Biodiversity, Conservation and Attractions (DBCA) staff helped on several days. There were also some individual DD members who collected Invertebrates and delivered them to the Team.

The Curator of Insects at the Western Australian Museum (WAM), Dr Nik Tatarnic, is appreciative of our efforts and is keen to incorporate our collections into the Zoological Collections at WAM. The feedback that I have received so far indicates that there are a number of new undescribed species within the collection and the Team's (and DD's) efforts are greatly appreciated.

The following is a summary of the number of different species within invertebrate orders collected at Yeo Lake Nature Reserve, which gives an idea of the diversity there. The complete list of collected invertebrates, with their scientific names, is listed at the end of this Invertebrate Team's Report.

- 76 Moths collected
- 76 + 91 Moths photographed
- 40 Beetles
- 18 Spiders
- 25 Ants
- 15 Mirids or Sap-sucking Bugs
- 12 Pentatomids or Stink Bugs
- 10 Pseudoscorpions
- 10 Leaf Hoppers
- 7 Cockroaches
- 5 Grasshoppers
- 3 Caddis-flies
- 3 Assassin Bugs
- 3 Antlions or Lacewings
- 2 Katydids
- 2 Crickets
- 2 Centipedes
- 2 Psocodea
- 2 Mantids
- 2 Flies
- 2 Tingids or Lacewing Bugs
- 1 Crusader Bug
- 1 Silverfish
- 1 Scorpion

Of these, 119 were unidentified at the genus level.

Some of the highlights from this expedition and the collection are as follows:

Aeliosoma weberi: A member of the Pentatomid family (Stink Bugs), only known from a total of 5 collections, two of which are in Western Australia. All specimens have been males and the female of this species has not, as yet, been collected and described. Collected by the Mammal and Reptile Team in their pitfall traps.

Carabocoris biplagiatus: An unusual bug that could be mistaken for a beetle but belongs in the Rhyparochromidae family of the true bugs (Hemiptera). Collected by the Mammal and Reptile Team in their pitfall traps.

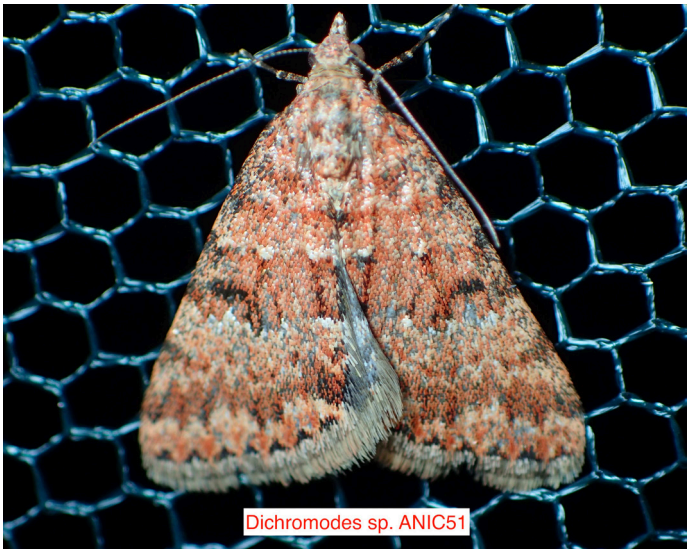
"Arrowheaded" Pentatomid: An undescribed and very unusual Pentatomid bug that belongs in the Diemeniini Tribe and is likely be a new genus. Previously known only from one female specimen, which usually makes describing these insects difficult as a lot is dependent upon the male genitalia for differentiation between species. Four males were collected from under bark and in leaf litter.

Leaf Hopper: An undescribed taxon of bug collected on *Triodia*.

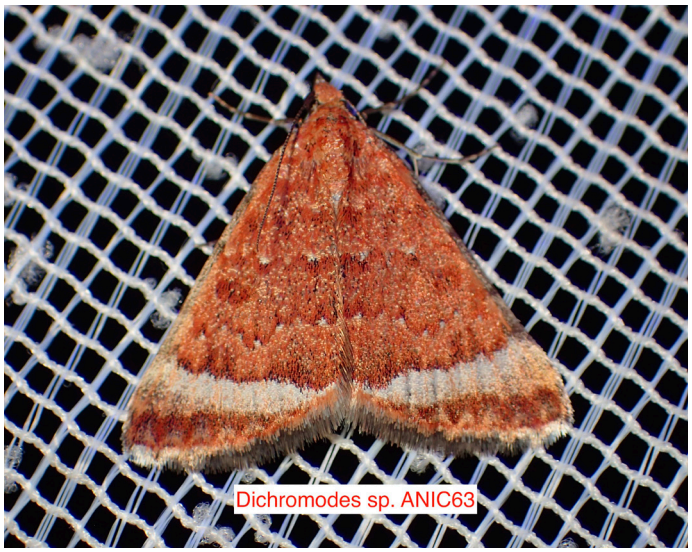
Moths: There are many undescribed species in the genus, *Dichromodes*. Many of these have already been recognised as separate species and given numbers to designate them from unknown specimens. In this way taxonomists can accumulate data on distribution before a species is described. At least nine different, but undescribed species of *Dichromodes* were identified at Yeo Lake Nature Reserve.

*Dichromodes AH11Au
*Dichromodes sp ANIC51
*Dichromodes sp. ANIC59
*Dichromodes sp. ANIC63
Dichromodes sp. ANIC3
Dichromodes sp. ANIC60
Dichromodes sp. ANIC62
Dichromodes sp. ANIC66
Dichromodes sp. unidentified
(*photographed)


Dichromodes AH11Au


Dichromodes sp. ANIC51


Dichromodes sp. ANIC59


Dichromodes sp. ANIC63

Pseudoscorpions are Short Range Endemics (SRE) because they cannot migrate too far from where they exist. As such they tend to evolve around particular habitats. On this DD expedition we concentrated on collecting as many Pseudoscorpions as possible from a variety of habitats, hoping to discover new species that meet the criteria for SREs. We collected approximately 10 different Pseudoscorpions all belonging to the Chernetidae family. None has been identified as yet but we are sure that there will be undescribed species given the unique habitats from which they were collected.


Pseudoscorpion 1


Pseudoscorpion


Pseudoscorpion 3


Pseudoscorpion 4

List of species

(Collected)

The following lists species in **Order** then within **Family**. Where possible each Order has the number of families and species described within Australia to give the reader an idea of where this collection fits into the overall picture of invertebrates within Australia. This represents only about 25%- 50% of the invertebrate fauna in Australia as many species are yet to be collected or are known but undescribed. It is also interesting to compare these numbers to the number of species of birds (828) and of plants (~23,000) estimated to live in Australia.

Class Arachnida (Spiders, Scorpions, Pseudoscorpions)
Australia ~3,700 species described

Spiders
18 unidentified species

Pseudoscorpions
10 unidentified species (all Chernetidae)

Scorpions
Urodacus sp.

Tharpnya sp. Spider. Class Arachnida.

Urodacus sp. Scorpion. Class Arachnida.

Class Chilopoda (Centipedes and House Centipedes)

Centipede
Scolopendra morsitans

House centipede
unidentified but possibly *Pilbarascutigera*?

Class Crustacea (Crabs, Prawns, Barnacles, Wood Lice)

Isopoda (Slaters)
Buddelundia sp.

Class Insecta/Hexapoda (Insects)

Thysanura (Silverfish)
Australia: 2 families, 39 species

Lepismatidae
Acroteisella erniei

Blattodea (Cockroaches and Termites)
Cockroaches: Australia 5 families, 534 species

Ectobiidae
Balta sp. narrow
Balta sp.
Calolampra irrorata

Blaberidae
Unidentified yellow-brown striped
Unidentified black
Unidentified dark brown
Unidentified black-striped

Coleoptera (Beetles)
Australia: 117 families, >25,000 species

Anthricidae
Ancyropilus sp.

Bothrideridae
Deretaphrus sp.

Buprestidae (Jewel beetles)
Castiarina recta

Carabidae
Harpalinae #1
Harpalinae #2
Harpalinae #3
Harpalinae #4
Philoscophus costalis
Unidentified dull green
Unidentified olive green
Unidentified shiny green

Cerambycidae (Longicorn beetles)
Uracanthus maculatus
Unidentified skinny brown
Unidentified grey spotty

Chrysomelidae (Leaf beetles)
Dicranosterna sp.
Unidentified #1
Unidentified #2

Cleridae
Eleale hirticollis

Coccinellidae (Ladybird beetles)
Coccinella transversallis

Curculioninae (Weevils)
Epamoebus ziczac
Myllocerus australis
Talaurinus sp.
Unidentified mottled brown
Unidentified medium black
Unidentified small brown

Dermestidae
Trogoderma sp.

Elateridae (Click beetles)
Unidentified

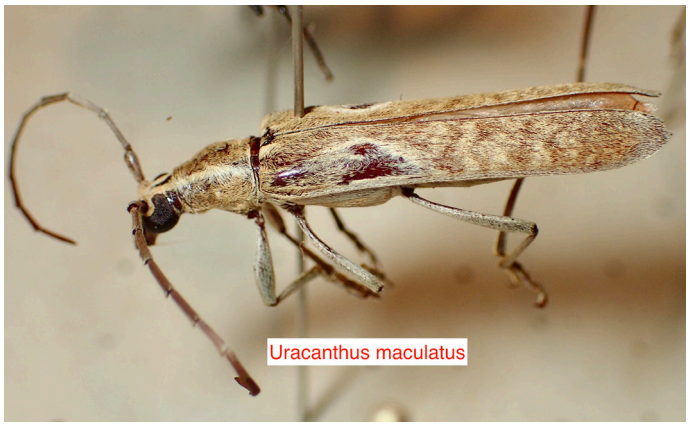
Eumolpinae
Unidentified small brown

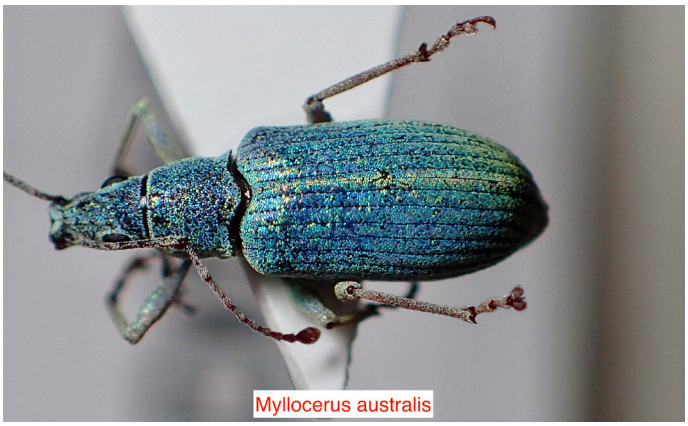
Platyainae
Notagonum submetallicum

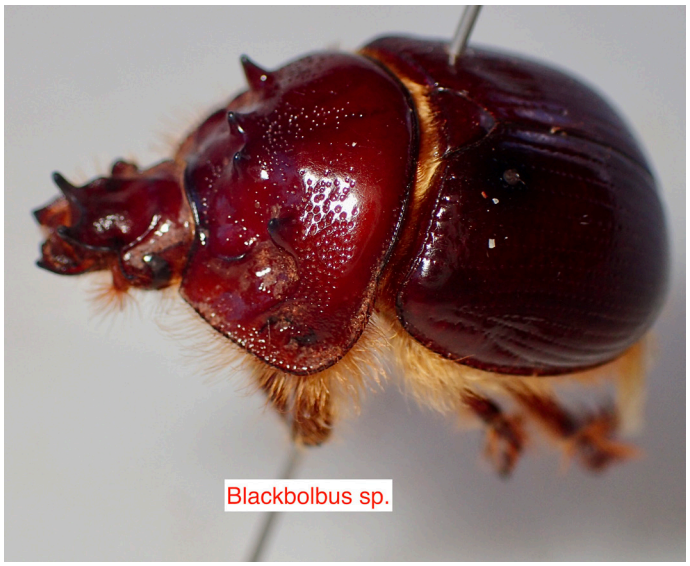
Scarabaeidae (Scarab beetles)
Blackbolbus sp.
Heteronyx sp. small
Unidentified very large brown
Unidentified very large pale brown
Unidentified very small

Tenebrionidae
Chalcopteroides sp.
Dysarchus sp.
Pterohelaeus sp.
Unidentified #1

Unidentified beetles
#1 small black
#2 black smallish







Diptera (Flies)
Australia: 111 families, 8,643 species

Nanexila danielsi
Oestroidae unidentified

Hemiptera (True Bugs, Hoppers, Scale Insects, Aphids)
Australia: 118 families, 6,000 species

Alydidae
Hamedius incarnatus
Stenophyella macreta

Coreidae
Mictis profana
Aulocosternum nigrorubrum

Geocoridae
Germalus australis
Germalus victoriae
Germalus sp.unidentified

Flatidae
Siphanta augustata

Fulgoridae
Unidentified large orange
Unidentified #1
Unidentified #2
Unidentified and undescribed

Lygaeidae
Nysius vinitor

Miridae
Coridromius chenopoderis
Campylomma sp.
Orius sp.
Fronsetta sp.
Creontiades dilutus
Acaciacapsus sp.
Unidentified Orthotylinae Halticini
Unidentified Orthotylinae sp AB
Unidentified Miridae small

Nabidae
Nabis kinbergii

Pentatomidae (Stink bugs)
Aeliosoma weberi
Amphidexius suspensus
Aplerotus maculatus
Cephaloplatus sp. unidentified
Niarius ooldeae
Oncocoris desertus
Neagenor spinosus
Piezodorus oceanicus
Turrubulana plana
Diemeniini genus undescribed
Halyini nymph unidentified
Pentatomidae wingless undescribed

Reduviidae (Assasin bugs)
Bargylia grossi
Oncocephalus sp.
Unidentified Emesine

Rhyparochromidae
Carabocoris biplagiatus
Dieuches sp.

Scutellaridae
Coleotichus costatus

Tingidae
Inoma silveirae
Nethersia westralensis

Heteroptera

Hyocephalidae
Maevius indecoris

Hymenoptera (Ants, Wasps, Bees and Sawflies)
Australia; 77 families, 14,900 species)

Braconidae
Unidentified sp. #1
Unidentified sp. #2

Bethylidae
Unidentified sp.

Ectatomminae
Rhytipodonera sp.

Formacidae
Pseudoneoponera sp. JDM 984
Polyrhachis (Campomyrma) sp. JDM 1010
(schwiedlandi complex)

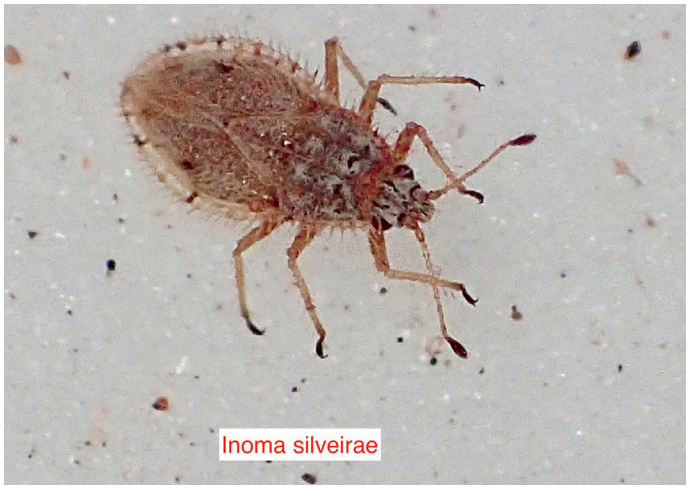
Polyrhachis (Campomyrma) nr pyrrhus Forel
Polyrhachis gravis Clark
Melophorus bagoti Lubbock (black gaster)
Camponotus inflatus Lubbock
Camponotus aurocinctus (F. Smith)
Lioponera varians (Clark)
Meranoplus oceanicus (Viehmeyer)
Iridomyrmex rufoniger (Lowne)
Camponotus sponsorum Forel
Iridomyrmex chasei Forel
Iridomyrmex roseatus Heterick & Shattuck
Iridomyrmex agilis Forel
Melophorus aeneovirens (Lowne)
Camponotus discors Forel
Calomyrmex splendidus smaragdinus Emery
Rhytidoponera cf. *crassinodis* Forel
Rhytidoponera violacea (Forel)
Rhytidoponera metallica (F. Smith)
Camponotus fieldeae Forel
Camponotus cinereus amperei Forel
Camponotus oetkeri Forel

Pompilidae
Turneromyia sp.

Scoliidae
Radumeris sp.


Rhytidoponera metallica


Pseudoneoponera sp. JDM 984


Inoma silveirae


Radumeris sp.

Lepidoptera (Moths and Butterflies)
Australia: 93 families, >11,000 species

Macrobathra BOLD BIN ACD0452
Macrobathra constrictella
Macrobathra heminephela
Macrobathra hemitropa
Macrobathra leucopeda
Mimodoxa tricommatica
Endoxyla euplecta
Endoxyla undescribed sp.
Endoxyla unidentified
Hygraula nitens
Eclipsiodes crypsixantha
Heliothela ophideresana
Leucinodes cordalis
Nomophila corticalis
Ethmia eupostica
Eublemma inconspicua
Metaeomera coccophaga
Poliodule melanotricha
Crypsiprora peratoscia
Praxis marmarinopa
Eporectis sp. unidentified
Eudesmeola lawsoni
Gonitis involuta
Grammodes ocellata
Ophiusa parcemacula
Pandesma submurina
Orvasca sp. undescribed
Ardozyga catarrhacta
Pexicopia sp. unidentified
Stegasta cosmodes
Stegasta variana
Boarmia sp. ANIC6
Capusa chionopleura
Lipogya exprimataria
Chlorocoma unidentified
Euloxia pyropa
Prasinocyma unidentified
Dichromodes AH11Au
*Dichromodes haematopa*AH01
Dichromodes orectis
Dichromodes sp. ANIC3
Dichromodes sp. ANIC60
Dichromodes sp. ANIC62
Dichromodes sp. ANIC66
Dichromodes sp. unidentified
Taxeotis AH04
Taxeotis euryzona
Taxeotis phaeopa
Taxeotis philodora
Taxeotis sp. unidentified
Scopula episcia
Traminda mundissima
Eremaea zonospila
Condica dolorosa
Condica sp. unidentified
Heliothis punctifera
Agrotis munda
Ectopatria horologa
Eremochroa macropa
Leucania cruegeri
Leucania stenographa
Earias chlorodes
Earias huegeliana
Earias paralella
Chrysonoma sp. unidentified
Endeolena sp. ANIC1
Eochrois epitoxa
Pachybela unidentified
Oecophoridae sp.#1 unidentified
Oecophoridae sp.#2 unidentified
Ctenomeristis almella
Symphonistis monospila
Vinicia macrota
Phycitinae sp. unidentified
Crocidosema plebejana
Phazaca interrupta

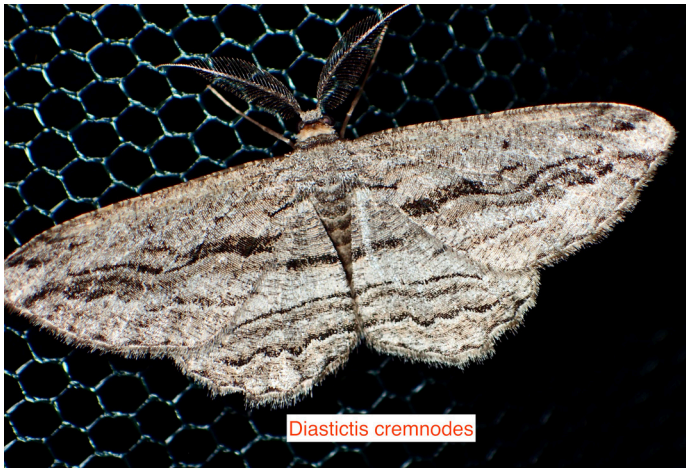

Leucania cruegeri

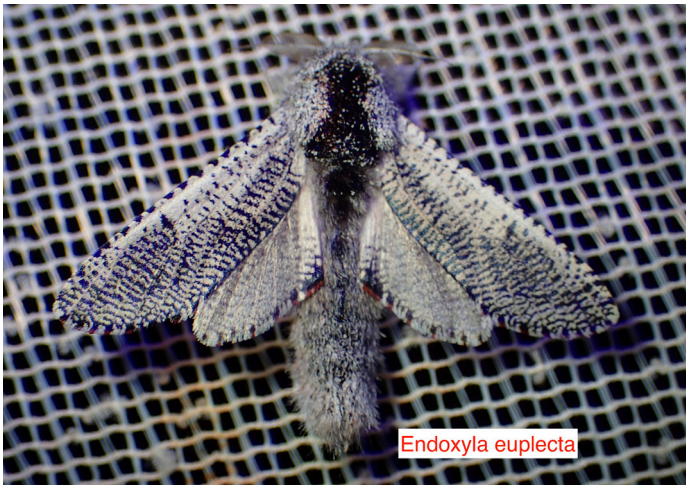

Crocidosema plebejana

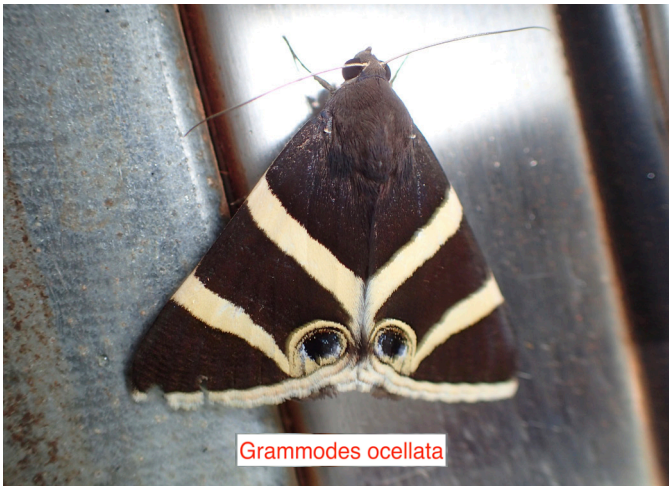
(*Lepidoptera Photographed)

**Agrotis munda*
**Anomocentris crystallota*
**Capusa chionopleura*
**Chlorocoma paraphylla*
**Condica* sp. unidentified
**Crocidosema plebejana*
**Dasypodia selenophora*
**Diastictis cremnodes*
**Diatenes* sp. unidentified
**Dichromodes* AH11Au
**Dichromodes ioneura*
**Dichromodes* sp ANIC51
**Dichromodes* sp. ANIC59
**Dichromodes* sp. ANIC63
**Earias paralella*
**Ectopatria paurogramma*
**Ectropis plectroneura*
**Endoxyla euplecta*
**Eremaea zonospila*
**Eremochroa alphitias*
**Eremochroa lunata*
**Eremochroa macropa*
**Ethmia eupostica*
**Etiella* sp. unidentified
**Etiella* sp. unidentified
**Eucosma* sp. ANIC11
**Eudesmeola lawsoni*
**Euageta dianipha*
**Euproctis* sp. ANIC5
**Grammodes ocellata*
**Hopliocnema brachycera*
**Hypoperigea tonsa*
**Leucania cruegeri*
**Leucinodes cordalis*
**Lipogya exprimataria*
**Lymantriinae* unidentified
**Macrobathra desmotoma*
**Macrobathra hemitropa*
**Mataeomera coccophaga*
**Mataeomera ligata*
**Mataeomera mesotaenia*
**Microbela epicona*
**Mimaglossa* sp. unidentified
**Mimodoxa tricommatica*
**Nacaduba biocellata*
**Nearcha* sp. 1 unidentified
**Nearcha* sp. 2 unidentified


Chlorocoma paraphylla


Diastictis cremnodes


Endoxyla euplecta


Grammodes ocellata

*Nearcha dasyzona
*Nomophila corticalis
*Notodontidae unidentified
*Ophiusa parcemacula
*Orvasca sp. undescribed
*Pandesma submurina
*Papilio demoleus
*Phazaca interrupta
*Poliodule melanotricha
*Praxis marmarinopa
*Spodoptera exigua
*Stegasta variana
*Tapinogyna perichroa
*Taxeotis sp. 1 unidentified
*Taxeotis sp. 2 unidentified
*Taxeotis euryzona
*Taxeotis phaeopa
*Vinicia macrota
*Zomariana doxasticana
*Unidentified 1
*Unidentified 2
*Unidentified 3
*Unidentified 4
*Unidentified 5
*Unidentified 6
*Unidentified 7
*Unidentified 8
*Unidentified 9
*Unidentified 10
*Unidentified 11
*Unidentified 12
*Unidentified 13
*Unidentified 14
*Unidentified 15
*Unidentified 16
*Unidentified 17
*Unidentified 18
*Unidentified 19
*Unidentified 20
*Unidentified 21
*Unidentified 22
*Unidentified 23
*Unidentified 24
*Unidentified 25

Mantodea (Mantids)
Australia: 3 families, 160 species

Unidentified sp. #1
Unidentified sp. #2

Neuroptera (Lacewings, Antlions, Mantis Flies)
Australia: 14 families, 600 species

Ascalaphidae (Owlfly)
Unidentified larva
**Trichoma gracilipenne*
(*photographed)

Myrmeleonididae (Antlions)
Unidentified sp. black
Unidentified sp. red

Orthoptera (Crickets and Grasshoppers)
Australia: 17 families, 1,482 species

Grasshoppers
Unidentified grey
Unidentified pale-brown
Unidentified red hunchbacked
Unidentified red rouge
Unidentified very large

Crickets
Melophorus aeneovirens
Euscyrtus hemelytrus

Katydids
Unidentified sp. #1
Unidentified sp. #2

Psocodea (Booklice, psocids and lice)
Unidentified sp. #1
Unidentified sp. #2

Trichoptera (Caddis-flies)
Australia: 26 families, 832 species

Unidentified sp. fine antennae
Unidentified sp. large hairy antennae
Unidentified sp. small pale antennae

Acknowledgements

A very special thank you to Dr Nik Tatarnic (Western Australian Museum) and Prof. Gerry Cassis (University of New South Wales) for their expertise in identifying some of the Hemiptera. Dr Brian Heterick's input into identifying all the ant species was greatly appreciated. I also thank the "experts" on iNaturalist who assisted with identifications of so many species we collected. Desert Discovery is indebted to the Wettenhall Environmental Trust that kindly sponsored the purchase of equipment used to attract and collect the invertebrates.

Bevan Buirchell checking his net. Photo: Libby Sakker.

Invertebrate Team: Bevan Buirchell (Team Leader), Jeremy Wallace, and Mark Heath. Photo: Maree Goods.

Botany

Text: Alan Bedggood. Photos: Maree Goods

The two weeks of plant surveying at the Yeo Lake Nature Reserve resulted in 188 pressed specimens being submitted to the WA Herbarium in Perth. Upon the identification of these, there were 169 individual species collected. This is a respectable duplication rate as it was based solely on the collective memory of previous collections on the project. The responses from the WA Herbarium after the specimens were identified were:

- a *Frankenia* species that "doesn't match any named taxa"
- a Priority 3 species "Poorly-known - known from several locations"
  - *Melaleuca apostiba*. This is a new location.
- no real range extensions as such but many collections filling significant distribution gaps of 100-200 km.

Most (if not all) specimens were suitable for identification and retention in the Herbarium. Finding patches of Native Boxthorn (*Lycium australe*) with quite variable leaf types between patches was a species of interest for Alan who has been seeking plants/seed of this difficult-to-find (restricted) species in Victoria. However, the presence of the leaf-type variations did not raise any special response.

Many specimens were not grown to their full potential due to the third successive dry season experienced in that area. Monitoring the very low daily rainfall figures for Laverton for the past couple of years did not suggest a good season for herbarium specimens for the Botany Team. This was the third dry year/season following very good rains in 2018 and into early 2019.

There must have been 20mm or so in late autumn of 2022 at Yeo Lake but not recorded at Laverton, indicated by quite a number of small annuals in flower around mud holes and protected sides of sand dunes. There were also a number of odd individuals (not large numbers or patches) of shrubs that were quite colourful (and collectable) including *Acacia, Eremophila, Senna* and *Solanum*.

With Yeo Lake being a salt lake, there were extensive areas of happy (well grown and flowering) saltbush plants including *Atriplex, Maireana, Sclerolaena* and *Tecticornia*.

There were six grass species in flower but all were shorter/smaller than they might get to in any sort of higher rainfall year.

Some plants can be readily identified by dried leaves and flower stems (grasses) or leaf shape and colour in the absence of flowers (*Eremophila*). However, herbarium specimens need to be fresh plant material that will hold together on mounted sheets. They also need to be identifiable by a botanist to be acceptable for further comparison and research. There were many more species seen in the Reserve but were deemed as "not collectable".

The plant presses were returned to the WA Herbarium with all DD specimens at the end of the project. They were placed into ovens for two weeks to dry before being placed into a freezer to kill any potential insects that may feast on the plant material. All of the field-book data collected for each species have been entered into Microsoft Excel in a format that is suitable for importing into the WA Herbarium database. These data were provided on September 12. The number of photographs was mostly reduced to three of the best for each species. However a few had two and the eucalypts tended to have five to include buds, fruit, leaves, bark and habit. The photographs (560) were transferred electronically to the WA Herbarium on October 4, 2022.

The DD recce undertaken in 2021 indicated that there was sufficient scope for the project. However, the Yeo Lake Nature Reserve has had little prior survey work and there was not much in the way of mapping of suitable tracks. Nightly interactions with members of other Teams allowed insight into track conditions and mention of potential collection sites for forthcoming days of activities.

The Botany Team consisted of Alan Bedggood, Phil Bianchi and Richard House, Mark and Sue Conlan, Maree and Graham Goods and Russell Wait. The Team was capably assisted by the addition of Ruby Stephens, Sophie Yang and Thomas Mesaglio for the first week. These were University students from Sydney with Thomas and Ruby, PhD candidates, and Sophie, a research scientist. Their addition and contributions to the Team were very welcome and appreciated.

For future DD collections, the WA Herbarium suggested:

1. With pressing plants, only two sheets of newspaper (one out, one in, interleaved) are best for drying plant specimens – allow the specimen to relax overnight, then the next day change out the newspaper (if needed); repeat every couple of days if you don't have a drier. Lots of newspaper does not decrease drying time (and in fact just traps moisture). It also adds to bulk for storage – and means carrying a lot more newspaper.

2. Go through specimens before submitting to the Herbarium and separate dry vs not dry specimens. This helps cut down workload for Herbarium staff (who have to go through every single specimen to make sure they are dry) – and ensures faster drying. Dry specimens can be placed in cardboard boxes for submission.

Species Collected DD 2022 Yeo Lake Nature Reserve

Species	Species	Species
Acacia burkittii	*Disphyma crassifolium*	*Eucalyptus* sp.
Acacia ligulata	*Dodonaea lobulata*	*Eucalyptus youngiana*
Acacia tetragonophylla	*Dodonaea rigida*	*Euphorbia* aff. *tannensis*
Alternanthera angustifolia	*Dodonaea viscosa*	*Euphorbia drummondii*
Aluta maisonneuvei	*Duboisia hopwoodii*	*Exocarpos aphyllus*
Amyema nestor	*Duperreya commixta*	*Frankenia* sp. (doesn't match any named taxa)
Anthotroche pannosa	*Dysphania kalpari*	*Glycine canescens*
Aristida contorta	*Einadia nutans* subsp. *eremaea*	*Gnephosis tenuissima*
Aristida holathera	*Enneapogon avenaceus*	*Goodenia occidentalis*
Atriplex codonocarpa	*Enneapogon caerulescens*	*Goodenia quasilibera*
Atriplex vesicaria (female)	*Enteropogon ramosus*	*Goodenia triodiophila*
Atriplex vesicaria (male)	*Eragrostis kennedyae*	*Gunniopsis quadrifida*
Austrostipa nitida	*Eragrostis xerophila*	*Gunniopsis* sp.
Bergia perennis	*Eremophila alternifolia*	*Gyrostemon ramulosus*
Brunonia australis	*Eremophila gilesii*	*Hakea lorea*
Calandrinia ? *eremaea*	*Eremophila latrobei*	*Hakea minyma*
Calandrinia balonensis	*Eremophila longifolia*	*Halgania cyanea*
Callitris collumellaris	*Eremophila maculata* subsp. *brevifolia*	*Indigofera georgei*
Calocephalus sp.	*Eremophila miniata*	*Jacksonia arida*
Calotis erinacea	*Eremophila oppositifolia* subsp. *angustifolia*	*Jasminum calcareum*
Calotis hispidula	*Eremophila platythamnos*	*Lawrencella davenportii*
Calotis multicaulis	*Eremophila scoparia*	*Lepidium rotundum*
Casuarina obesa	*Eremophila serrulata*	*Lomandra leucocephala*
Centipeda crateriformis	*Eremophila youngii*	*Lycium australe*
Chenopodium deserticola	*Eriachne pulchella* subsp. *pulchella*	*Lysiana* aff. *casuarinae*
Chrysocephalum puteale	*Erodium cygnorum*	*Maireana amoena*
Convolvulus clementii	*Eucalyptus concinna*	*Maireana appressa*
Corynotheca divaricata	*Eucalyptus ecdysiastes*	*Maireana carnosa*
Cratystylis subspinescens	*Eucalyptus effusa subsp. exsul*	*Maireana georgei*
Cynanchum viminale subsp. *australe*	*Eucalyptus eremicola* subsp. *peeneri*	*Maireana glomerifolia*
Daucus glochidiatus	*Eucalyptus glomerosa*	*Maireana platycarpa*
Daviesia aphylla	*Eucalyptus gongylocarpa*	*Maireana pyramidata*
Dichanthium sericeum subsp. *humilius*	*Eucalyptus lucasii*	*Maireana suaedifolia*
Dicrastylis ? *doranii*	*Eucalyptus oleosa* subsp. *oleosa*	*Maireana tomentosa*
Dicrastylis exsucosa	*Eucalyptus salubris*	*Marsdenia australis*
Digitaria brownii		

Species Collected DD 2022 Yeo Lake Nature Reserve (continued)

Species	Species	Species
Marsilea hirsuta	*Rhodanthe citrina*	*Senna* sp. Austin (A. Strid 20210)
Melaleuca apostiba	*Rhodanthe maryonii*	*Sida calyxhymenia*
Monacather paradoxa	*Rhodanthe propinqua*	*Sida* sp. Excedentifolia (J.L. Egan 1925)
Myriocephalus pygmaeus	*Rhodanthe stricta*	*Siemssenia capillaris*
Nicotiana occidentalis	*Roebuckiella ciliocarpa*	*Solanum cleistogamum*
Olearia eremaea	*Roepera eremaea*	*Solanum coactiliferum*
Olearia muelleri	*Rutidosis helichrysoides*	*Solanum lasiophyllum*
Paspalidium constrictum	*Salsola australis*	*Solanum orbiculatum*
Plantago turrifera	*Santalum spicatum*	*Stenopetalum pedicellare*
Pluchea dunlopii	*Scaevola spinescens*	*Stenopetalum salicola*
Psydrax latifolia	*Sclerolaena cuneata*	*Streptoglossa liatroides*
Psydrax suaveolens	*Sclerolaena deserticola*	*Swainsona tenuis*
Pterocaulon sphacelatum	*Sclerolaena eriacantha*	*Tecticornia calyptera*
Ptilotus exaltatus	*Sclerolaena eurotioides*	*Tecticornia indica* subsp. *bidens*
Ptilotus obovatus	*Sclerolaena parviflora*	*Tecticornia sp.*
Ptilotus obovatus	*Senecio gregorii*	*Teucrium teucriiflorum*
Ptilotus polystachyus	*Senna artemisioides* subsp. *filifolia*	*Thiseltonia gracillima*
Ptilotus schwartzii	*Senna artemisioides* subsp. *helmsii*	*Triodia basedowii*
Rhodanthe charsleyae	*Senna artemisioides* subsp. *oligophylla*	*Vittadinia eremaea*
Rhodanthe chlorocephala	*Senna artemisioides* subsp. x *sturtii*	
Rhodanthe chlorocephala subsp. *splendida*	*Senna glutinosa* subsp. *chatelainiana*	

DD1745 *Anthotroche pannosa.*

DD1656 *Dodonaea rigida.*

DD1679 *Maireana georgei.*

DD1616 *Solanum orbiculatum.*

Plant collection numbers DD 2022 Yeo Lake Nature Reserve

Coln #	Name	Coln #	Name	Coln #	Name
DD1572	*Calotis multicaulis*	DD 1607	*Lepidium rotundum*	DD 1642	*Eragrostis xerophila*
DD1573	*Rhodanthe propinqua*	DD 1608	*Eucalyptus ecdysiastes*	DD 1643	*Marsdenia australis*
DD1574	*Rhodanthe charsleyae*	DD 1609	*Thiseltonia gracillima*	DD 1644	*Swainsona tenuis*
DD1575	*Eremophila youngii*	DD 1610	*Lawrencella davenportii*	DD 1645	*Mairena carnosa*
DD1576	*Cratystylis subspinescens*	DD 1611	*Gunniopsis quadrifida*	DD 1646	*Marsilea hirsuta*
DD1577	*Maireana platycarpa*	DD 1612	*Acacia burkittii*	DD 1647	*Streptoglossa liatroides*
DD1578	*Sclerolaena eurotioides*	DD 1613	*Gnephosis tenuissima*	DD 1648	*Aristida contorta*
DD1579	*Exocarpos aphyllus*	DD 1614	*Gunniopsis* sp.	DD 1649	*Enneapogon avenaceus*
DD1580	*Tecticornia* sp.	DD 1615	*Roebuckiella ciliocarpa*	DD 1650	*Eragrostis kennedyae*
DD1581	*Swainsona tenuis*	DD 1616	*Solanum orbiculatum*	DD 1651	*Maireana appressa*
DD1582	*Disphyma crassifolium*	DD 1617	*Senna artemisioides* subsp. *filifolia*	DD 1652	*Eucalyptus effusa* subsp. *exsul*
DD1583	*Acacia tetragonophylla*	DD 1618	*Maireana suaedifolia*	DD 1653	*Amyema nestor*
DD1584	*Scaevola spinescens*	DD 1619	*Lycium australe*	DD 1654	*Olearia eremaea*
DD1585	*Frankenia* sp. (doesn't match any named taxa)	DD 1620	*Maireana pyramidata*	DD 1655	*Dodonaea viscosa*
DD1586	*Maireana pyramidata*	DD 1621	*Lycium australe*	DD 1656	*Dodonaea rigida*
DD1587	*Sida calyxhymenia*	DD 1622	*Maireana carnosa*	DD 1657	*Psydrax latifolia*
DD1588	*Ptilotus obovatus*	DD 1623	*Solanum lasiophyllum*	DD 1658	*Pterocaulon sphacelatum*
DD1589	*Maireana glomerifolia*	DD 1624	*Cynanchum viminale* subsp. *australe*	DD 1659	*Ptilotus schwartzii*
DD1590	*Sclerolaena eriacantha*	DD 1625	*Rhodanthe chlorocephala* subsp. *splendida*	DD 1660	*Senna artemisioides subsp.* x *sturtii*
DD1591	*Olearia muelleri*	DD 1626	*Rhodanthe stricta*	DD 1661	*Lysiana* aff. *casuarinae*
DD1592	*Eremophila oppositifolia* subsp. *angustifolia*	DD 1627	*Goodenia quasilibera*	DD 1662	*Duperreya commixta*
DD1593	*Dodonaea lobulata*	DD 1628	*Daucus glochidiatus*	DD 1663	*Eremophila serrulata*
DD1594	*Rhodanthe chlorocephala*	DD 1629	*Myriocephalus pygmaeus*	DD 1664	*Atriplex vesicaria* (male)
DD1595	*Calotis hispidula*	DD 1630	*Alternanthera angustifolia*	DD 1665	*Atriplex vesicaria* (female)
DD1596	*Senecio gregorii*	DD 1631	*Plantago turrifera*	DD 1666	*Atriplex vesicaria* (female)
DD1597	*Calocephalus* sp.	DD 1632	*Centipeda crateriformis*	DD 1667	*Eucalyptus lucasii*
DD1598	*Siemssenia capillaris*	DD 1633	*Nicotiana occidentalis*	DD 1668	*Eremophila scoparia*
DD1599	*Stenopetalum salicola*	DD 1634	*Solanum cleistogamum*	DD 1669	*Jasminum calcareum*
DD1600	*Maireana amoena*	DD 1635	*Enteropogon ramosus*	DD 1670	*Senna artemisioides* subsp. *helmsii*
DD 1601	*Salsola australis*	DD 1636	*Streptoglossa liatroides*	DD 1671	*Ptilotus obovatus*
DD1602	*Sclerolaena deserticola*	DD 1637	*Dichanthium sericeum* subsp. *humilius*	DD 1672	*Acacia ligulata*
DD1603	*Calandrinia balonensis*	DD 1638	*Sclerolaena cuneata*	DD 1673	*Senna artemisioides* subsp. *oligophylla*
DD1604	*Calotis hispidula*	DD 1639	*Rutidosis helichrysoides*	DD 1674	*Eremophila latrobei*
DD1605	*Rhodanthe chlorocephala*	DD 1640	*Euphorbia drummondii*		
DD1606	*Erodium cygnorum*	DD 1641	*Convolvulus clementii*		

DD1581 *Swainsona tenuis.*

DD1603 *Calandrinia balonensis*

Plant collection numbers DD 2022 Yeo Lake Nature Reserve (continued)

Coln #	Name	Coln #	Name	Coln #	Name
DD 1675	*Eucalyptus oleosa* subsp. *oleosa*	DD 1703	*Eucalyptus salubris*	DD 1732	*Dicrastylis exsucosa*
DD 1676	*Senna* sp. Austin (A. Strid 20210)	DD 1704	*Eucalyptus youngiana*	DD 1733	*Goodenia triodiophila*
DD 1677	*Glycine canescens*	DD 1705	*Eucalyptus gongylocarpa*	DD 1734	*Sida* sp. Excedentifolia (J.L. Egan 1925)
DD 1678	*Goodenia triodiophila*	DD 1707	*Eucalyptus* sp.	DD 1735	*Eriachne pulchella* subsp. *pulchella*
DD 1679	*Maireana georgei*	DD 1708	*Aluta maisonneuvei*	DD 1736	*Aristida holathera*
DD 1680	*Eucalyptus concinna*	DD 1709	*Psydrax suaveolens*	DD 1737	*Aristida contorta*
DD 1681	*Tecticornia indica* subsp. *bidens*	DD 1710	*Einadia nutans* subsp. *eremaea*	DD 1738	*Monacather paradoxa*
DD 1682	*Bergia perennis*	DD 1711	*Atriplex codonocarpa*	DD 1739	*Brunonia australis*
DD 1683	*Eremophila longifolia*	DD 1712	*Maireana tomentosa*	DD 1740	*Solanum coactiliferum*
DD 1684	*Eremophila maculata* subsp. *brevifolia*	DD 1713	*Melaleuca apostiba*	DD 1741	*Digitaria brownii*
DD 1685	*Teucrium teucriiflorum*	DD 1714	*Eremophila gilesii*	DD 1742	*Austrostipa nitida*
DD 1686	*Casuarina obesa*	DD 1715	*Santalum spicatum*	DD 1743	*Vittadinia eremaea*
DD 1687	*Casuarina obesa*	DD 1716	*Euphorbia* aff. *tannensis*	DD 1744	*Gyrostemon ramulosus*
DD 1688	*Rhodanthe citrina*	DD 1717	*Indigofera georgei*	DD 1745	*Anthotroche pannosa*
DD 1689	*Stenopetalum pedicellare*	DD 1718	*Eucalyptus eremicola* subsp. *peeneri*	DD 1746	*Rutidosis helichrysoides*
DD 1690	*Goodenia occidentalis*	DD 1719	*Ptilotus exaltatus*	DD 1747	*Pluchea dunlopii*
DD 1691	*Eremophila miniata*	DD 1720	*Dysphania kalpari*	DD 1748	*Hakea lorea*
DD 1692	*Lycium australe*	DD 1721	*Enneapogon caerulescens*	DD 1749	*Eremophila alternifolia*
DD 1693	*Jacksonia arida*	DD 1722	*Paspalidium constrictum*	DD 1750	*Senna glutinosa* subsp. *chatelainiana*
DD 1694	*Rhodanthe maryonii*	DD 1723	*Triodia basedowii*	DD 1751	*Calotis erinacea*
DD 1695	*Dicrastylis* ? *doranii*	DD 1724	*Roepera eremaea*	DD 1752	*Corynotheca divaricata*
DD 1696	*Chrysocephalum puteale*	DD 1725	*Solanum coactiliferum*	DD 1753	*Jacksonia arida*
DD 1697	*Eremophila platythamnos*	DD 1726	*Ptilotus polystachyus*	DD 1754	*Hakea minyma*
DD 1698	*Callitris collumellaris*	DD 1727	*Calandrinia* ? *eremaea*	DD 1755	*Psydrax suaveolens*
DD 1699	*Tecticornia calyptera*	DD 1728	*Solanum orbiculatum*	DD 1756	*Chenopodium deserticola*
DD 1700	*Tecticornia* sp.	DD 1729	*Salsola australis*	DD 1758	*Lomandra leucocephala*
DD 1701	*Sclerolaena parviflora*	DD 1730	*Daviesia aphylla*	DD 1759	*Duboisia hopwoodii*
DD 1702	*Eucalyptus glomerosa*	DD 1731	*Halgania cyanea*		

DD1688 *Rhodanthe citrina.*

DD1732 *Dicrastylis exsucossa.* Photo: Graham Goods.

DD1730 *Daviesia aphylla.*

DD1612 *Acacia burkittii.*

DD1588 *Sida calyxhymenia.*

DD1629 *Myriocephalus pygmaeus.*

DD1636 *Streptoglossa liatroides.*

DD1653 *Amyema nestor.*

DD1727 *Calandrinia* ? *eremaea.*

DD1753 *Jacksonia arida.* Photo: Graham Goods.

DD1684 *Eremophila maculata* subsp. *brevifolia.*

DD1731 *Halgania cyanea.*

Botany Team.
Back: Mark Conlan, Alan Bedggood (Team Leader), Sophie Yang, Ruby Stephens, Thomas Mesaglio, Phil Bianchi.
Front: Graham Goods, Maree Goods, Sue Conlan, Russell Wait, Richard House. Photo Russell Wait.

Fungi and Lichen

Malcolm McKinty

Fungi from Yeo Lake Nature Reserve

The ephemeral nature of the fruit-bodies of most species of fungi means that finding them is largely opportunistic and depends on the search coinciding with their location, their emergence and before they have deteriorated or been consumed. The Yeo Lake region had received only limited rainfall for several years prior to the 2022 Desert Discovery project. As a consequence, the fungal fruit-bodies that were found were species able to persist despite desiccation. The majority comprised puffballs and their allies that are common to arid and semi-arid environments.

The vast majority of the macrofungi fall into two main divisions based on microscopic characteristics – the Basidiomycota, where the spores are produced on the outside of specialised club-shaped cells and the Ascomycota, in which the spores are produced inside specialised sac-like cells, called asci.

Depending on the fungus' species group, the spores of the Basidiomycota may be produced on the surface of the fruit-body; on specialised surfaces such as gills (or lamella) that are like the leaves of a book; on spines; as the lining of tubes; or, as in the case of the powdery spore mass in a puffball, within the fruit-body. For the purposes of description, the fungi found during this project have been placed into morphological groups - an artificial grouping of similar-shaped fungi (see Appendix 1).

Agarics

The general group of 'agarics' includes fungi on which the spores are produced on gills. Agarics incorporate the majority of fungi and include the 'mushrooms'. Most agarics are ephemeral.

Montagnea arenaria
Desert Inkcap

Montagnea arenaria.

Considered relatively uncommon, this species grows in sandy soils in many arid areas of the world.

The stem is woody and the gills brittle.

Montagnea arenaria was found to be restricted to the red sand-dunes beside the Anne Beadell Highway in the south-west of the Yeo Lake Nature Reserve.

Five occurrences of this species found during this project are recorded on iNaturalist, two specimens of which were collected for the Perth Herbarium.

Bracket Polypores

The polypores are a large group of fungi in which the spores are produced from tubes (which appear as pores) or gill-like structures under a cap. Most polypores are tough and leathery or woody and are almost always attached to wood.

Family: Hymenochaetaceae

Robust Bracket

Two occurrences of this woody, hoof-shaped perennial fungus were recorded from the Yeo Lake Nature Reserve; one of which (albeit dead and disintegrating) was collected for the Perth Herbarium.

Both specimens were found on Mulga (*Acacia aneura*).

Family: Hymenochaetaceae. 'Robust Bracket'
. Photo: Christine Magun.

Trametes coccinea

Scarlet Bracket Fungus

Previously named *Pycnoporus coccineus,* this polypore is a common wood-decaying (saprotrophic) fungus found across Australia from the arid areas to moist fern gullies.

It can persist for many years before decaying.

Trametes coccinea, upper surface.

Trametes coccinea, under (pore) surface.

Three occurrences of *Trametes coccinea* were found during the project. All were desiccated but nevertheless displayed the spectacular colour of the pore surface.

Puffballs

Puffballs are usually spherical or oval-shaped fungi in which the spores appear as a mass within an outer wall (peridium). The peridium on some species may comprise an outer layer (exoperidium) which disintegrates as the fungus matures to expose an inner layer (endoperidium). Some have a small circular opening (ostiole, pore or stoma) through which the spores are discharged when pressure (such as from rain drops) is applied to the peridium. Others crack open or progressively disintegrate to release the spores.

Stemless Puffballs

Only one typical spherical puffball was found during the project.

***Bovista* sp.**

Bovista sp.

Bovista sp. This specimen was ruptured to expose the spores.

The stemless fruit-bodies of *Bovista* tend to be oval, spherical or pear-shaped, and typically 1 to 8 cm in diameter. The white or light-coloured thin and fragile exoperidium which, in a young specimen may be smooth, granular or finely spiny – depending on the species – sloughs off at maturity to expose a smoother endoperidium.

It has brown to purple-brown spores.

Stalked Puffballs

As the name of this group implies, these puffballs are raised above the ground by a stem which may be fibrous or woody.

Podaxis pistillaris

Desert Shaggy Mane or Black Powderpuff

Podaxis pistillaris.

This very distinctive relative of the puffballs was the most common and persistent fungus found during this project.

A saprotrophic species, it is common in the semi-arid and arid areas of Australia as well as in many arid areas of the world.

The enveloping cap (peridium) splits, lifts and/or shreds to expose the dark-brown powdery spore-mass which is held in a fragile web-like structure. The spores are dispersed by the wind.

Fourteen were recorded during the DD project and entered on iNaturalist, two of which were taken as specimens.

***Tulostoma* sp.**

The genus *Tulostoma* embraces a large number of species of stalked puffballs in which the spores are ejected through a stoma in the top of the thin-walled peridium which acts like bellows when raindrops strike it.

Depending on the species, the fruit-bodies vary between 5mm and 20mm tall and can be partially buried or fully exposed. It is difficult to identify them to species level in the field.

They are common fungi of sandy soils in arid and semi-arid regions of the world.

Tulostoma sp.

Tulostoma sp.

Tulostoma sp.

Tulostoma sp.

Eleven specimens of *Tulostoma* were collected during the project; four are depicted above.

Earth Stars

Geastars (earth stars) are another form of puffball. They have a double-layered peridium, the outer layer of which splits to form a number of rays – like a star – to expose the central puffball. Their spores are ejected through a central stoma in the puffball under the impact of rain.

Geastrum pectinatum
Beaked Earth Star

The long, striated 'beak' terminating in a small round pore is one of the identifying features of *Geastrum pectinatum*.

This specimen and two other species of *Geastrum* were collected from litter under dense shrubs.

Geastrum pectinatum.

Leathery Shelf Fungus

Genus/species unknown.

Genus/species unknown

This thin, leathery, closely-adhering crust was found on dead eucalypt wood.

Ascomycota

The Ascomycota produce their spores in microscopic tubes or sacs called asci that form the fertile layer. The 'cup fungi' are part of a large group in which the fertile layer is cup-shaped or flat to convex.

Cup fungus
Genus/species unknown

Several fruit-bodies of this coprophilic cup fungus which had erupted from camel dung were found during this project.

Genus/species unknown. Fungus on camel dung.

Other Fungal Species

Genus/species unknown.

Genus/species unknown

This minute, hairy fungus (with a spider friend) on a substrate of dead eucalypt wood was difficult to photograph with clarity.

Lichen from Yeo Lake Nature Reserve

A lichen is a composite organism consisting of fungi living symbiotically with algae or cyanobacteria. The fungal component benefits from the carbohydrates produced by the algae or cyanobacteria via photosynthesis. The algae or cyanobacteria benefit by being protected from the environment by the filaments of the fungi, which also gather moisture and nutrients from the environment, and (usually) provide an anchor to the substrate.

Lichens come in many colours, sizes and forms. The body (thallus) of most lichens is different from those of either the fungus or alga growing separately. Lichens may have tiny, leafless branches (fruticose), flat leaf-like structures (foliose), flakes that lie on the surface like peeling paint (crustose) or other growth forms.

The Yeo Lake Nature Reserve carried a rich diversity of lichen, eight specimens of which were collected from various locations during the project.

Flavoparmelia rutidota, on bark of *Acacia aneura.*

Psora decipiens.

Acarospora citrina, (yellow-green).

Heterodea sp.

Siphula sp.

Soil crust lichen.

Soil crust lichen.

Epilithic lichen on quartz.

Collection information

Because of the uncertain conservation status of fungi and lichen, all specimens were collected under the umbrella of an "Authorisation to Take or Disturb Threatened Flora" (TFL 2223-0025) issued by the Department of Biodiversity, Conservation and Attractions, Western Australia.

The specimens have been lodged with the Western Australian Herbarium and are under review as to their identification. Should any species be identified as Threatened or Priority according to the Biodiversity Conservation Act 2016, it will be recorded on the 'Threatened and Priority Database'.

Eight packets of various substrates were also forwarded to the Perth Herbarium for testing for the presence of slime moulds.

Appendix 1 summarises those fungal species recorded by the author. Some of the specimens collected and the records now on iNaturalist include contributions by other DD participants.

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Malcom McKinty.

Appendix 1

FUNGI FROM YEO LAKE NATURE RESERVE
Numbers of fungi by morphological group

MORPHOLOGICAL GROUP	SPECIES	NUMBER COLLECTED	NUMBER ENTERED ON iNATURALIST
agaric (gills under a cap)	*Montagnea arenaria*	2	5
polypore – bracket (bracket-shaped with pores under a cap; tough texture)	*Fomitiporia robusta*	1	2
	Trametes coccinea	3	3
stemless puffball (spores enclosed in a sac; stem absent or reduced	*Bovista* sp.	1	1
stalked puffball (spores enclosed in a sac supported on a stem)	*Podaxis pistillaris*	2	14
	Tulostoma sp.	11	11
earth star (spores enclosed in a sac surrounded by star-shaped rays)	*Geastrum pectinatum*	1	1
	Geastrum sp.	2	2
leathery shelf fungus	Unknown genus/species	1	0
unknown species	Unknown genus/species	2	0
cup fungus	Unknown genus/species	1	1
TOTAL		**27**	**40**

Tracking Survey

Joss Haiblen and Trish Macdonald

Supporting Material

Survey data sheets, summary spreadsheets, and photos relating to this survey are held by Desert Discovery Inc. (DD). This includes plot reference photos as well as photos of notable findings. Data presented below that are not referenced within the report can be found in the supporting material.

Introduction

We, Trish Macdonald and Joss Haiblen, coordinated the tracking survey at Yeo Lake Nature Reserve from 16-27 August 2022. Tracking surveys in the arid zone (including those conducted as part of DD2014 and DD2016) have been brought together under the banner of the Arid Zone Monitoring Project funded through the Threatened Species Recovery Hub (https://www.nespthreatenedspecies.edu.au/projects/arid-zone-monitoring-surveys-for-vertebrates-across-arid-and-semi-arid-zones). We have benefited from guidance by two key advocates for, and practitioners of, arid zone track-based monitoring – Rachel Paltridge (Indigenous Desert Alliance) and Danae Moore (Australian Wildlife Conservancy).

Their particular interest in threatened species has informed the Arid Zone Monitoring Project's focus on the Greater Bilby *Macrotis lagotis* (known over much of the arid zone as 'Ninu') and the Great Desert Skink *Liopholis kintorei* (known over much of the arid zone as 'Tjakura'). At Yeo Lake, a further threatened species focus (Malleefowl *Leipoa ocellata*) was provided by Joe Benshemesh (University of Melbourne) who has guided DD's Marsupial Mole surveys for many years. He had recently found Malleefowl evidence in the Great Victoria Desert to the southwest of Yeo Lake Nature Reserve and he was keen for us to add Malleefowl to our survey given historical records within the Reserve (Map 3).

Aside from these threatened species, the tracking surveys aim to record the larger reptiles, birds and mammals whose tracks, scats, burrows, diggings and remains are readily detectable, as well as some smaller species such as the hopping mice and mulgaras which have distinctive tracks. However, the vast majority of the smaller species are surveyed by the Mammals and Reptiles Team, predominantly through trapping.

Survey Methods

Three survey methods were used. The predominant method involved systematically walking 2 hectare plots at approximately 5km spacing along roads and tracks (Map 1). We walked the plots in line sweeps with spacing between ourselves adjusted to each site such that we could see all of the ground (photo 29B). Aside from sign of the target animals, we recorded information on location, weather, fire history, habitat/vegetation and trackability. As fully explained in our DD2016 report, each 2 hectare 'A' plot was paired with an adjacent 2 hectare 'B' plot in order to cater for the original 4 hectare plot method applicable to the Great Desert Skink (DD 2016).

The second method (Map 2) was an exploratory line search (see next section) targeting the three threatened species – Greater Bilby, Great Desert Skink, and Malleefowl. The third method (Map 2) involved spot surveys at sites of special interest reported to us by other DD participants as they went about their particular surveys.

Exploratory Line Search

After completing the survey of tracking plots, and without evidence of Malleefowl and only one piece of ancient evidence of Greater Bilby (spoil mound at Plot YL4A, photo 4A-a), we conducted an exploratory line search. The area chosen was a block of mallee eucalypt (several species) and mulga woodland with a lower storey of mixed acacias, eremophilas, sennas and sandalwood over a sandplain of spinifex and maybe 30% bare ground. Much of the mallee (large trunks and canopies) and the spinifex (large rings) could be described as old growth.

This block shows as green on the topographic maps and is bounded by Yeo Lake to the north, the Yeo Lake Homestead to Yeo Lake track to the east, and "claypan track" to the south. From the western end of the "claypan track" four of us (Libby Goodchild, Andrew Tatnell, Trish and Joss) walked north and then east for a distance of 9km (Map 2). We were spaced such that we covered a 200m wide swathe over 9km, thus observing 1,800 ha.

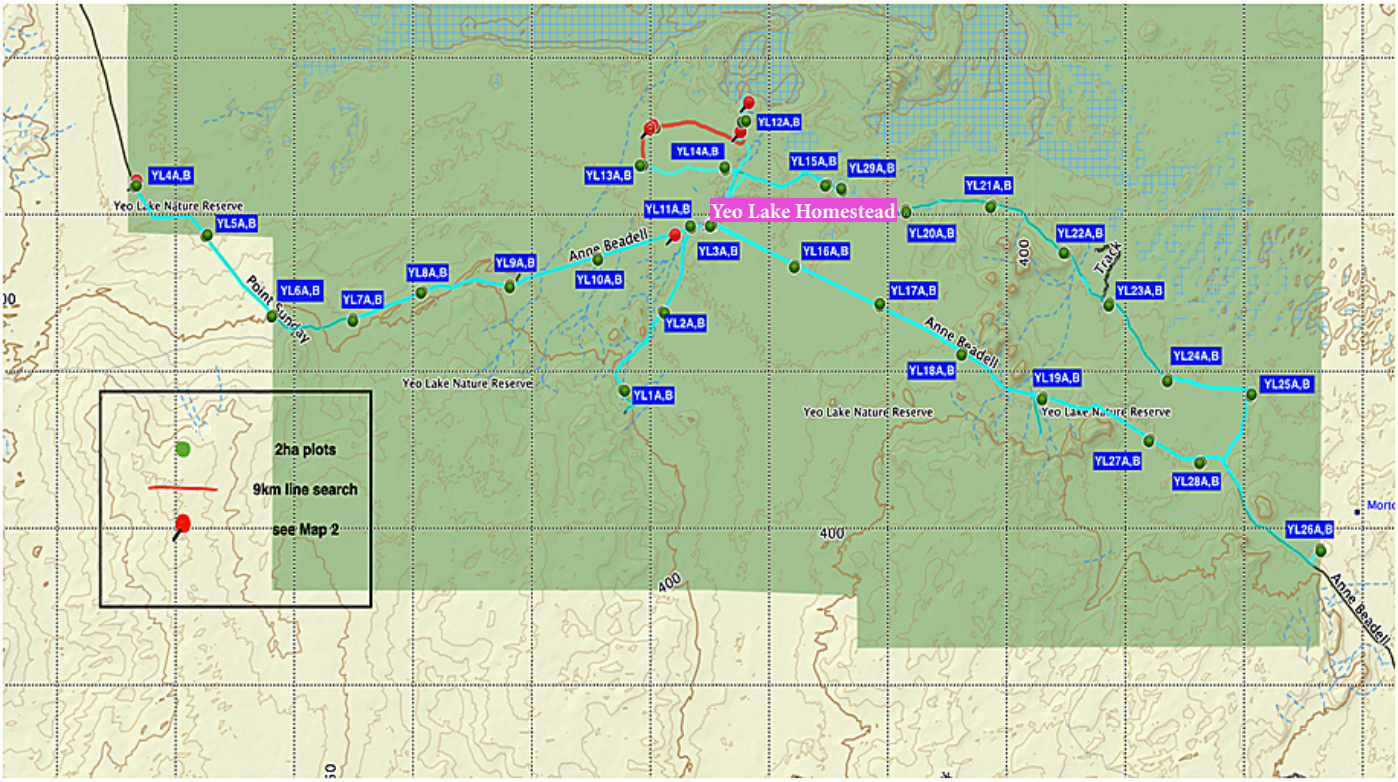
Our wide spacing and brisk pace were appropriate in that we were not looking at tracks and other smaller features as in the plot surveys, but rather we were looking for large disturbances/features on the ground, particularly those associated with Malleefowl and Greater Bilby.

This woodland block was chosen as it was in the area and habitat where there were historical records of Malleefowl (Map 3), and it provided a contrast to most of the randomly chosen plots we had surveyed. Where ever several big old mallees grew together, there was quite a reasonable layer of leaf litter, but alas no evidence of Malleefowl was found.

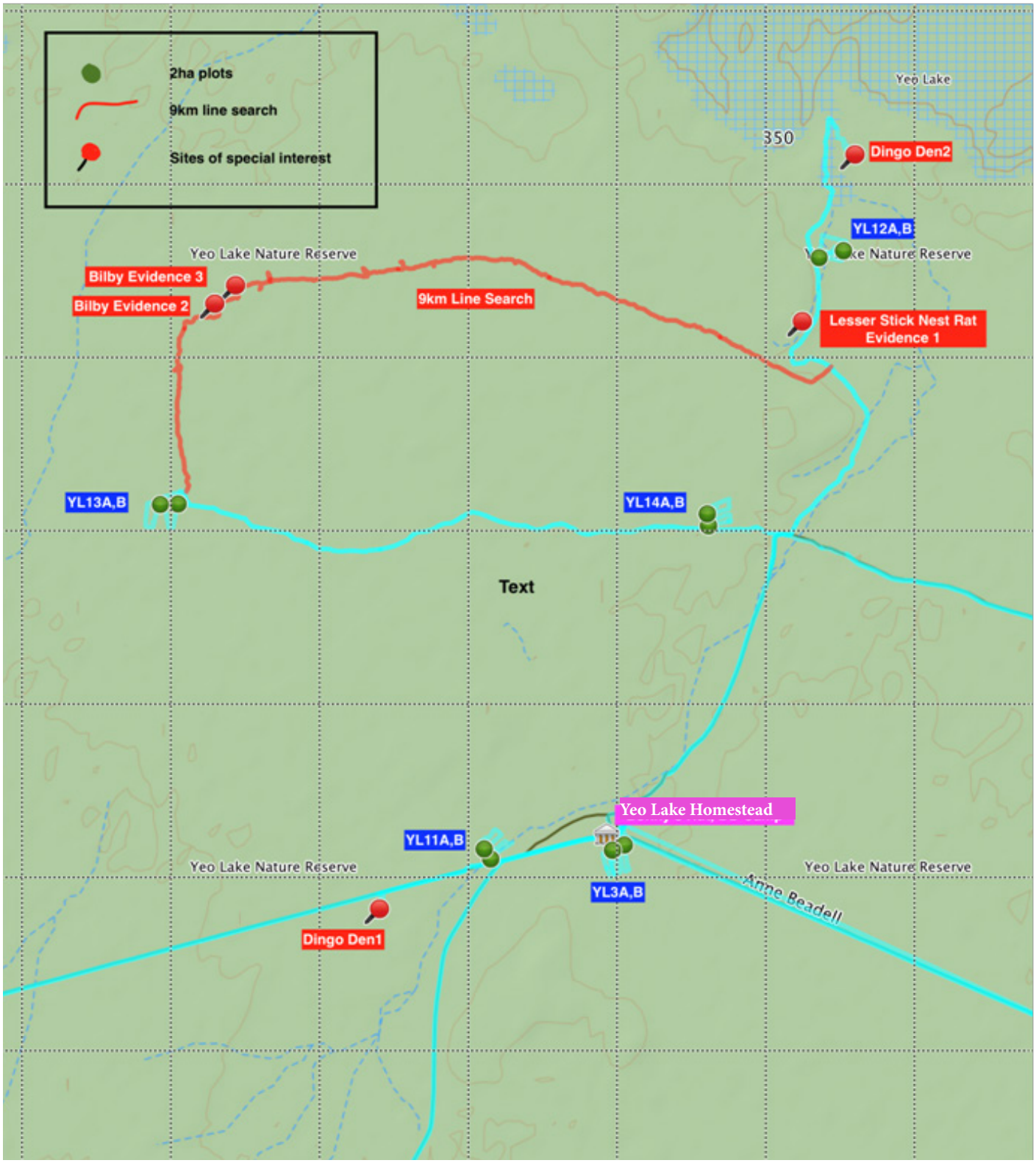
We did, however, find two sites (Bilby Evidence 2 and 3) with very old spoil mounds up to half a metre high of a shape and size consistent with Greater Bilby burrows (photos Bilby Evidence 2a and 3a). In some cases the burrow associated with a mound was still evident, and in others the burrow had closed in. There were no tracks or scats of any animal at these sites. The Bilby Evidence 3 site also contained a deep digging exposing the lateral roots of a *Senna artemisioides* subsp. *petiolaris* shrub (photo Bilby Evidence 3a). This looked very much like bardi/witchetty grub Bilby feeding sites encountered on previous DD projects (see for example DD 2016). There was certainly no sign of anything other than very old/ancient activity by Greater Bilbies.

While the purpose and conduct of this survey did not lend itself to observing finer details, we could not help but notice the general paucity of tracks on the ground, despite a trackability score of 2. The exception was cats. As elsewhere, there were frequent fresh cat tracks.

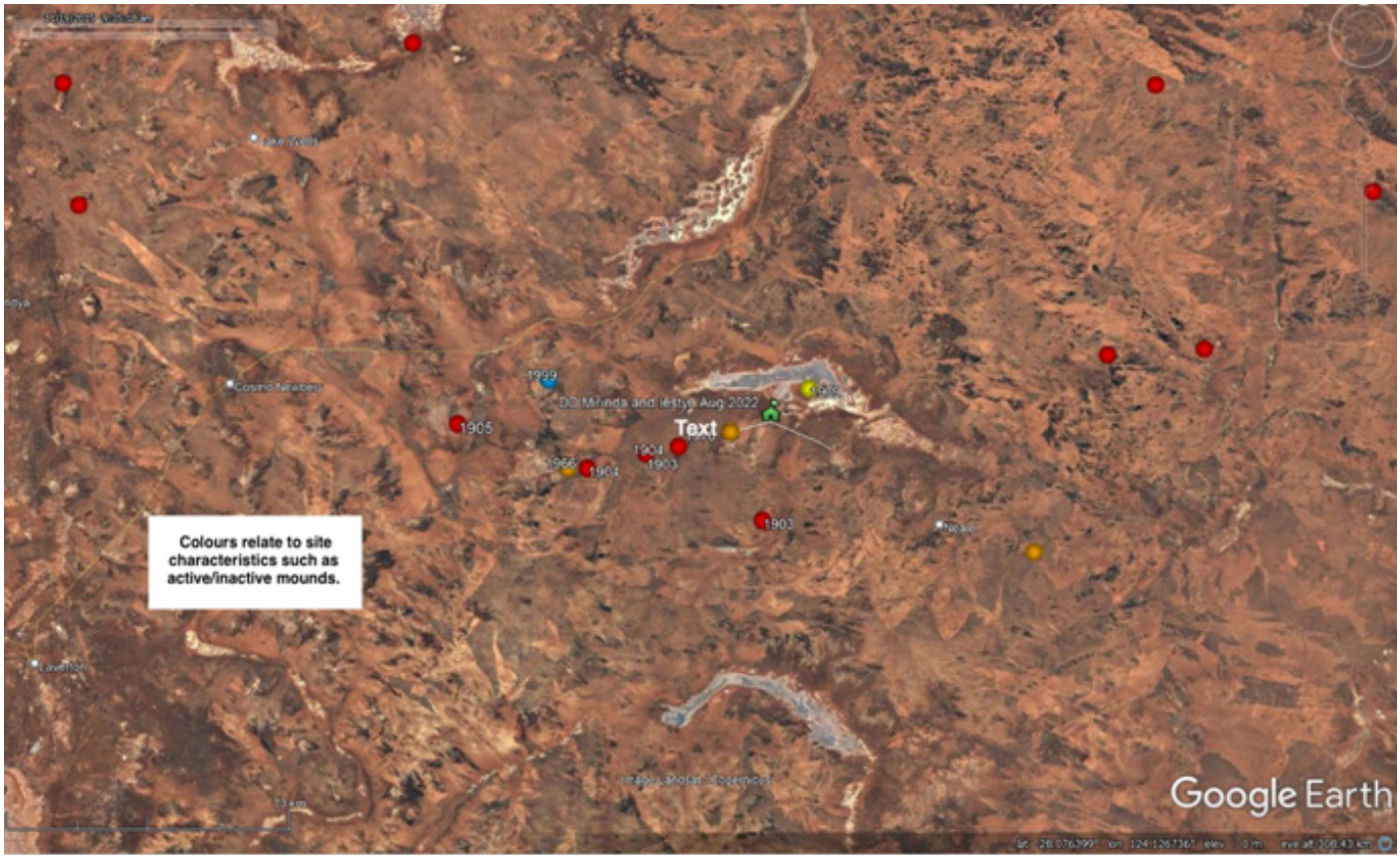
Map 1: Tracking Survey locations throughout Yeo Lake Nature Reserve



Map 2: Tracking Survey locations in the vicinity of DD Camp 2022



Map 3: Historical Malleefowl records near Yeo Lake (supplied by Joe Benshemesh)



Results

- Species of Special Interest

(a) Malleefowl

No current or historical sign of Malleefowl was found by any of the survey methods. The only potential habitat we encountered was the old-growth mallee on the exploratory line search, beneath which were significant amounts of leaf litter.

(b) Burrowing Bettong

Historical burrow systems/warrens were found, especially south of the DD Camp on plots such as YL1B (photo 1B-a) and YL2A and B. They appear as light-coloured stony spoil covering a hundred square metres or more, and up to a metre high over a landscape of reddish sand/clay. At YL1B the burrows had been taken over by rabbits. At YL2A and B there were 3 warrens approximately 20m x 15m in size with deflation hollows and no remaining open burrows. There was a potential small warren on Plot YL10B.

(c) Lesser Stick Nest Rat

A Site of Special Interest at S28.03851 E124.33496 was reported to us by Jeremy Wallace and the Entomology Team. It consisted of several small caves on a rocky rise packed with a concentration of sticks and amberat (photos Stick Nest Rat Evidence 1a). We have encountered amberat in caves in the Flinders Ranges and in the Tanami, but not before with sticks still in place.

(d) Great Desert Skink

We did not find, in any of the survey methods, sign that was clearly attributable to Great Desert Skink. There may have been some ancient historical burrow system/warren sites but great passage of time leaves perhaps less sign than is the case for more robust diggers such as the Burrowing Bettong or Greater Bilby.

(e) Greater Bilby

No recent activity was detected by any of the survey methods, but historical observations are detailed in Table 1.

Table 1: Sites of Greater Bilby Historical Evidence

Site	Part of	Location	Observations	Photos
Bilby Evidence 1	Plot YL4A	S28.05943 E123.99406	One ancient spoil mound (half a metre high) from a burrow no longer evident.	4A-a
Bilby Evidence 2	Exploratory Line Search	S28.04718 E124.28362	Ancient spoil mounds up to half a metre high of a shape and size consistent with Greater Bilby burrows. In some cases the burrow associated with a mound was still evident, and in others the burrow had closed in. There were no tracks or scats of any animal at the site.	Bilby Evidence 2a
Bilby Evidence 3	Exploratory Line Search	S28.03580 E124.28543	Ancient spoil mounds up to half a metre high of a shape and size consistent with Greater Bilby burrows. In some cases the burrow associated with a mound was still evident, and in others the burrow had closed in. There were no tracks or scats of any animal at the site. Also a deep digging exposing the lateral roots of a *Senna artemisioides petiolaris* shrub. This looked very much like bardi/witchetty grub Bilby feeding sites encountered on previous DD projects (e.g. DD2016).	Bilby Evidence 3a

(f) Dingo

Dingo sign such as tracks and scats was encountered on the tracking plots – see Results – Tracking Plots. Two Sites of Special Interest were reported to us, which turned out to be Dingo dens as detailed in Table 2. In country distant from suitable rock formations, Dingoes will dig dens in suitable soil (often sandy). They are known to augment burrows created by rabbits or large goannas, and we imagine abandoned Bilby burrows would also be attractive. However we have no evidence of what may have preceded Dingoes at the two den sites.

Table 2: Dingo Dens

Site	Reported by	Location	Observations	Photos
Dingo Den 1	Linda Brotherton and the Bird Team	S28.08258 E124.29801	Located in an island of trees on an *Olearia* sandplain, a den system comprising one burrow entrance (with several approaches) up to 400mm in diameter featuring massive earthmoving on the scale of a wombat's. Many remains of Dingo scats around the site, consisting of bleached bone fragments. The diggings were reasonably fresh (not ancient) but there were no tracks of any kind.	Dingo Den 1a
Dingo Den 2	Jeremy Wallace and the Entomology Team	S28.02599 E124.33957	Located on a sandplain featuring old growth spinifex, a large den system comprising 6 burrow entrances up to 350 mm in diameter featuring massive earthmoving on the scale of a wombat's. The diggings were fresh and there were fresh tracks of adult and juvenile Dingoes.	Dingo Den 2i

Table 3: Tracking Plot Results – presence of any sign

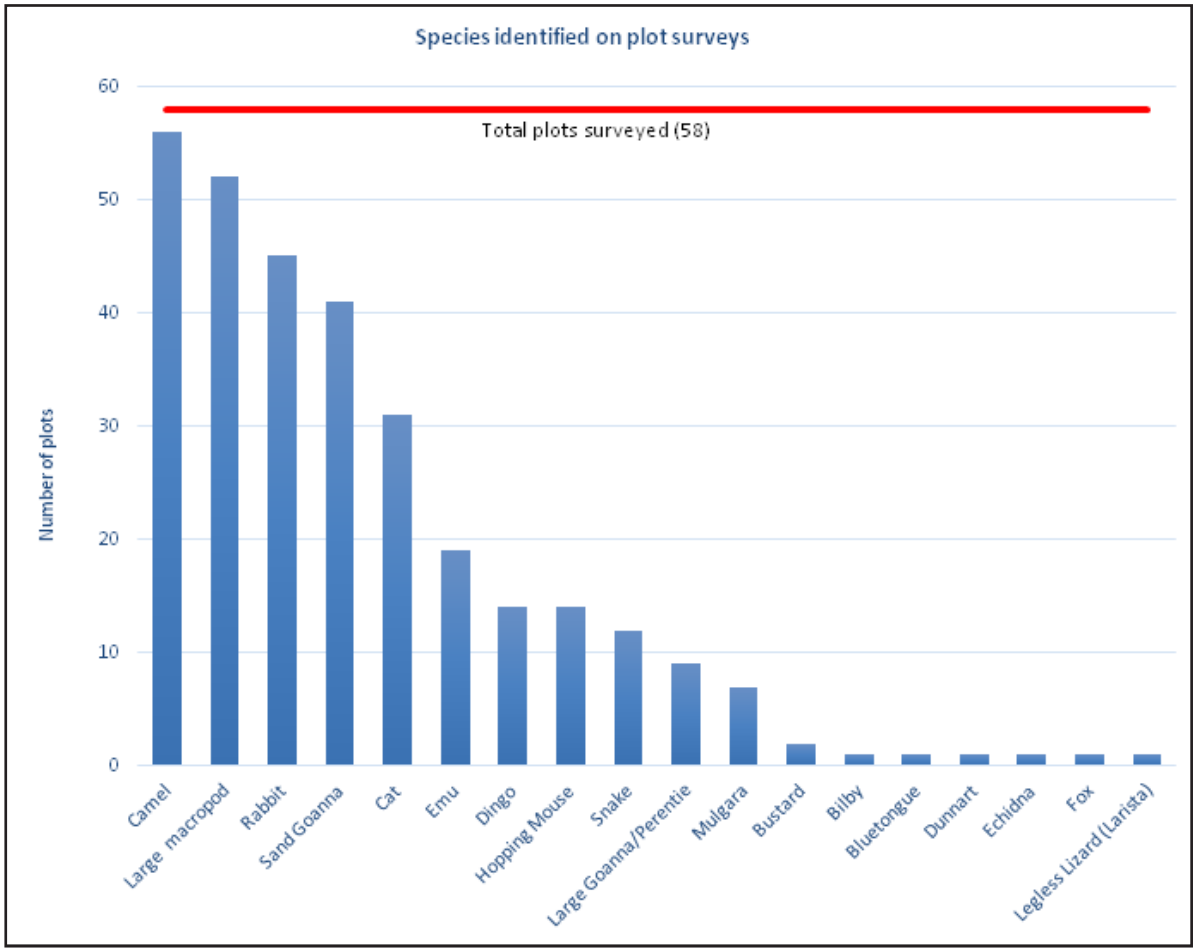
Plot	Habitat	Time since fires (years)	Camel	Rabbit	Cat	Fox	Dingo	Large Goanna/ Perentie	Sand Goanna	Bluetongue	Legless Lizard *Lerista*	Snake	Bustard	Emu	Echidna	Large macropod	Bilby	Mulgara	Hopping Mouse	Dunnart
YL1A	Lateritic rise, mulga woodland	>10	x	x																
YL1B	Lateritic rise	>10	x	x																
YL2A	Mulga woodland	5-10	x	x												x				
YL2B	Lateritic rise	>10	x	x												x				
YL3A	Mulga woodland	>10	x	x												x				
YL3B		>10	x	x												x				
YL4A	Spinifex sandplain	>10	x	x					x							x	x			
YL4B		5-10, >10	x	x								x		x		x				
YL5A	Spinifex sandplain	1-2	x	x	x				x			x				x				
YL5B		1-2, 3-5	x	x					x							x				
YL6A	Spinifex sandplain	1-2, 3-5	x						x							x				
YL6B		4-8	x		x											x				
YL7A	Mulga Woodland with spinifex	1-2, >10	x	x	x	x	x		x			x		x		x				
YL7B		1-2	x	x	x		x		x			x		x		x				
YL8A	Spinifex sandplain	1-2	x	x	x		x	x	x							x				
YL8B		1-2, 3-5	x	x			x		x					x		x				
YL9A	Mulga woodland	>10	x						x					x		x				
YL9B		>10												x		x				
YL10A	Olearia sandplain		x													x				
YL10B			x	x			x									x				
YL11A	Sandplain with claypans	>10	x									x				x				
YL11B	Sandplain	>10	x	x			x									x				
YL12A	Sandplain	>10	x	x	x		x		x		x				x	x		x	x	
YL12B	Sandplain with small dunes	>10	x	x	x		x		x							x				
YL13A	Mulga woodland	>10	x	x				x	x							x				
YL13B	Mixed woodland	>10	x	x	x		x	x	x							x				
YL14A	Mixed woodland	>10	x	x	x		x		x					x		x			x	
YL14B	Mulga Woodland with old growth spinifex	>10	x		x				x			x		x		x		x		
YL15A	Mulga woodland	>10	x		x											x		x	x	
YL15B	Mulga Woodland with old growth spinifex on dune	>10	x	x	x				x					x		x		x	x	
YL16A	Mulga Woodland with old growth spinifex	>10	x	x					x			x		x		x			x	
Y16B	Mulga woodland	>10	x	x	x				x			x				x			x	

Plot	Habitat	Time since fires (years)	Camel	Rabbit	Cat	Fox	Dingo	Large Goanna/ Perentie	Sand Goanna	Bluetongue	Legless Lizard *Lerista*	Snake	Bustard	Emu	Echidna	Large macropod	Bilby	Mulgara	Hopping Mouse	Dunnart
YL17A	Mulga Woodland with old growth spinifex	>10	x	x					x	x				x						
YL17B		>10	x	x	x				x			x							x	
YL18A	Mulga Woodland with old growth spinifex	>10	x	x	x				x			x		x		x				
YL18B		>10	x	x	x				x			x		x						
YL19A	Mulga woodland	>10	x		x									x						
YL19B		>10	x		x											x				
YL20A	Mulga woodland	>10	x	x	x				x					x		x			x	
YL20B	Eucalypt woodland	5-10	x	x	x		x		x							x			x	
YL21A	Mulga woodland and lateritic rise	>10	x	x					x							x				
YL21B		>10	x	x					x							x				
YL22A	Mulga woodland	>10	x				x	x	x							x			x	
YL22B		>10	x	x			x		x					x		x			x	
YL23A	Mulga woodland	>10	x	x					x							x				
YL23B		>10	x	x					x							x				
YL24A	Mulga woodland	1-2, >10	x	x	x		x		x							x		x		
YL24B		1-2	x	x	x				x							x				
YL25A	Mallee woodland on sandplain	1-2	x	x	x			x	x							x			x	
YL25B		1-2	x	x	x			x	x							x				
YL26A	Mulga woodland	>10	x	x	x				x					x		x				
YL26B		>10	x		x				x							x				
YL27A	Mallee woodland on sandplain	1-2	x	x	x			x	x					x		x				
YL27B	Mulga woodland	1-2	x	x				x	x					x		x				
YL28A	Dunefield	1-2	x		x				x				x			x		x	x	
YL28B		1-2		x	x				x				x			x		x	x	x
YL29A	Dunefields and samphire flat	>10	x	x	x			x	x							x				
YL29B		>10	x	x	x											x				
			56	**45**	**31**	**1**	**14**	**9**	**41**	**1**	**1**	**12**	**2**	**19**	**1**	**52**	**1**	**7**	**14**	**1**

Table 4: Tracking Plot Results – ordered by frequency of species

Species	Number of plots with any sign	As a percentage of the 58 plots
Camel	56	96.6
Large macropod	52	89.7
Rabbit	45	77.6
Sand Goanna	41	70.7
Cat	31	53.4
Emu	19	32.8
Dingo	14	24.1
Hopping Mouse	14	24.1
Snake	12	20.7
Large Goanna/Perentie	9	15.5
Mulgara	7	12.1
Bustard	2	3.4
Bilby	1	1.7
Bluetongue	1	1.7
Dunnart	1	1.7
Echidna	1	1.7
Fox	1	1.7
Legless Lizard (*Lerista*)	1	1.7

Chart 1: Species identified on plot surveys – ordered by number of plots



Discussion

The story of this survey can be crudely summarised as one of camels and cats.

Camels of all ages were present across the landscape with abundant tracks, scats, pads, and lie-downs from fresh to very old. Some favourite food plants such as Desert Poplar *Codonocarpus cotinifolius* were absent while others were heavily grazed. Camels are known to eat more than 80% of the common plant species in Central Australia (Dorges et al 2003). Camels may be significantly suppressing vegetation at Yeo Lake Nature Reserve.

Cats were detected on more than half the plots, mostly by virtue of tracks, most of which were fresh tracks occurring on plots of good to moderate trackability. Even on the exploratory line search, where the pace was brisk and tracks were not a target, we could not help but notice frequent fresh cat tracks (and not many other tracks). It is difficult not to conclude that cats would also frequent areas of poor trackability (stony ground, hard clay). If so, cats are ubiquitous across the landscape. Their impact on small to medium mammals and reptiles is well known.

Rabbit sign was found on 77% of plots but most of it was very old. It is possible that the current dry conditions are suppressing rabbit numbers.

It is interesting that Dingoes were found on only 24% of plots (notwithstanding the two den sites), while cats were so widespread. Perhaps at present, water is a limiting factor, if it can be assumed Dingoes have greater need of free-standing water while cats can survive up to a point on the blood of their prey. We know from experience that when there is free-standing water in places like Newhaven Wildlife Sanctuary in the NT, and in the absence of culling, the Dingo population can build up and push cats out to drier areas. Currently at Yeo Lake, there does not appear to be much keeping cats in check.

The Greater Bilby would have occurred historically at Yeo Lake. Our findings on Plot YL4A and on the exploratory line search are consistent with this. As to their absence at present – cats, lack of rainfall, and suppression of vegetation by grazers could all be in the mix. A further factor may be fire.

The Reserve appears to have experienced hot wildfires in rapid succession in some parts, notably the far east. However much of the Reserve, and indeed over 60% of the plots and all the Sites of Special Interest plus the exploratory line search area, was long unburnt. None of this is necessarily in the interest of Bilbies. In the words of Rachel Paltridge (Paltridge 2015):

> Although the discrete patches of laterite appear to be the preferred habitat for bilbies on Ngururrpa country, sandplain habitats can be made productive for bilbies with strategic burning to stimulate a flush of early successional plant species that produce seeds and fruits favoured by bilbies. Maintaining a network of recently burnt patches through the area ensures fire-promoted food resources are available each year and limits the spread of hot summer wildfires that leave animals particularly vulnerable to predation.

We were pleased to hear the DBCA representatives at DD2022 speak of plans to step up management of the Reserve with an emphasis on fire and ferals. In other parts of the arid zone, especially where there are active Indigenous ranger groups, we have seen pleasing advances in ecosystem recovery – one example being the westward spread of Bilbies from the DD2016 area north of Kiwirrkurra.

Despite the dry times in 2022 and before, Yeo Lake Nature Reserve appears to be primed for recovery under good management. Much of the Reserve is long unburnt, leaving good scope for breaking up the vegetation into a mix of burn ages. Most of the extensive mulga woodland appears to be coping well with the dry conditions, unlike the large stands in the NT that have succumbed to heat stress (Morton 2022, p229). Mallee woodland areas, particularly along the 9km route of the exploratory line search, seemed particularly vibrant with the eucalypts, acacias, sennas, eremophilas and sandalwood appearing in good condition.

We hope this report proves useful to DBCA and we wish them well with future management of Yeo Lake Nature Reserve.

Acknowledgments

We would like to thank Rachael Paltridge for her wise counsel over the years in the arts of surveying tracking plots, and for many informative discussions on desert ecology. For DD2022 her advice and support was invaluable, both in advance of the project and at the end when she attended with Indigenous Desert Alliance colleague Hannah Cliff, fresh from working on the adjacent Cosmo Newbury lands with the Yilka Rangers.

To Andrew Tatnell and Libby Goodchild, thanks for steady and informed assistance that enabled us to achieve maximum coverage of the reserve using the 5km/2 hectare method. DD stalwart Libby Sakker together with Andreas and Christine Magun brought their long experience, and love of, the desert to the task. Mel Mykytiuk from DBCA and media guru Allie Hanly provided welcome assistance. Also, a special mention of those who brought key incidental observations to us, especially Linda Brotherton and the Bird Team for "Dingo Den 1", and Jeremy Wallace and the Entomology Team for "Dingo Den 2" and "Lesser Stick Nest Rat Evidence 1".

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Joss Haiblen, Trish Macdonald, Andrew Tatnell, Libby Goodchild, Christine and Andreas Magun. Photo: Maree Goods

29B – Typical plot survey method (Plot 29 featuring Cypress Pines).

4A-a - Historical Bilby spoil mound.

Bilby Evidence 2a - Historical burrows and spoil mounds.

Bilby Evidence 3a - Eroded historical spoil mound with exposed roots of *Senna artemisioides* subsp. *petiolaris*.

1B-a - Historical Burrowing Bettong warren on Plot 1B.

Stick Nest Rat Evidence 1a - Small cave featuring concentration of sticks and amberat.

Dingo Den 1a - a single burrow entrance with several approaches.

Dingo Den 2i - a complex of 6 burrow entrances.

Weather

Iestyn Hosking

Iestyn Hosking.

All who attended the 2022 Desert Discovery project would agree that the weather was mostly colder than expected for late winter in desert country. This, following more than eight years of drought conditions, meant a few very cold, frosty mornings with dew-point being reached most nights. Temperatures exceeded 30°C on only two days and there were only two nights with minimum temperatures above 15°C– at the beginning and end of the project; not so great for the Mammal and Reptile Team's results, but more friendly for the rest of the people involved. There was no rain during DD, but some rainfall had occurred a few weeks prior to the start of the Project.

Weather (temperature, wind speed and relative humidity) was recorded near sunrise (between 5 and 6am) and between 1 and 4pm, using a hand-held Kestrel Weather Meter. This did not pick up the full variation of temperature and humidity across the day and I suggest acquiring a small weather station for the next project to get a more complete picture of the weather.

Desert Discovery 2022 Yeo Lake weather data

Date & time	Temperature	Wind	Humidity	Rain	Moon		General Day Conditions		
	°C	kph	%	mm	Phase	Illumination	Cloud	Wind	Temperature
15/08/2022 9:00	15.6	2	52	0	1st quarter	bright	clear	slight	mild
15/08/2022 12:30	25.2	4	28	0		bright	slight	slight	warm
16/08/2022 6:15	14.3	7	48	0	1st quarter	bright	clear	moderate	mild
16/08/2022 14:30	31.7	20	21.3	0		bright	slight	strong	hot
17/08/2022 5:25	18	0	41	0	1st quarter	bright	clear	nil	warm
17/08/2022 14:00	24	4.2	42	0		bright	slight	moderate	warm
18/08/2022 5:30	10	5	75	0	1st quarter	moderate	slight	moderate	cold
18/08/2022 14:30	20.6	10	27	0		bright	slight	moderate	mild
19/08/2022 5:30	4.5	0	52	0	1st quarter	moderate	clear	nil	cold
19/08/2022 14:30	22	2	23	0		bright	slight	slight	mild
20/08/2022 5:30	5	0	45	0	1st quarter	moderate	clear	nil	cold
20/08/2022 14:30	23	6	26	0		bright	moderate	moderate	mild
21/08/2022 5:10	3.1	0	51	0	1st quarter	bright	clear	nil	cold
21/08/2022 14:00	28	5	15	0		bright	clear	slight	warm
22/08/2022 5:45	9.5	7	67	0	new moon	bright	clear	moderate	cold
22/08/2022 15:10	20	7	34	0		bright	slight	moderate	mild
23/08/2022 5:30	2.8	0	67	0	new moon	bright	clear	nil	cold
23/08/2022 16:00	17	2	30	0		bright	slight	slight	mild
24/08/2022 5:20	2.8	0	67	0	new moon	bright	clear	nil	cold
24/08/2022 14:40	20.5	5	24.3	0		bright	slight	moderate	mild
25/08/2022 5:45	8.7	0	53	0	new moon	bright	clear	nil	cold
25/08/2022 15:00	21.9	1.4	21	0		bright	slight	slight	mild
26/08/2022 5:15	3.7	0	50	0	new moon	bright	clear	nil	cold
26/08/2022 15:00	26	2	12	0		bright	clear	slight	warm
27/08/2022 5:30	2.8	0	38	0	new moon	bright	clear	nil	cold
27/08/2022 13:20	30.5	12	11	0		bright	clear	moderate	hot
Note: All data were recorded at the base camp									

Department of Biodiversity, Conservation and Attractions

Katherine Hope, Tiana Jones, Tegan Payne, Nikita Vennik, Melissa Mykytiuk

Yeo Lake is a Class A Nature Reserve managed by the Department of Biodiversity, Conservation and Attractions (DBCA), Goldfields Region (the region). The reserve covers 321,946 hectares and is one of two important wetland systems within the Great Victoria Desert Bioregion. It also holds outstanding historical and cultural significance and is included in part of the Yilka Native Title claim.

Inappropriate fire regimes, which include large-scale and too-frequent unmanaged fire, are recent and ongoing threats to the values and diversity of arid Australian ecosystems. Inappropriate fire regimes exacerbate other threats, such as predation and browsing from feral animals and changes to hydrology. DBCA is working towards implementing mosaic-style burning across the desert reserves, including Yeo Lake Nature Reserve. Research shows that mosaic/patchwork burning reduces the risk of large-scale fires, which in turn maximises habitat heterogeneity and maintains biodiversity.

Yeo Lake Nature Reserve was chosen as a study area to create baseline data that can be used to assess responses to fire management. The results from the survey run by Desert Discovery will also inform knowledge gaps on our desert species and inform us on future management for the reserve in general. Ideally, these surveys will be repeated every 5 to 10 years as we deliver on management goals.

Along with the outcomes for the reserve itself, this survey also allowed DBCA staff to work with experts in a range of fields. The collaboration and information sharing helped to expand the region's knowledge on surveying techniques and species, as well as providing personal growth and further appreciation for Australia's arid zones. The relationship built between Desert Discovery and the region will allow future collaborative work targeting data-deficient areas across the Goldfields to build on species knowledge and to inform management.

Tiana Jones, Katherine Hope, Melissa Mykutiuk, Tegan Payne, and Nikita Vennik. DBCA staff who attended DD 2022.

Katherine Hope and Tegan Payne working the Auger.

Digging mole trenches.

Katherine Hope, Tiana Jones and Nikita Vennik

Mole trenches.

Climbing Trees, iNaturalist and Daisy Bushes

Thomas Mesaglio, PhD candidate at the University of New South Wales

Ruby Stephens (Macquarie University), Sophie Yang (University of New South Wales) and I (Thomas Mesaglio, University of New South Wales), approached the 2022 Desert Discovery Project with three aims in mind: gain field experience in a novel environment and learn from the many experts in attendance; record as many species as possible, especially plants, and fill in data gaps for the area; and, attempt to find and photograph at least one of ten never-before published photographs of plant species from the region. The Project was a roaring success on all three fronts.

The opportunity to work with and talk to so many experts and seasoned veterans was fantastic, especially given they were so generous with their time and knowledge. The expedition was an amazing learning experience, with lessons in botanical collection, history, moth trapping, Four-Wheel-Driving, and tracking among many areas all part and parcel of the trip, through both planned evening talks and daily interactions during fieldwork and at camp. It was also great to be part of a collection-focused trip and experience the collection of herbarium vouchers. Although Ruby is an experienced collector, Sophie and I have mainly participated in photographic-based BioBlitzes, so it was really beneficial to learn what kind of specimens are worth collecting, how they're collected (climbing trees to collect mistletoes and eucalypt fruits is the norm for every expedition, right?) and preserved, and what information and metadata needs to be recorded. It was also fascinating to see that, despite the very harsh and dry conditions, there was still plenty of life (across all taxa) to be found at Yeo Lake Nature Reserve.

Ruby Stephens, Sophie Yang and Thomas Mesaglio collecting material from a Barlee Box *(Eucalyptus lucasii)*.

Whenever I visit new areas in Australia, particularly during BioBlitzes, I always aim to fill in as many spatial data gaps as possible; these biodiversity data are so important for updating species ranges and informing distribution models. Before the 2022 Desert Discovery Project, Yeo Lake Nature Reserve was very poorly represented on iNaturalist (and indeed data-poor more broadly on the Atlas of Living Australia), with fewer than 75 records across all taxa, most of these submitted by Bevan Buirchell. Now, through the observations of Ruby, Sophie, and myself, combined with those of Bevan, Mark Heath, Mal McKinty, Maree and Graham Goods and Nathan Johnson there are more than 1,400 observations for the region uploaded to iNaturalist, covering over 450 species.

There are still records to be uploaded, and many still waiting identification from experts. As of 1 February 2023, 1,324 observations across 429 identified species (with many others waiting for identification) were uploaded to iNaturalist as part of the 2022 Project.

You can explore these observations by visiting the iNaturalist website for the Project:
https://www.inaturalist.org/projects/desert-discovery-2022-yeo-lake-nature-reserve

Taxon	No. observations	No. species
Plants	486	159
Birds	66	22
Mammals	25	7
Reptiles	19	10
Insects	734	225
Fungi including lichens	55	12
Arachnids	44	16
Other taxa	9	2

Many of these observations represent the first records for Yeo Lake Nature Reserve for those species. Some especially exciting records from my own photographs included the first cicada records from Yeo Lake, and the first record of the coccid scale insect *Cryptes utzoni* since its description in 2018, the type specimen of which was actually discovered and collected at Yeo Lake!

One of two moults from *Burbunga* sp. cicadas.

Cryptes utzoni, a coccid scale insect, on the stem of a mulga (*Acacia aneura*).

Most excitingly, however, were two plants I photographed. The first chapter of my PhD explored how many native Australian vascular plant species have no photographs of live individuals across 33 major online databases and identification resources. Heading into this year's Project, I had a list of ten species that had previously been recorded from Yeo Lake Nature Reserve but their photographs had never been published. There was excitement on the first day when we thought we had found one of the species, the daisy bush *Olearia eremaea*, five minutes into the first survey, but that species turned out to be another shrubby Asteraceae, *Cratystylis subspinescens*. Just three days later, however, we did manage to find *O. eremaea*! These images of a small shrub growing on top of a breakaway are the first photographs of this species to be published.

First-ever photographs recorded of *Olearia eremaea.*

As an added bonus, we also found *Stenopetalum salicola*, a native species in the Family Brassicaceae, which had never been recorded from Yeo Lake Nature Reserve, with the nearest specimen collected in 1968 from Lake Raeside, 250 km to the southwest. Excitingly, we found a fruiting individual growing on a sandy dune at the edge of the lake. This is also the first published photograph of this species.

Across the whole Project, we managed to find, photograph and collect five previously unphotographed (across any major online plant database) plant species: *Cratystylis subspinescens, Olearia eremaea, Stenopetalum salicola, Jacksonia arida* and *Psydrax suaveolens*.

First-ever photograph recorded of *Stenopetalum salicola.*

Thomas Mesaglio.

Yeo Lake Nature Reserve - iNaturalist

Thomas Mesaglio, PhD candidate at the University of New South Wales

Introduction

In biodiversity citizen science, iNaturalist is a world leader, with more than 126 million verifiable observations representing over 413,000 species uploaded by 2.5 million observers as of January 2023. Australia is one of the strongest contributors to the platform, with almost 5 million observations of close to 50,000 species uploaded by ~63,000 observers. Since mid-2016, Australian usage of iNaturalist has grown exponentially (Mesaglio and Callaghan 2021), and is heavily used not only by amateur naturalists, but also by a diverse community of taxonomists, conservationists, land managers, curators and researchers. There are now thousands of Scientific Publications, Management Plans and Conservation Programs that have used, or continue to use, iNaturalist data. Australian iNaturalist data have been used to monitor mosquitoes as part of public health programs (Braz Sousa *et al.* 2022), map rapidly the effect of bushfires on biodiversity at large spatial and temporal scales, (Kirchhoff *et al.* 2021), to quantify marine habitat (Bolt *et al.* 2022), and to discover new species (Krueger *et al.* 2023) among many uses.

Unsurprisingly, however, there are many spatial biases in the data. Most of Australia's records are clustered around major cities, especially across southeastern Australia (Figure 1); these biases towards population centres and major roads and infrastructure are well known in citizen science datasets (Geldmann *et al.* 2016, Hughes *et al.* 2021). Perhaps the most conspicuous data gap is Australia's vast arid interior. Aside from some minor hotspots around popular tourist locations such as Alice Springs and Uluru, much of Australia's desert is effectively unsurveyed. These biases also exist in professional datasets and research (Boakes *et al.* 2010, Piccolo *et al.* 2020), so filling in these data gaps is crucial for improving our understanding of desert biodiversity. Actively promoting gap filling via organisations such as Desert Discovery, and using iNaturalist to record and store these data, is thus a valuable enterprise. This is especially the case given the large community of expert identifiers that use the platform and identify uploaded observations.

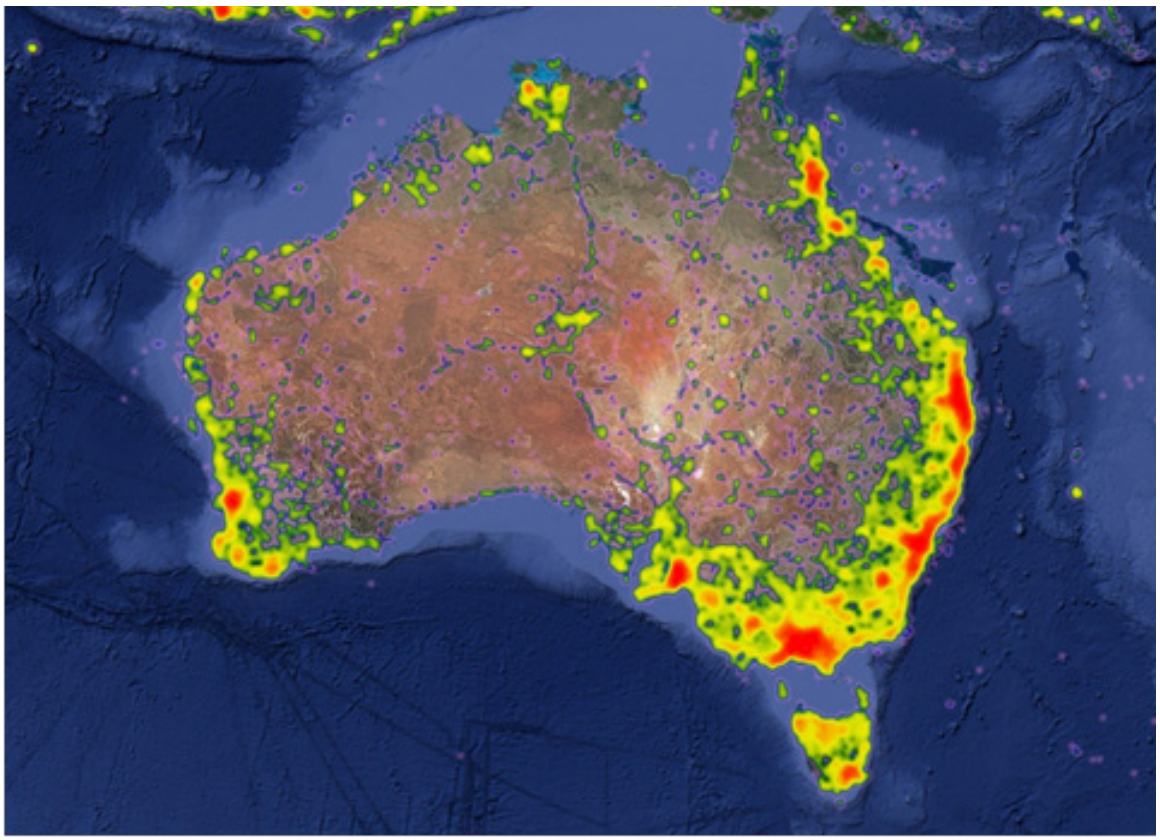

Figure 1. Heat map for Australian iNaturalist observations. The warmer the colour, the greater the density of observations. Note that the colours code for relative density, not absolute density. Reproduced and modified from Mesaglio and Callaghan (2021).

Desert Discovery Project

From 15-28 August 2022, Desert Discovery Inc. (http://desertdiscoveryinc.com.au) conducted its 14th Project, all in Western Australia except for one in the Northern Territory in 2008. The Project focused on Yeo Lake Nature Reserve (YLNR) on the western edge of the Great Victoria Desert. Multiple Teams, including Botany, Invertebrates, Mammals and Reptiles, and Birds conducted bioblitzes and collected museum and herbarium specimens during the two weeks. Presentations on iNaturalist were delivered to participants before and during the expedition. After the Project, a 'place' (i.e., polygon) was created for YLNR on iNaturalist to track observations made within the Region, as well as for the Project itself. https://www.inaturalist.org/projects/desert-discovery-2022-yeo-lake-nature-reserve

Results

Before the 2022 Project, just 114 observations within YLNR had been uploaded to iNaturalist. Given 57 of these were uploaded by Bevan Buirchell during a 2021 reconnaissance survey for the Project, and 55 were uploaded by Thomas Mesaglio and Bevan from the camp site on the night prior to the Project's official start, only one other observation had ever been uploaded to iNaturalist in the entire reserve.

The Project added 1,324 observations of 429 named species contributed by eight observers (bringing the total for YLNR to 1,438 observations of 453 species; Figure 2), an amazing contribution from a single event. Notably, this species count is a significant underestimate, as many of the records uploaded are yet to receive identification (e.g. many esoteric insects), although over 150 users, including many experts, have already contributed identifications. Not only have iNaturalist and the YLNR project been invaluable for uploading photographs of collected specimens, contributing to an 'extended specimen' (see e.g., Webster 2017, Heberling and Isaac 2018) and allowing these images to be linked to their vouchers, they also afforded the opportunity to record observations of species that weren't collected, e.g., vertebrates, plants without fertile material, highly active invertebrates. These observations cover a diverse range of taxa (Table 1), and include many significant finds.

Table 1. Taxonomic breakdown of iNaturalist observations within Yeo Lake Nature Reserve.

Taxon	No. observations	No. species
Plants	486	159
Birds	66	22
Mammals	25	7
Reptiles	19	10
Insects	734	225
Fungi including lichens	55	12
Arachnids	44	16
Other taxa	9	2

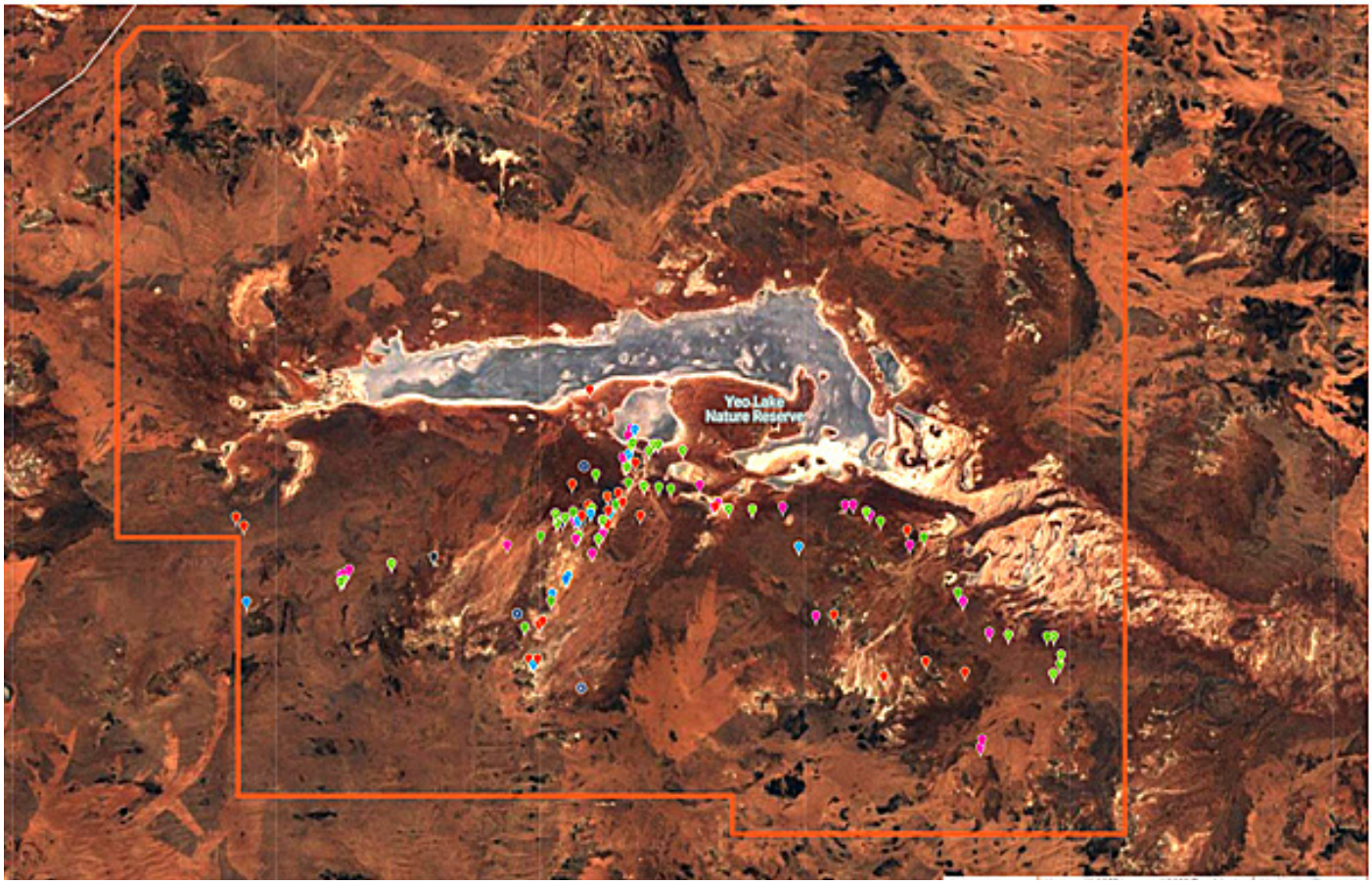

Figure 2. Map of Yeo Lake Nature Reserve showing spatial distribution of iNaturalist records.

Observations for 32 species within the area represent the first records (and still the only records for almost all cases) uploaded to iNaturalist for these taxa, providing invaluable reference material for other users. The Project also contains images for three plant species (Figure 3) which had previously never been photographed in the field (see Mesaglio *et al*. 2023), and an additional two species without photographs on any major online database, *Cratystylis subspinescens* and *Psydrax suaveolens*. Photographs of the prostrate paper daisy *Myriocephalus pygmaea* at Yeo Lake represent just the third image set of the species.

1. *Stenopetalum salicola*. First photographed on 16 August 2022. A native of the family Brassicaceae previously unrecorded from the region, with the nearest record a 1968 collection from 250 km to the southwest at Lake Raeside.
2. *Olearia eremaea*. First photographed on 18 August 2022. A rare daisy-bush endemic to the arid interior of Western Australia.
3. *Jacksonia arida*. First photographed on 21 August 2022. A widespread native pea.

Figure 3. Previously unphotographed plants observed at Yeo Lake Nature Reserve.
Top row: *Stenopetalum salicola*. Photos: Thomas Mesaglio.
Middle row: *Olearia eremaea*. Photos: Thomas Mesaglio.
Bottom row: *Jacksonia arida*. Photos: Maree Goods.

Many of the invertebrates observed and photographed during the YLNR Project are poorly known and represented by fewer than ten records on the Atlas of Living Australia (ALA). Significantly, photographs of moults from *Burbunga* sp. represent the first ever records of cicadas from Yeo Lake Nature Reserve in the ALA. An observation of the scale insect *Cryptes utzoni* (Figure 4), which was recently discovered and described from specimens from Yeo Lake (Lin *et al.* 2018) is currently the only record of this species on the ALA, and seemingly the only known record other than the collected specimens in the original description. Both the *Burbunga* and *Cryptes* observations are especially notable given neither was collected, and both were only identified once uploaded to iNaturalist thanks to the expertise of Australian expert identifiers (Lindsay Popple, Lyn Cook).

Figure 4. *Cryptes utzoni*, a coccid scale insect, on the stem of a mulga *(Acacia aneura*).

Conclusions

The Desert Discovery Project - and by extension the general Yeo Lake Nature Reserve polygon - on iNaturalist is a valuable data repository, containing many significant observations and photographs of rare species. For many of these records, especially those representing organisms that were not collected, identifications were only made possible through uploading them to iNaturalist and soliciting assistance from expert identifiers. The decision by Desert Discovery to use iNaturalist as a data repository for the 2022 Yeo Lake Project has been of great benefit for better understanding and mapping the unique biodiversity in Western Australia's arid interior.

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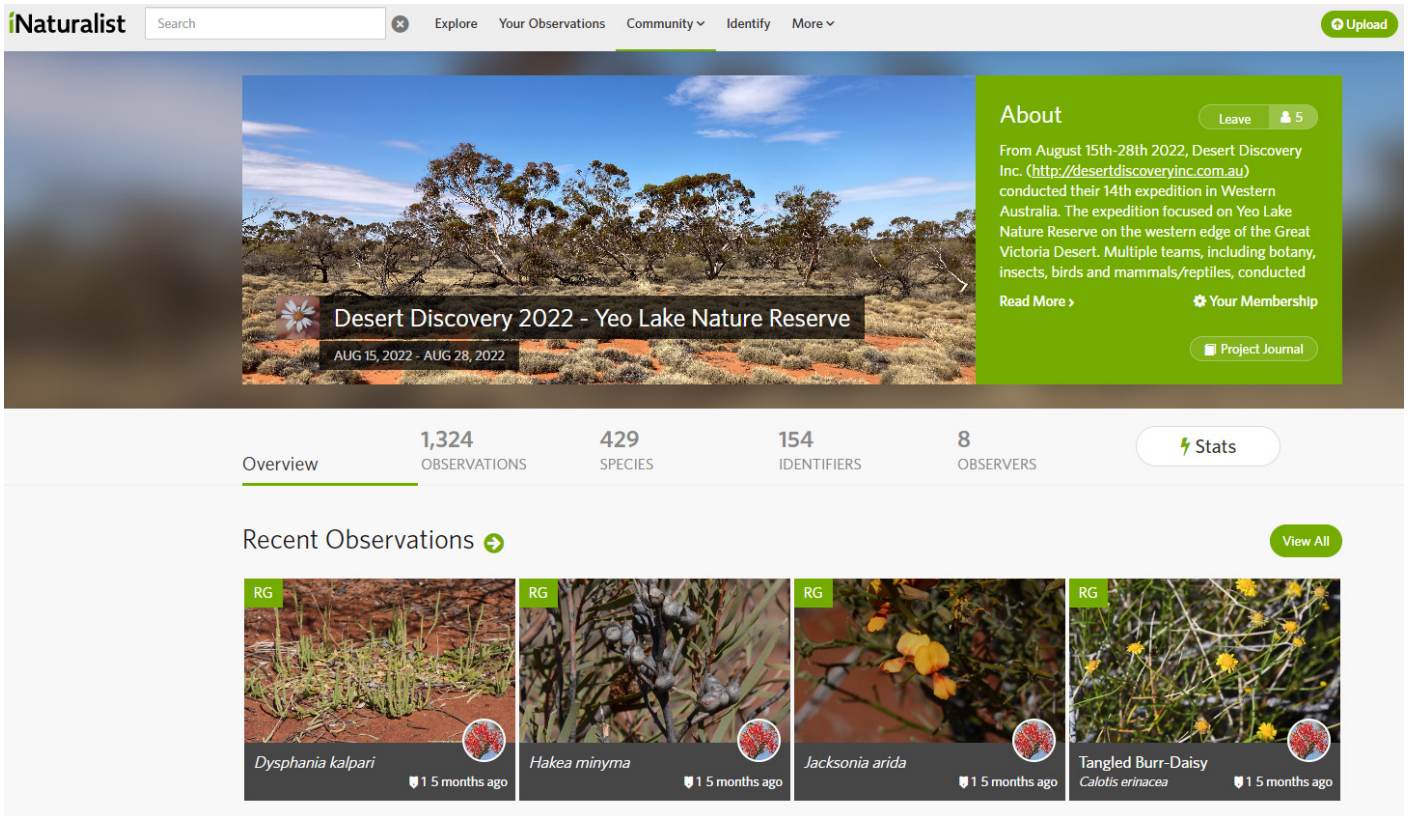
A screen shot of the Desert Discover 2022 - Yeo Lake Nature Reserve Project



Saltgrass Podcast

Allie Hanly - saltgrasspodcast.com

I attended Desert Discovery 2022 at Yeo Lake Nature Reserve as a guest and partner of long-term DD member Nathan (Nate) Johnson. I am a professional podcaster and radio host and currently produce a show called 'Saltgrass', which is about how my local community is acting and reacting to the climate crisis.

Though I brought my sound recording equipment, I was not sure how much I would record while on the project. I was there to have a holiday and experience this "thing" to which Nate is deeply committed.

Turns out I couldn't help myself, I was instantly caught up in everyone's enthusiasm and rapidly attached myself to various Teams with sound recorder and GoPro camera tucked into my jean's pockets. I went out for full days with the Botany, Mammals and Reptiles, Tracking and Invertebrate Teams. I wasn't able to move around with the birders, though I did capture Linda's campfire life story. I also sat and chatted with the maintenance crew and talked about Marsupial Moles as well. In the end I gathered over 190 separate sound recordings, some of which are short snippets - attempts to get the sounds of birds or the action of a Team. Others were hour-long conversations with Team Leaders and others in attendance at the project. There are chats with all three of the university students as well as the Team from the Western Australian Department of Biodiversity, Conservation and Attractions.

I am also very honoured to have caught extended interviews with some of the mentors and elders of Desert Discovery. Libby Sakker was at the project and kind enough to share with me tales of her life, travels and her Desert Discovery memories. I also caught up with Andreas and Christine Magun, hearing about their dedication to repeatedly travelling from the other side of the world for Desert Discovery. On the way home we stopped at Clive Crouch's home and spoke to him about his life and the development of the "Crouch traps" used by the Mammals and Reptiles Team for many years. Finally, several weeks after getting home from Yeo Lake Nature Reserve, we made a special trip to Leeton in New South Wales to meet up with Wilko (John Wilkinson). Libby drove all the way from Sydney to join us and help the conversation along as she has many shared memories with Wilko, not just from Desert Discovery, but also from years of camel treks.

All of this material will take some time to sort through, edit and shape itself into episodes. I am going to seek funding to help me achieve this and my goal is to produce 10 to 12 episodes of Saltgrass all focussed on my trip to Yeo Lake Nature Resrve. Themes that make it relevant to my listening audience are: love of nature, citizen science, volunteerism and ecology. My hope is that this will be ready to be released in the second half of 2023.

Allie Hanly.

Sound recorder and moth at Desert Discovery Inc. AGM.

GoPro in a tree.

Trish Macdonald giving instructions on how to survey for tracks. Allie Hanly filming and recording. Photo: Libby Sakker.

Acknowledgements

Desert Discovery Inc. Executive and Committee

The Desert Discovery Committee would like to pass on a huge Thank you to all who contributed to the 2022 expedition at Yeo Lake Nature Reserve. Despite the cool and dry conditions, all Teams managed to gather valuable data and species records. A big Thank you to the following groups and individuals who supported the expedition:

- Support from Department of Biodiversity, Conservation and Attractions (DBCA) staff was invaluable, including assistance with planning, logistics, providing extra drinking water, auger for digging pitfall bucket holes and latrines, information exchange etc. All five staff in attendance; Katherine Hope, Melissa Mykytiuk, Nikita Vennik, Tiana Jones and Tegan Payne were a valuable addition to the Project, contributing their knowledge, labour and hard work to survey activities.

Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

- The Wettenhall Environment Trust for assisting with funding of; entomology survey equipment, some mammal/reptile survey equipment, data record printing costs and funding of three fantastic early career scientists to attend the first week of the Project. More information on the Trust and their Small Environment Grant Scheme can be found at: https://wettenhall.org.au/grants/small-environmental-grants/
- The three enthusiastic and knowledgeable early career scientists: Thomas Mesaglio, Ruby Stephens and Sophie Yang. Their contribution to many Teams especially the Botany Team was greatly appreciated, with their contagious enthusiasm and knowledge -exchange valuable to many.

Wettenhall ENVIRONMENT TRUST

- Joe Benshemesh for providing maps and reports of previous Malleefowl records for the Yeo Lake area and LiDAR work undertaken further south. Thankyou also to Joe for lending equipment to undertake mole trench surveys. A report of Malleefowl LiDAR work undertaken further south can be found on the Great Victoria Desert Biodiversity Trust website 'outputs' page: http://gvdbiodiversitytrust.org.au/?page_id=108.
- Thankyou to David Thuo from CSIRO for encouraging the collection of sand samples from potential mole holes during surveys, for possible eDNA detection. Unfortunately no Great Desert Skink burrows or latrines were detected during surveys for scat collections to undertake eDNA work. Here is a short video explaining more about eDNA: https://www.youtube.com/watch?v=TQdTV1rAlWY
- Rachel Paltridge and Hannah Cliff from the Indigenous Desert Alliance for attending the final two nights of Desert Discovery. Their desert and tracking experience is invaluable and connection to traditional owner communities important for potential future partnerships with ranger groups. More information on the Indigenous Desert Alliance can be found on their website: https://www.indigenousdesertalliance.com/
- The Western Australian Herbarium and its Collections Manager, Shelley James. Shelley assisted with the supply of presses and liaised with the Botany Team Leader.
- The staff at the Western Australian Museum for encouragement and support to the Invertebrate Team. Special thanks to Dr Nik Tatarnic, Julianne Waldock, Dr Mark Harvey and Dr Brian Heterick for their assistance in identifying the insects and arachnids that were collected.
- The Department of Primary Industries and Regional Development (DPIRD) and the Wildlife Animal Ethics Committee (WEAC) as well as the DBCA for providing the appropriate permits and relevant information for DD to undertake the terrestrial vertebrate element of the survey.
- Birdlife Australia for providing bird survey methods and our observations were entered into BirdLife Australia's Atlas database.
- A huge thanks to Ben Blomfield for making the time and effort to deliver the Desert Discovery trailer and equipment, helping to set up and organising the all-important tea, coffee and biscuits! Ben's massive contributions to Desert Discovery are highly valued. Unfortunately Ben could only attend Yeo Lake Nature Reserve briefly due to family reasons.
- Thanks to the Team Leaders and participants who contributed to survey activities and logistics, for making the camp and survey activities a success.
- Finally - to prepare a Report such as this requires separate reports from each of the Team Leaders and then these have to be put into pdf format and photographs inserted. It all takes great patience, knowledge and skill and is achieved by Maree Goods. Maree has spent hours preparing and formatting this wonderful Report and we thank her for her invaluable work.

Thank You to the Executive and Committee

Desert Discovery members and attendees of the Yeo Lake Nature Reserve Project

Thank you very much to our outstanding Executive Committee for working efficiently, cooperatively and tirelessly throughout several years, culminating in August 2022, in a productive, successful and very enjoyable Project at Yeo Lake Nature Reserve. Such a lot of work was needed beforehand which most of us don't ever see or even know about!

We also appreciated your friendly help and availability at the campsite, especially in the evenings with Speakers arranged and a fire burning, hot water ready for tea, coffee, Milo and biscuits. Mark and Sue you are a great team as President and President's wife. Sue you have a special talent for asking Speakers the most pertinent questions. Colleen you give your time and care very generously to all of us, you just "get things done" and with humour. We appreciate and thank Ben for all his logistical work, especially getting the campsite set up, even though he knew he needed to be at home. We were sad he had to leave early. Mirinda thank you for your work prior to this project. We respect your decision to resign from the Committee at the AGM, and wish you well for your future career. Thank you Nathan for continuing to work on the Committee and we thank Bevan and Linda who joined you. All looks very well for the DD project in 2024.